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Research Paper

Exploration of Mathematical Concepts in the Katto-Katto Game

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Abstract

One game that is currently viral in Sinjai Regency and even throughout Indonesia is the Katto-Katto game. Games that can distract children from online games. In addition, this game is often contested at schools and in the community, especially in Sinjai District. This research is expected to provide information to teachers and students about the mathematical concepts in the katto-katto game. This game is not just played, but the teacher must be able to integrate it with learning in the classroom. This study's research type is an exploration with a qualitative approach. The study subjects were primary school children and teachers in the Sinjai district. The technique of taking the subject is purposive sampling. The data collection technique used was observations, interviews to discover the mathematical concepts of the game tools, and documentation to document the shape of the katto-katto game tools. The instruments used were observation, interview guides, and documentation. The analytical techniques used are reduction, data display, and concluding. Data were analyzed by triangulation of methods and sources. From the results, it can be concluded that the katto-katto game contains several mathematical concepts that are taught in schools, both in terms of tools and the process of playing. In terms of the tool, there is a spatial concept in the form of a ball; the measurement is on the rope. The game process has concepts of weight measurement, calculation, the angle formed, and speed.

Keywords *Exploration; Katto-Katto Games; Mathematical Concepts*

INTRODUCTION

One game that is currently viral in Sinjai Regency and even throughout Indonesia is the Katto-Katto game. This game started a trend at the end of 2022 and is growing and in demand at the beginning of 2023; this game is in great demand by children and even adults. This katto-katto game is one of the traditional games in Indonesia, which is played by pitting plastic balls. This game has actually been around since the 1990s and was taken from the Bugis Makassar word meaning the sound of a crash. This game actually does not come from Indonesia but from America. This game was invented in America in the 1960s called clackers ball toys. These kattos in America are made of acrylic and don't last long because there have been many victims.

In the last few months, this Katto-Katto game has been able to divert children from online games and even adults. In addition, this game is often contested at schools and in the community, especially in Sinjai District. This Katto-katto game was once held by the Office of Cooperatives, Small and Medium Enterprises, and Labor (Diskonpnaker) and was attended by more than 160 participants. This shows that this game has caught the attention of many Sinjai residents, from children and adults to the elderly.

A teacher should be able to make this katto-katto game an opportunity to innovate learning based on local wisdom and contextual learning. Students will tend to be enthusiastic about learning

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and will understand learning material more easily if the material is related to their interests and preferences. This is corroborated by previous research, which states that teachers need to arouse students' interest in learning so they can be passionate about receiving lessons, awaken students to be directly involved in learning, learn in a fun way, and be able to use a variety of fun learning methods, strategies, techniques, and approaches (Simbolon, 2014).

This game is not just played by students, but teachers must be able to integrate it with learning in class. Teachers in the modern era now have to introduce and teach old games because their philosophical values are very high compared to today's online games. The benefits of old games have the benefit of stimulating the growth and development of children. An appropriate learning design is choosing the characteristics of games that can support the achievement of students' basic competencies and integrating them into learning by making them learning methods and media, and one of the efforts to preserve them is by integrating traditional games into learning (Rustan & Munawir, 2020).

In addition, traditional student games Lots contain elements of mathematics such as flat wake material, number recognition, sets, the concept of distance, probability, and integer operations. This allows students to learn from the fun everyday world, as well as according to the socio-cultural life in Sinjai, especially South Sinjai (Irmayanti & Danial, 2019). This is in line with previous research, which states that the mathematical concept contained in the culture based on the traditional hopscotch game in the West Kalimantan area is the concept of data structures which include rectangles and circles. So it can be concluded that ethnomathematics can make it easier for students to understand everyday problems (Surmiyanti & Nurhaliza, 2021). This is reinforced by mentoring teachers in implementing fun offline learning methods using various tools and materials available in the surrounding environment and giving assignments to students related to traditional games that are often played by children in Sinjai Regency, such as playing marbles, mabbelle, maggurecceng. In addition, it is easier for students to understand mathematics subject matter, which is usually only given assignments in the form of modules that are sometimes not understood by students (Irmayanti & Fajar, 2022).

Based on initial observations, there are several schools in Sinjai Regency that have also held a Katto-Katto game competition at the end of the semester during sports and arts week activities. However, this game is only contested as entertainment; teachers have not integrated it with learning. A teacher, especially an elementary school teacher, must be able to take the opportunity to make this katto-katto game a learning innovation based on local wisdom. Learning associated with games will increase students' interest and motivation in understanding learning material, especially with abstract mathematical material. In addition to introducing learning materials, this game will shape student characters, such as children's focus and social interaction. This is corroborated by research which shows that playing katto-katto will help children to improve their motoric and cognitive abilities, as well as their social skills, because children who play katto-katto tend to be more active in interacting and socializing considering that this game will be more exciting if played separately together and will reduce the intensity of children's use and dependence on gadgets (Hopeman & Rahma, 2023).

Based on the description above, the researcher is interested in examining in depth related to the mathematical concepts in the katto-katto game, which will be used as a reference by teachers, especially elementary school teachers, in conducting innovative learning based on local wisdom.

LITERATURE REVIEWS

Many direct experiences are gained by children playing traditional games, which can unknowingly shape various aspects of development in children, especially teaching positive values (Mulyana & Lengkana, 2019). Traditional games are often called folk games, namely games that grew and developed in the past, especially growing in rural communities (Mulyani, 2016). Traditional games are the result of extracting from one's own culture, which contains a lot of educational values because playing activities gives a feeling of joy and cheerfulness to the children

who play (Sumarsono, 2022).

Bugis traditional games are playing activities that are not only enjoyable but also physical movement activities by combining imagination and thinking (Asfar et al., 2021). Traditional games are not only a means of entertainment and refreshing the mind but also have recreational, competitive, pedagogical, magical, and religious values (Arga et al., 2020). There are many kinds of traditional games in the province of South Sulawesi, ranging from games that are analogical to thinking to physical and motoric flexibility. (Manggau et al., 2015) . The best means to strengthen children's character is through games that involve the child's body and mind. Traditional games can support the physical involvement and thinking of children (Nadjamuddin, 2016).

In addition, previous research shows that Lojo/Palejo games can instill and shape cultural values and build children's character, such as discipline, honesty, independence, responsibility, hard work, passion, friendship, peace-loving, and deliberation (Yulianti, 2020). The learning strategy for the Bugis Ma'benteng game integrated with 4C Skills based on Android can improve analytical thinking skills (Dewi et al., 2022). The ma'boy game is one of the traditional Sulawesi games that can be used to train students' ability to describe a problem and provide reasons based on concrete evidence (Asfar & Asfar, 2020)

Learning models that link to traditional games can increase the value of student activity in culture-based Nobangan learning (A. Thalib & Maulinda, 2021). Traditional games of South Sumatra are used as a medium for introduction and as one of the solutions for preserving traditional games in South Sumatra (Taroreh & Satria, 2020).

Traditional games can also be associated with mathematical material. This is corroborated by research which states that the game typical of Sundanese culture, namely Engklek, has elements of flat geometry, namely squares, rectangles, and semicircles in the maps used in the game; there are also elements of counting in the game; while for tops there are elements of mathematics in the form of tubes which the form of the game is like a tube, the game process contains elements of character education in the form of togetherness, honesty, sportsmanship, and others (Febriyanti et al., 2018).

The traditional catfish game contains elements of length units, recognizes tube shapes, and calculates scores, including addition, multiplication, subtraction, and division operations. (2) The traditional game of gundu contains elements of spherical shapes, circular shapes, subtraction operations, and making circle patterns. (3) The traditional congklak game contains elements of arithmetic operations and number sequences. (4) The traditional game of giant snakes and ladders contains elements of numbers, arithmetic operations, and opportunities. (5) The traditional game of kites contains elements of a flat kite shape. (6) The traditional game of moonlight contains elements of pattern making, square, rectangular and semicircular shapes, and arithmetic operations. (7) The traditional bekel game contains elements of ballroom construction and arithmetic operations. Elements in these traditional games can be used as educational media for learning mathematics and prove that mathematics can be learned in a fun way (Karina et al., 2021).

In addition, previous research also states that students play traditional games. Lots contain elements of mathematics, including flat shape material, number recognition, sets, the concept of distance, opportunity, and integer operations which can make students learn from the fun everyday world and according to the socio-cultural life in Sinjai, especially South Sinjai (Irmayanti & Danial, 2019).

One of the traditional games in Sinjai Regency, which is currently going viral, is the Katto-Katto game. This game is not only viral in Sinjai Regency, but it has also gone viral throughout Indonesia. Although it has been popular in Indonesia for a long time, katto-katto is not an original Indonesian game. Lato-lato is thought to have originated in Europe and the United States, which

appeared in the late 1960s and became increasingly popular in the early 1970s. In fact, katto-katto has various charms and contains things that can make people learn what focus is. , balance, colliding with problems, and happiness (Aji Purnomo, 2023).

In addition, other studies have shown that playing katto-katto will help children to improve their motoric and cognitive abilities, as well as their social skills, because children who play katto-katto tend to be more active in interacting and socializing considering that this game will be more fun when played together and will reduce the intensity of children's use and dependence on gadgets (Hopeman & Rahma, 2023).

Based on some of the opinions above, it can be concluded that traditional games can be related to learning at school from a cognitive, affective, and psychomotor perspective. One of the traditional games is katto-katto in the form of plastic balls connected by ropes which can be used as innovative learning media in mathematics.

RESEARCH METHOD

The type of research in this study is exploratory with a qualitative approach. The research subjects were elementary school students and teachers in Sinjai District. The technique of taking the subject by using purposive sampling. The selection of subjects is based on the consideration that students are proficient in playing Katto-Katto and are able to communicate opinions to others. In addition, other subjects of this research are elementary school teachers who understand the concept of the Katto-Katto game and understand the concept of mathematics in learning in elementary school. The data collection tool is the researcher himself using data collection techniques and related information. The data collection technique used was observation to find out the mathematical concepts of the Katto-Katto game tools and processes. Interview techniques are used to find out in depth the mathematical concepts of the game tools and processes. Documentation is used to document the shape of the katto-katto game tool. The instruments used were observation sheets, interview guides, and documentation.

The analysis technique used is reduction, data display, and conclusion. Reducing data is the process of reducing data in this study by summarizing the results of random observations and interviews into a form that is easy to understand. In the results of the interview, words that are not in accordance with the research objectives will be omitted. Presentation of data can be done in the form of tables, graphs, phi chard, pictograms, and the like. Through the presentation of data, the data is organized, arranged in a relationship pattern so that it is possible to draw conclusions from the data. The presentation of data is done in the form of descriptive descriptions in accordance with the observed aspects so that it is easier to understand. Drawing research conclusions from the data that has been collected and verifying these conclusions. Conclusions are drawn according to the problems raised in the research.

Data were analyzed by triangulation of sources and methods. Source triangulation is carried out by matching data from students and teachers, while technical triangulation is by adjusting observation, interview, and documentation techniques.

FINDINGS AND DISCUSSION

In this study, respondents were given a code to distinguish one respondent from another. The code for the respondent is as follows.

Table 1 Participant Profiles

Participant	code	Details
Subject 1	S1	Student
Subject 2	S2	Student

Subject 3	S3	Teacher
Subject 4	S4	Teacher

1. Katto-Katto Game Tool

Based on the results of the documentation in terms of playing equipment, the forms of katto-katto that are known and played by elementary school children in Sinjai Regency can be seen in the image below.

Figure 1. Form of Katto-katto

Physically, the kattos are made of plastic and have two pendulums connected by a string. There is a ring in the middle of the rope to connect the katto-katto, which is the control device of the ball so that it sounds when it is swung. Along with the rise of the katto-katto game, many creative ideas have emerged by changing the shape of the katto-katto with the aim that this game is varied from the katto-latto form that appeared for the first time. The following is the result of the documentation of variations in the form of katto-katto.

The picture above shows the variations in the form of katto used by elementary school children in Sinjai Regency, consisting of small, medium katto, large katto, and matic katto. In addition, the colors are colorful; there are red, yellow, green, blue, and white. Based on the results of the analysis of the katto-katto game tool, this is closely related to learning in schools, especially in mathematics, namely the material of geometric shapes, shapes, and measurements.

Based on the results of interviews with subject 1 regarding the form of katto-katto, namely:

> "Katto-katto consists of two balls, a rope that connects the two balls, and there is a handle in the shape of a circle" (S1)

Based on the results of interviews with subject 2 regarding the form of katto-katto, namely:

> "The katto -katto that I have played are small and large and of different colors, some are red, yellow and blue and the shape of the katto-katto game consists of katto-katto in the shape of a ball, the strings must be balanced " (S2)

Based on the results of an interview with one of the elementary school teachers in Sinjai (S3), it was stated:

> "In terms of the shape of the katto-katto, it has something to do with learning mathematics, which is related to the material for spatial shapes in the form of balls, the material for flat shapes in the form of rectangles, triangles, and circles. In geometrical material, the shape of the katto-katto resembles a ball. This game can be used to measure the surface area of a ball, the volume of a ball, and also the characteristics of a ball. The handle of the katto-katto game is in the form of a circle, while its application in the learning process is the characteristics of a circle, measuring the radius, diameter of the circle, and also circumference of the circle. For the rope to form a rectangle, we can measure the length (S3).

The results of interviews with subject 4 stated that:

> "In terms of playing tools, katto-katto can be used to introduce colors and compare the number of katto-katto based on the existing colors because katto-katto consists of several colors on balls and ropes. The handle of the katto-katto game tool is in the form of a circle which can be used to introduce flat shapes in the form of a circle and can also be used as a medium for counting, counting the number of balls and can be used in learning balanced measurements so as to produce a sound " (S4)

Based on the results of the analysis of the documentation and interviews related to the katto -katto game tool, it can be stated that this game can be applied in the process of learning mathematics. The material related to the game can be seen in the ball-shaped kattos, which can be used in teaching geometric material in the form of balls. The katto-katto game tool can be used to measure the surface area of the ball, the volume of the ball, and also the characteristics of the ball. The katto-katto game handle is a circle that can be used to introduce the characteristics of a circle and measure the radius, the diameter of the circle, and also the circumference of the circle. While the rope forms, a rectangle can be used in teaching length measurement material. In addition, this game tool can be used as a medium for counting, counting the number of balls, and the many tools used.

2. Katto-Katto Game Process

Based on the results of observations of children playing katto-katto games, it can be seen that the process of playing katto-katto has a relationship with mathematical material, namely the material of angles. Two plastic balls connected by a string will form a corner whether played or not played. If played, it will form an angle of 30^0 to 180^0.

The documentation when the katto-katto collide will form an angle like the following picture:

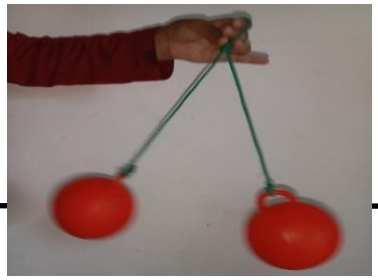

Figure 3. Katto-katto form an angle

Based on the results of interviews with subject 1 stated that:

"We must be calm and focused before starting; the kattos must be balanced than the kattos are shaken up and down alternately " (S1).

The results of interviews with subject 2 stated that:

"When the katto-katto is shaken up and down, they will collide and meet on top and produce a knock-tok sound, but we have to be patient, calm, and practice a lot so that they can collide on top. The way to play it starts from inserting it into the finger, adjusting the balance between the two balls to be the same length, then playing it slowly to fast" (S2).

Based on interviews with subject 3 stated that:

"The process of playing the katto-katto also has something to do with mathematical material, namely angle material, because if this instrument is played, it will form an angle of 30 degrees to 180 degrees. Besides that, it can also introduce weight measurements because to produce impacts and sounds, the kattos must be balanced and must be the same weight (S3).

The results of interviews with subject 4 state that

"How to play the katto-katto to form 360° must be done in a calm manner, focused, and with lots of practice. Start by holding the end of the katto-katto game rope; you have to make sure the two ropes are the same length; then the katto-katto starts to be shaken by raising your hands up and down alternately to form an isosceles triangle; after the shaking is balanced, your hands are immediately raised quickly so that both balls can meet each other to form a 360° angle and must be done with focus so as not to fail. When the balls meet to form a 360° angle, the game can be said to be successful. So it can be said that the process of playing katto-katto can form a 360° angle when the two balls meet in the position below and above" (S4)

Followed by an interview with subject 4 stated that:

"The process of playing this game has something to do with the mathematics material taught in schools, namely the calculation of each beat, the angle formed, the speed, and the calculation of the time for each beat" (S4).

Based on the results of the analysis above, it can be stated that the process of playing katto-katto can be related to the mathematical material about angles. In this process, we can introduce corner material that forms right angles, acute, and obtuse angles ranging from 30° to 360°. In addition, this game is also related to the measurement of weight and length. In the game process, it can also be used in calculating each beat, the speed, and the calculation of each beat. In addition, the process of playing katto-katto can train to focus and balance which is, of course, not just a toy but also related to their learning at school, especially mathematics. This katto-katto game will make it easier for children to understand mathematical concepts. This is confirmed by previous research that the communication formed in traditional games is one of the natural characteristics that occur.

Thus, traditional games can be used in mathematics learning as a form of social interaction between students based on local culture (Zayyadi et al., 2018). This is in line with research which states that traditional games can improve children's motor skills, one of which is by using traditional games because children can play traditional games with other friends both at school and at home at any time (Rahmadani et al., 2017).

Katto-katto games can be applied in the process of learning mathematics. In terms of the tool, there is a spatial concept in the form of a ball; the measurement is on the rope. In the game process, there is the concept of measuring weight, calculating each beat, the angle formed and speed and calculating time. So a teacher must be able to carry out learning innovations to increase student activity in learning. The results of research that strengthens learning with innovative development of a scientific approach that is integrated with "Make a Match" and "Reward Education Games," which have succeeded in increasing student learning activities (Purnama, 2022). This is reinforced by the statement that a teacher must encourage context-based learning by giving students a perfect level of autonomy over learning activities, helping students activate thinking and meta-cognitive skills to achieve effective classroom management (Abdullahi, 2022).

Based on the results of observations, this game can divert and reduce the impact of gadget addiction that is currently being experienced by many children. Katto-katto games can stimulate children's motor skills. Improve coordination function between cognitive and motor skills. The coordination function between cognitive and fine motor in hand occurs when the child tries to play the katto-katto to make a sound. Train children to focus and concentrate. Training children to maintain balance has the potential to bring out a competitive attitude or encourage children to achieve targets to fight until they can win that moment. The katto-katto game can also be simple healing. Because the game is able to make the children who play it laugh and feel happy.

Katto-katto has various charms, and in it, there are things that can make humans learn about focus, balance, clashing with problems, and happiness. All humans, including children, need to focus in order to achieve success in life and in learning. To gain focus, you need practice. the importance of focus, in the first stage, it is clear that the game is able to make humans focus as the game of katto-katto also demands focus; if you lose focus, then your hand can hit the katto-katto pendulum until you feel electrocuted instantly, then focus is the key. When playing katto-katto, there are 2 pendulums that collide with each other moving to produce a sound; a balance will be created (one pendulum moves to the right and the other to the left). The two-way interaction that occurs between the two katto-katto pendulums makes the human brain interpret how to gain focus while investigating, analyzing, and finding solutions so that the two pendulums can balance when they collide both at the bottom and above to produce a knock tok tok sound. Happiness is obtained when a child is able to focus on playing, balancing, and solving problems (able to swing the kattos well up and down, moving in tandem to produce a nok nok nok sound once, twice, three times, and even manages to repeat it many times until other people see it be happy too). The results of previous studies stated that traditional games could play a key role in relation to the emotional aspects of physical education (Akbari et al., 2009). Playing traditional games maintains physical health, improves spiritual and mental health, and institutes cultural values such as generosity, forgiveness, sacrifice, altruism, combating ignorance, and adherence to moral principles and virtues (DEHKORDI, 2017). This is in line with research showing that games have many benefits in early childhood development (Sulistyaningtyas & Fauziah, 2019). The same thing states that the resulting traditional game-based outdoor learning module influences the development of prosocial behavior in early childhood (SB Thalib & Ahmad, 2020). Other research on the traditional Congklak game can be an alternative for teachers in training and increasing students' working memory capacity because of the components in working memory capacity, such as the *central executive, the*

phonological loop, and the visuospatial sketch board. (Iasha et al., 2020) . The results of other studies show that traditional children's games pay attention to the socio-cultural context of children and the skills that children develop in the classroom through cultural heritage sources, such as games that are useful and sustainable in everyday life and in the future (Madondo & Tsikira, 2022).

This katto-katto game can not only be related to mathematical material about shapes, planes, angles, and measurements but can also be used for effective assessment in learning such as focus, balance and practice, social interaction with peers as well as competitive attitudes or encouraging children to reach the target in order to fight until you can win that moment.

Based on observations, this katto-katto game also has a negative impact if done excessively because it will cause swelling in the hands. Apart from that, if the ball breaks, it will potentially cause injury to the child. If the rope breaks, it will hit the body or other objects around the players.

CONCLUSION

From the results of the study, it can be concluded that the katto-katto game contains several mathematical concepts that are taught in schools, both in terms of tools and the process of playing. In terms of the tools, there is a spatial concept in the form of a ball, measurements on the ropes, and the sum of the tools. In the game process, there is the concept of measuring weight, calculating each beat, the angle formed and speed and calculating time. In addition to the concept of mathematical knowledge, the katto-katto game can be used as an effective assessment, namely focus, patience, agility, and balance. The game of katto-katto in the Sinjai community has a dual function, namely educational, recreational, and social functions. The development of learning mathematics in elementary schools based on cultural games such as katto-katto games will not only make students enjoy learning mathematics but will also improve the quality of learning mathematics in particular and mathematics education in general. In addition, this katto-katto game also has a negative impact if done excessively because it will cause swelling in the hands. Apart from that, if the ball breaks, it will potentially cause injury to the child. If the rope breaks, it will hit the body or other objects around the players.

LIMITATION & FURTHER RESEARCH

The limitation of this research is that it has not yet implemented the katto-katto game in learning; it is only limited to exploring the mathematical concepts associated with the katto-katto game. In addition, the research subjects were only elementary school students and teachers in Sinjai District. This study only examines katto-katto games which are related to mathematical concepts not yet related to other subjects.

REFERENCES

Abdullahi, N. J. K. (2022). *Pedagogical Innovative Methods and Classroom Management in Nigeria*.

Aji Purnomo, S. (2023). *Belajar dari Permainan Lato-Lato*. NU Online Banten.

Akbari, H., Abdoli, B., Shafizadehkenari, M., Khalaji, H., Hajihosseini, S., & Ziaee, V. (2009). The effect of traditional games in fundamental motor skill development in 7-9-year-old boys. *Iranian Journal of Pediatrics*, *19*(2), 123–129.

Arga, H. S. P., Nurfurqon, F. F., & Wulandari, M. A. (2020). *Permainan tradisional dalam pembelajaran IPS SD*. Tre Alea Jacta Pedagogie.

Asfar, A. M. I. T., & Asfar, A. M. I. A. (2020). *Model Pembelajaran Berbasis Permainan Tradisional Bugis Makassar "Ma'boy."* Media Sains Indonesia.

Asfar, A. M. I. T., Asfar, A. M. I. A., Nurwijaya, S., & Fauziah, A. (2021). *Integrasi Permainan Tradisional "Lojo-Lojo Pindip" Dalam Model Pembelajaran Problem Guided Solving Discovery*. Media Sains Indonesia.

DEHKORDI, M. R. (2017). The educational impact of traditional games: the role of Zurkhaneh sport in

educating children. *International Journal of Sports Culture and Science*, *5*(3), 134–139.
Dewi, S. S., Asfar, A. M. I. T., Asfar, A. M. I. A., Nurannisa, A., Nurhasanah, N., & Rosdaliani, A. (2022). Peningkatan Kemampuan Berpikir Analitik Siswa melalui Elaborasi Permainan Bugis Ma'benteng Terintegrasi 4C Skills Berbasis Android. *Seminar Nasional Paedagoria*, *2*, 286–291.
Febriyanti, C., Prasetya, R., & Irawan, A. (2018). Etnomatematika pada permainan tradisional engklek dan gasing khas kebudayaan sunda. *Barekeng: Jurnal Ilmu Matematika Dan Terapan*, *12*(1), 1–6.
Hopeman, T. A., & Rahma, A. (2023). Do the clackers balls toys Make a student's behavior change? A literature review at elementary school. *Jurnal Pendidikan West Science*, *1*(1), 39–44.
Iasha, V., Al Ghozali, M. I., Supena, A., Wahyudiana, E., Setiawan, B., & Auliaty, Y. (2020). The Traditional Games Effect on Improving Students Working Memory Capacity in Primary Schools. *Proceedings of the 4th International Conference on Learning Innovation and Quality Education*, 1–5.
Irmayanti, I., & Danial, D. (2019). Eksplorasi Etnomatematika Permainan Pada Siswa Sekolah Dasar Di Sinjai Selatan. *AULADUNA: Jurnal Pendidikan Dasar Islam*. https://doi.org/10.24252/auladuna.v6i1a10.2019
Irmayanti, I., & Fajar, F. (2022). Workshop Metode Pembelajaran Matematika Berbasis Luring di SDN Nomor 30 Tongke-Tongke. *JDISTIRA*, *2*(1), 32–36.
Karina, C. D., Supardi, U. S., & Suparman, L. A. (2021). Eksplorasi Etnomatematika Pada Permainan Tradisional Indonesia Komunitas TGR (Traditional Games Return). *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *5*(2), 1599–1615.
Madondo, F., & Tsikira, J. (2022). Traditional children's games: their relevance on skills development among rural zimbabwean children age 3–8 years. *Journal of Research in Childhood Education*, *36*(3), 406–420.
Manggau, A., Akil Musi, M., & Syamsuardi, S. (2015). *Nilai-Nilai Pendidikan Dalam Permainan Tradisional Kerakyatan Sulawesi Selatan*.
Mulyana, Y., & Lengkana, A. S. (2019). *Permainan tradisional*. Salam Insan Mulia.
Mulyani, N. (2016). *Super asyik permainan tradisional anak Indonesia*. Diva Press.
Nadjamuddin, A. (2016). Membangun Karakter Anak Lewat Permainan Tradisional Daerah Gorontalo. *TADBIR: Jurnal Manajemen Pendidikan Islam*, *4*(2), 74–79.
Purnama, H. I. (2022). Applying the "Make a Match" Model-based on a Scientific Approach through Reward Education Game for Elementary School Students. *International Journal of Theory and Application in Elementary and Secondary School Education*, *4*(1), 13–21.
Rahmadani, N. K. A., Latiana, L., & AEN, R. A. (2017). The Influence of Traditional Games on The Development of Children's Basic Motor Skills. *International Conference of Early Childhood Education (ICECE 2017)*, 160–163.
Rustan, E., & Munawir, A. (2020). Eksistensi Permainan Tradisional Edukatif Pada Generasi Digital Natives. *Jurnal Pendidikan Dan Kebudayaan*, *5*(2), 181–196.
Simbolon, N. (2014). Faktor-faktor yang mempengaruhi minat belajar peserta didik. *Elementary School Journal Pgsd Fip Unimed*, *1*(2).
Sulistyaningtyas, R. E., & Fauziah, P. Y. (2019). The implementation of traditional games for early childhood education. *3rd International Conference on Current Issues in Education (ICCIE 2018)*, 431–435.
Sumarsono, R. N. (2022). *Permainan Tradisional Nusantara*. uwais inspirasi indonesia.
Surmiyanti, C., & Nurhaliza, S. (2021). Etnomatematika dalam Budaya Berdompu pada Permainan Tradisional Engklek di Kalimantan Barat. *JUWARA: Jurnal Wawasan Dan Aksara*, *1*(1), 47–57.
Taroreh, B. S., & Satria, M. H. (2020). Implementasi Permainan CBA pada Pembelajaran Atletik sebagai Solusi Alternatif Melestarikan Permainan Tradisional di Sumatera Selatan. *Jurnal Curere*, *4*(1), 9–16.
Thalib, A., & Maulinda, R. (2021). Pengembangan Model Pembelajaran Nobangan Berbasis Permainan Tradisional Suku Kaili Terhadap Nilai Keaktifan Siswa Kelas Iv Sekolah Dasar. *Elementary School: Jurnal Pendidikan Dan Pembelajaran Ke-SD-AN*, *8*(1), 199-â.
Thalib, S. B., & Ahmad, M. A. (2020). The Outdoor Learning Modules Based on Traditional Games in Improving Prosocial Behaviour of Early Childhood. *International Education Studies*, *13*(10), 88–104.
Yulianti, N. (2020). Permainan Tradisonal Lojo (Palejo) Dari Provinsi Sulawesi Tenggara Dan Pembentukan Karakter Kerja Keras Pada Peserta Didik Sd/Mi Di Indonesia. *MAGISTRA: Media Pengembangan Ilmu Pendidikan Dasar Dan Keislaman*, *11*(2).
Zayyadi, M., Hasanah, S. I., & Surahmi, E. (2018). Ethnomathematics Exploration in Traditional Games As A Form Of Student'Social Interaction. *JIPM (Jurnal Ilmiah Pendidikan Matematika)*, *6*(2), 125–132.