Journal of Indonesian Elementary Education
Vol. 1, No. 1, Desember 2023, pp. 15-30
https://ejournal.intelektualedu.com/index.php/JIEE/index

# Time Measurement Learning through Traditional Spinning Top Games

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**Abstract:** This research aims to describe the use of the Gasing game in mathematics learning, how to accurately measure the rotation time of the top, measure the distance traveled by the top, measure the angle of rotation of the top, and the influence of the Gasing game on student learning outcomes in mathematics lessons in elementary schools. The research method used is descriptive qualitative, with the research subjects being class III students at Muhammadiyah Elementary School, Gresik Complex. In the discussion, it was found that the use of the Gasing game has benefits in increasing student involvement and motivation, strengthening conceptual understanding, improving social skills, appreciating cultural heritage, and providing contextual learning. Apart from that, it also explains the steps to accurately measure the rotation time of a top, measure the distance traveled by a top, and measure the angle of rotation of a top. This research provides an in-depth understanding of the influence of the Gasing game on student learning outcomes in mathematics lessons in elementary schools, by showing that the Gasing game can increase students' interest and motivation, strengthen conceptual understanding, improve problem solving skills, and improve students' social and collaborative skills.

**Keywords:** *Traditional games, Time Measurement, Spinning*

**Abstrak:** Penelitian ini bertujuan untuk mendeskripsikan kegunaan permainan Gasing dalam pembelajaran matematika, cara mengukur waktu putaran gasing dengan tepat, mengukur jarak yang ditempuh gasing, mengukur sudut putaran gasing, dan pengaruh permainan Gasing. terhadap hasil belajar siswa pada pembelajaran matematika di sekolah dasar. Metode penelitian yang digunakan adalah deskriptif kualitatif, dengan subjek penelitian adalah siswa kelas III SD Muhammadiyah Komplek Gresik. Dalam diskusi ditemukan bahwa penggunaan permainan Gasing mempunyai manfaat dalam meningkatkan keterlibatan dan motivasi siswa, memperkuat pemahaman konsep, meningkatkan keterampilan sosial, mengapresiasi warisan budaya, dan memberikan pembelajaran kontekstual. Selain itu juga dijelaskan langkah-langkah mengukur waktu putaran gasing secara akurat, mengukur jarak yang ditempuh gasing, dan mengukur sudut rotasi gasing. Penelitian ini memberikan pemahaman mendalam mengenai pengaruh permainan gasing terhadap hasil belajar siswa pada pembelajaran matematika di sekolah dasar, dengan menunjukkan bahwa permainan gasing dapat meningkatkan minat dan motivasi siswa, memperkuat pemahaman konsep, meningkatkan keterampilan pemecahan masalah dan meningkatkan keterampilan sosial dan kolaboratif siswa.

**Kata Kunci:** *Permainan tradisional, Pengukuran waktu, Gasing*

## INTRODUCTION

The traditional game Gasing is one of the most popular games in Indonesia. This game is not only entertaining, but can also teach math concepts, especially measuring time (Suyudi, 2022). In mathematics subjects, measuring time is an important topic to study. By utilizing the Gasing game, we can teach the concept of time measurement in an interactive and fun way. The Gasing game is a traditional game played using a top as the main tool. A top is a tool made of wood or metal that has

a disc-like shape and can rotate on a flat surface. This game is usually played by two or more players facing each other.

In the Gasing game, time is very important. Each player must measure the time correctly to get optimal results. Measuring time in the Gasing game involves several mathematical concepts, such as seconds, minutes and hours. Players need to calculate the time required for the top to spin quickly and accurately. The concept of measuring time in the Gasing game can be taught through several activities (Febriyanti et al., 2018). One way is to measure the rotation time of the top. Players can use a stopwatch or watch to measure the time it takes for the top to spin. They can record the spinning time of the top in seconds or even minutes.

Additionally, time measurement can also be taught through competitive play between players. For example, players can be given the challenge of measuring the exact time to spin a top as far as possible within a certain time. Players must calculate the time carefully and try to spin the top as far as possible before time runs out. By using the Gasing game in mathematics learning, students can learn the concept of time measurement in a practical and fun way. They can develop their ability to measure time accurately and calculate time durations correctly. Apart from that, this game can also improve students' problem solving and concentration skills.

In learning mathematics, it is important to create an interesting and interactive learning experience. By utilizing traditional games such as Gasing, we can teach mathematical concepts in a fun and engaging way. Students will be more interested and motivated to learn when they are involved in fun games. The traditional game Gasing can be an effective tool for teaching the concept of time measurement in mathematics subjects (Latif & Hamka, 2019). By utilizing this game, students can learn the concept of time measurement in an interactive and fun way. Apart from that, the Gasing game can also improve students' problem solving and concentration skills. Let's leverage our rich culture to create interesting and rewarding learning experiences for students.

Apart from measuring time, the Gasing game can also teach other concepts in mathematics, such as measuring distances and angles. In the Gasing game, players need to measure the distance traveled by the top when spinning. They also need to measure the rotation angle of the top to get maximum results. The concept of measuring distance in the Gasing game can be taught by giving students the task of measuring the distance traveled by a top when spinning. They can use a ruler or measuring tape to measure distances accurately. By involving distance measurements, students can understand the concept of measuring in units of length, such as meters or centimeters. Apart from that, measuring angles can also be taught through the Gasing game. Players need to measure the angle of rotation of the top as it spins using an angle measuring device, such as a protractor. By studying the concept of measuring angles, students can understand the relationship between angles and rotation in the Gasing game. However, according to mathematical concepts that require visualization (Ulya, 2017) traditional games can help to visualize them.

In learning mathematics, the use of traditional games such as Gasing can provide a different and interesting learning experience for students. They can learn math concepts in a practical and fun way. Based on the results of research conducted by (Irma Risdiyanti, 2018), in her research there are various mathematical concepts in traditional games, namely the concept of number comparison, plane number operations, similarity, congruence, and relations. From the results of research (Anton Jaelani, 2013), in a learning experiment the use of the traditional top game was used as a medium to teach students about the concept of measuring time. This is in line with research (Dwi Safitri, 2015), ethnomathematics in Malay gasing sambas is the concept of time, opportunity in group draws and game turns in team formation by paying attention to the number having to be even, calculating the score in whole numbers, and the shape of the playing field, namely a circle.

Apart from that, the Gasing game can also develop students' social skills, such as cooperation and communication, when they play in groups. The use of traditional games in mathematics learning can also enrich

students' knowledge about local culture and heritage. They can learn the history and meaning of the Gasing game in Indonesian culture (Karlimah, 2016). This can increase their sense of pride and appreciation for their cultural heritage. The traditional game of Gasing can be an effective tool for teaching mathematical concepts, especially in measuring time, distance and angles.

Therefore, researchers are interested and aim to apply the traditional spinning top game to time measurement material in class III elementary school. In this way, students can learn mathematical concepts in an interactive and fun wayApart from that, the use of traditional games can also enrich students' knowledge about local culture and heritage. Let's leverage our rich culture to create interesting and rewarding learning experiences for students.

## METHOD

This research uses a descriptive approach by applying qualitative research methods. Qualitative research is an approach that involves data acquisition in the form of descriptions through interview interactions or written notes from the subject who is the focus of observation (Luthfiyah, 2017). According to (Sukmadinata, 2012), the descriptive approach is a research method that aims to explain in detail events or phenomena that are currently taking place or have occurred in the past. This research uses a descriptive approach with qualitative research methods to apply mathematics learning related to the traditional top game in time measurement material in class III elementary school.

One of the advantages of the qualitative descriptive method is its ability to explore a deep understanding of the phenomenon being studied. This research was conducted with the subjects of class III students at Muhammadiyah Elementary School, Gresik Complex. This method allows researchers to explore the perspectives, experiences, and points of view of individuals or groups involved in the research. By understanding the time measurement material, students can apply the traditional top game which is in class III at Muhammadiyah Elementary School, Gresik Complex. In the qualitative descriptive method, data collection is carried out through

interviews and observation. The results of this analysis are then used to describe the phenomenon under study and provide an in-depth interpretation.

## RESULTS AND DISCUSSION

### *How to integrate the Gasing game in mathematics learning to teach the concept of measuring time*

To integrate the Gasing game in mathematics learning to teach the concept of measuring time, there are several approaches that can be taken. One way to integrate the Gasing game in mathematics learning is to use the game as a real example of measuring time in everyday life. Teachers can start by introducing the Gasing game to students and explaining that this game involves measuring the right time. The teacher can show how accurately measured time can affect the outcome of the game (Hasanah et al., 2021). Next, the teacher can divide students into small groups and give each group a top. They will be asked to measure the time it takes for the top to spin rapidly. The teacher can give each group a stopwatch or watch to measure time. Students can record the spinning top time in seconds or minutes.

After students have taken time measurements, the teacher can ask them to share the measurement results and record them on the board. The teacher can lead a discussion about the results of different time measurements and how faster or slower times can affect the outcome of the game. Teachers can also invite students to compare top rotation times between different groups. In addition, teachers can challenge students to measure the right time to spin the top as far as possible within a certain time. The teacher can use a timer or stopwatch to set the time and students must try to spin the top as far as possible before time runs out. After the challenge is completed, the teacher can ask students to compare the results of their time measurements and discuss the strategies used to achieve optimal results.

During the learning process, teachers can also ask students reflective questions, such as "How can precise timing affect the outcome of the game?" or "Are there any special strategies that can be used to speed up the spinning of the top?". This will encourage students to think critically about

the concept of time measurement and apply it in the context of the Gasing game. By integrating the Gasing game in mathematics learning, students will have an interactive and fun learning experience. They will be able to see firsthand how precise timing can affect the outcome in the game. This approach can also help students understand the concept of measuring time concretely and practice it in real situations (Ambaradiani et al., 2023). Teaching methods are needed to deliver learning material effectively and efficiently. The methods used by teachers in completing learning tasks often vary from the concept of teaching strategies, teaching styles to learning methods (Aguss, 2019).

The Top Game can help students understand the concept of measuring time in the following ways: (a) Practical Experience: In the Gasing game, students will be directly involved in measuring time. They will use a stopwatch or watch to measure the time it takes for the top to spin. By taking direct time measurements, students will gain practical experience of how time is measured and how precise time measurements can affect the outcome of the game; (b) Relevant Context: The Gasing Game provides a relevant context for teaching the concept of time measurement. Students can see how accurate timing can affect the outcome in a game. They will realize that faster or slower times can make a difference in achieving the desired results. By relating time measurements to real situations in games, students will more easily understand this concept; (c) Active Involvement: In the Gasing game, students will be actively involved in measuring time. They will measure the spinning time of the top themselves and record the results. Through this active involvement, students will better understand the importance of measuring time correctly and calculating time duration correctly. They will also develop observation and problem-solving skills as they try to spin the top as fast as possible; (d) Collaborative Learning: Top Games can be played in small groups, where students can work together to measure time and compare measurement results. Through this collaborative learning, students can learn from each other and share strategies for measuring time accurately. They can also compare the results of time measurements between different groups and discuss differences in the

results obtained; (e) Motivation and Interest: Using the Gasing game in mathematics learning can increase students' motivation and interest in learning. Fun and interactive games will make students more interested and motivated to learn about the concept of time measurement. They will see that mathematics is not just about numbers and formulas, but can also be applied in fun, real situations (Khaq, 2022).

With the help of the Gasing game, students will have a fun and interactive learning experience in understanding the concept of measuring time. They will develop a better understanding of how time measurement works and how it can be applied in everyday life.

***Benefits of using the Gasing game in learning mathematics***

Using the Gasing game in learning mathematics has various benefits, including: (a) Increase Involvement and Motivation: Gasing Games provide interactive and fun learning, which can increase student engagement and motivation. By involving students in play activities, they will be more interested and motivated to learn. This helps create a positive learning environment and builds students' interest in mathematics (Iwan et al., 2023); (b) Strengthening Mathematical Concepts: Through the Spinning Top game, students can strengthen their understanding of mathematical concepts, such as measuring time, distance, and angles. They can see firsthand how these concepts are applied in real situations. Top games can also help students develop problem solving skills, logical thinking, and critical thinking abilities; (c) Improves Social Skills: Top games are often played in groups, which encourages students to work together, communicate, and collaborate. They learn to share ideas, strategies, and measurement results with their group members. This helps improve students' social skills, such as cooperation, communication, self-confidence, and decision making in groups; (d) Appreciating Cultural Heritage: The Gasing Game is a traditional Indonesian game that is rich in cultural value. By integrating this game into mathematics learning, students can learn about their own cultural heritage. This helps increase their sense of pride and appreciation for their cultural heritage, while connecting it to their mathematics learning; (e) Contextual Learning: The Top Game provides a real and relevant context for students in

learning mathematical concepts. They can see how mathematical concepts are applied in game situations, which makes learning more meaningful and easy to understand. Contextual learning like this helps students relate mathematical concepts to their daily lives.

By using the Gasing game in mathematics learning, students can experience interactive, fun and meaningful learning. They can strengthen their understanding of mathematical concepts, develop social skills, appreciate cultural heritage, and see the relevance of mathematics in everyday life. The Gasing game can help students increase engagement and motivation in learning mathematics in several interesting ways. First, the Gasing game provides interactive and fun learning. Students will be actively involved in the game, spinning tops, measuring time, and recording results. This activity provides a fun hands-on experience and makes students feel involved in learning (Suyudi, 2022). They will feel that mathematics is not just about numbers and formulas, but also about real experiences that they can enjoy. (Rahayu, 2016) believes that educational games based on local excellence can be used as a mathematics learning medium that connects the learning process with students' local culture.

Apart from that, the Gasing game also provides challenges and competitions that can increase student motivation. Students will feel motivated to try to spin the top as quickly as possible or achieve better results than their classmates. They will feel challenged to improve their skills in measuring time and strategy in spinning a top. This challenge makes learning mathematics more interesting and makes students enthusiastic about learning. Furthermore, the Gasing game also allows students to learn collaboratively. They can work in small groups, discuss, share strategies, and compare the results of their time measurements. This collaboration can increase student engagement because they feel supported by their classmates and can learn from others' experiences and ideas. Students can also feel additional satisfaction and motivation when they succeed in achieving good results and get appreciation from their classmates (Siregar & Lestari, 2018).

Apart from that, the Gasing game also offers a relevant and real context in mathematics learning. Students can see how accurate timing can affect the outcome in a game. They will realize that faster or slower times can make a difference in achieving the desired results. This real context makes it easier for students to understand and relate the concept of time measurement to everyday situations. This is in accordance with the opinion of Dharmamulya and Febriyanti et al in (Merliza, 2021) that traditional games enable students to understand mathematical concepts thereby increasing creative thinking in a fun atmosphere. Thus, the Gasing game can help students increase involvement and motivation in learning mathematics. Through interactive experiences, competitive challenges, collaboration, and relevant context, students will feel more engaged, motivated, and excited about learning mathematics. Spinning games enrich students' learning experience, make it more interesting, and help them develop their math skills in a fun way (Aprijon, 2020).

**How to accurately measure the rotation time of a spinning top in the Spinning Top game**

To accurately measure the rotation time of a spinning top in the Gasing game, there are several steps you can follow:

1. Prepare an accurate time measuring device: Make sure you have a reliable stopwatch or watch to measure time. Also make sure that the time measuring device is set correctly and functions well.
2. Prepare a top and a flat place: Make sure you have a top ready to spin and a flat place to play. Make sure the playing surface is not slippery so that the top can spin smoothly.
3. Start timing when the top is released: When you are ready to start the game, press the start button on your stopwatch or watch. Remove the top in the method you have chosen, such as rotating it by hand or using a top spinning tool.
4. Pay attention to the rotation of the top: While measuring the time, pay close attention to the rotation of the top. Observe how many times the top rotates fully or partially in the time you are measuring. You can use sight and hearing to estimate the rotation time of the top.

5. Stop measuring time when the top stops: When the top stops spinning, immediately stop measuring time by pressing the stop button on your stopwatch or watch. Record the rotation time of the top in seconds or minutes.
6. Repeat the measurement to get more accurate results: To get more accurate results, repeat the top rotation time measurement several times. Take measurements several times and calculate the average rotation time of the top to get more consistent results.
7. Record the measurement results: After you have finished taking measurements, record the results of measuring the top rotation time. You can record it in the table or notes provided.

By following the steps above, you can accurately measure the rotation time of the spinning top in the Gasing game. It is important to pay close attention and use a reliable timing device to get accurate results. Correct time measurement will help you understand and apply the concept of time measurement in the Gasing game better. This is in accordance with the opinion of (Himmatul Ulya, 2016) that traditional games can invite students into real situations to learn social arithmetic. By experiencing these traditional games directly, students can more easily understand the concepts they are learning, and the cultural heritage left by their ancestors from generation to generation can continue to be preserved.

***How to measure the distance traveled by a top when spinning in the Gasing game and how to measure the angle of rotation of a top in the Gasing game***

To measure the distance traveled by a top when spinning in the Gasing game, there are several steps that can be followed:

1. Prepare the right distance measuring tools: Make sure you have a ruler or tape measure that can be used to measure the distance. Make sure the measuring tool has a scale that is accurate and easy to read.
2. Determine the start point and end point: Determine the start point and end point of the top movement. The starting point can be marked

by the position of the top when it is first released, while the end point can be marked by the position of the top when it stops spinning.

3. Place the measuring tool along the distance the top travels: Place the measuring tool along the distance the top travels, starting from the starting point to the ending point. Make sure the measuring tool is in a straight position and parallel to the top movement path.
4. Read and record the distance traveled: Read and record the distance traveled by the top by referring to the scale on the measuring device. Make sure to read carefully and thoroughly to get accurate results. Record the distance traveled in appropriate units, such as meters or centimeters.

To measure the angle of rotation of a spinning top in the Gasing game, you can do it in the following way:

1. Prepare the right-angle measuring tool: Use an angle measuring tool, such as a protractor or angle stun gun, to measure the angle of rotation of the top. Make sure the angle measuring tool functions properly and has an accurate scale.
2. Determine the reference point: Determine the reference point that will be used as a benchmark for measuring the rotation angle of the top. For example, you can use the starting point of the top's movement as a reference point.
3. Place the angle measuring tool along the rotation path of the top: Place the angle measuring tool along the rotation path of the top so that the reference point is at an angle of 0 degrees. Make sure the angle measuring tool is in a stable position and parallel to the line of rotation of the top.
4. Read and record the angle of rotation of the top: Read and record the angle of rotation of the top by referring to the scale on the angle measuring device. Make sure to read carefully and thoroughly to get accurate results. Record the angle of rotation of the top in degrees.

By following the steps above, you can measure the distance traveled by the top when spinning and measure the rotation angle of the top accurately in the Tops game. It is important to use proper measuring tools

and read carefully to get accurate results. Accurately measuring distances and rotation angles will help you understand and apply measurement concepts in the Gasing game better.

Integrating the Gasing game in mathematics learning for the concept of measuring time provides an interactive learning experience. In the game, students practically measure the spinning time of a top using a stopwatch or watch. They were actively involved in observing and recording the results of the measurements, which strengthened their understanding of the concept of time. The importance of precise time measurements was also applied in the challenge, where students tried to spin a top as quickly as possible within the allotted time. Discussion and reflective questions help students think critically about the relationship between time and game outcomes. Apart from the concept of time, using the Gasing game provides benefits such as increased motivation, contextual learning, and development of social skills. Learning that is fun and relevant to local culture can also increase students' interest in mathematics. Thus, the integration of the Gasing game can enrich mathematics learning through practical experience, student motivation, and active involvement in measuring time.

## CONCLUSION

In conclusion, the Gasing Game has benefits in mathematics learning, such as increasing student involvement and motivation, strengthening mathematical concepts, improving social skills, respecting cultural heritage, and providing contextual learning. In measuring the rotation time of a top accurately, the steps that need to be followed are preparing the correct time measuring device, determining the start and end points, starting the measurement when the top is released, paying attention to the rotation of the top, and stopping the measurement when the top stops. Meanwhile, to measure the distance traveled by a top, the steps that need to be followed are preparing an appropriate distance measuring device, determining the start and end points, placing the measuring device along the distance the top moves, reading and recording the distance traveled. To measure the angle of rotation of a top, the steps

that need to be followed are preparing the right angle measuring tool, determining a reference point, placing the angle measuring tool along the rotation path of the top, reading and recording the angle of rotation of the top.

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