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# The Effect of Ice Breaking Implementation on Mathematics Learning Outcomes of Class VIII at SMP Negeri 2 Samarinda

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## Abstrak

Suasana pembelajaran matematika pada siang hari terkesan kurang menyenangkan sehingga siswa cepat merasa bosan, mengantuk, sulit berkonsentrasi, dan hasil belajar matematika siswa rendah. Selain itu, guru jarang melakukan penyegaran seperti *ice breaking* pada saat pembelajaran. Oleh sebab itu, tujuan dari penelitian ini adalah untuk mengetahui pengaruh penerapan *ice breaking* terhadap hasil belajar matematika kelas VIII SMP Negeri 2 Samarinda. Penelitian ini menggunakan metode eksperimen semu dengan desain *posttest-only cotrol group*. Populasi penelitian terdiri dari 339 siswa kelas VIII yang terbagi menjadi 11 kelas. Sampel diambil secara *purposive*, yakni dengan memilih dua kelas yang memiliki jadwal mata pelajaran matematika pukul 13.00 hingga 15.00 WITA dan nilai akhir semester ganjil tidak berbeda signifikan. Data hasil belajar matematika diperoleh melalui *posttest*. Kemudian, statistik deskriptif dan inferensial (uji-t) digunakan untuk menganalisis data yang diperoleh. Hasil uji hipotesis pihak kanan menunjukkan nilai probabilitas yaitu 0,024 < 0,05 sehingga $H_0$ ditolak. Jadi, penerapan *ice breaking* berpengaruh positif terhadap hasil belajar matematika pada kelas VIII SMP Negeri 2 Samarinda.

## *Abstract*

*The atmosphere of mathematics learning during the day seems less enjoyable so students quickly feel bored, and sleepy, have difficulty concentrating, and students' mathematics learning outcomes are low. Apart from that, teachers rarely provide refreshments such as icebreakers during learning. Therefore, it is important to carry out this research to determine whether or not there is a positive influence of the application of ice breaking on mathematics learning outcomesin class VIII of SMP Negeri 2 Samarinda. This research uses a quasi-experimental method with a posttest-only control group design. The research population consisted of 339 class VIII students divided into 11 classes. The sample was taken deliberately, namely by selecting two classes that had a mathematics subject schedule from 13.00 to 15.00 WITA and the final grades for the odd semester were not significantly different. Data on mathematics learning outcomes was obtained through posttest. Then, descriptive and inferential statistics (t-test) were used to analyze the data that had been obtained. The results of the right-tailed hypothesis test show a probability value of 0.024 < 0.05 so $H_0$ is rejected. So, there is a positive influence of the application of ice breaking on mathematics learning outcomes in class VIII of SMP Negeri 2 Samarinda.*

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## Introduction

Learning is an individual's effort to achieve behavioral change in the form of knowledge, skills, or attitudes through experience or interaction with their environment. When learning, students need to focus their attention in order to understand the material being studied and to be able to do something they could not do before (Haslianti, 2019). During the learning process, the teacher's role is not limited to delivering the material, but also as a facilitator and motivator who can create a conducive learning environment and capture the students' attention. Therefore, students should be given stimuli to help them focus and become more motivated to engage in the learning process (Alfiatin, 2023).

Learning that is too rigid and formal, without any excitement, will definitely feel boring and disrupt the brain's concentration over a long period of time. Moreover, it is known that students' concentration levels are related to their interest in an activity. If students find the activity engaging, their ability to concentrate can last for a long period of time (Miswati et al., 2021). Students who are focused can understand the important information conveyed during the learning process. This shows that concentration plays an important role in helping students grasp the material and achieve better learning outcomes (Maghfiroti et al., 2023). Therefore, teachers must design various enjoyable activities to create an optimal learning environment. When learning takes place in an enjoyable way, students tend to accept the lessons more easily without feeling forced or pressured. This can help optimize students' learning outcomes (Alfiatin, 2023).

Learning outcomes refer to the behavioral changes experienced by students as a result of their interaction with the environment. These changes encompass three main domains: affective, psychomotor, and cognitive (Pujiarti, 2022). According to Susanto (2014), learning outcomes indicate the extent to which students understand the explanation of the material and questions through tests. Therefore, student learning outcomes are important as they provide information about the students' progress (Nabillah & Prasetyo Abadi, 2019).

Mathematics is a fundamental and crucial science that is studied at all levels of education. According to Arta et al., (2020) Mathematics is a body of knowledge that contains abstract ideas and is structured to enhance thinking and reasoning skills. Therefore, teachers need to have a strong theoretical foundation when teaching mathematics. One learning theory that can be applied is Thorndike's theory. Thorndike's theory is considered relevant to the concept of school mathematics learning because it helps develop students' thinking abilities. According to Thorndike's theory, the learning process involves a connection between stimulus and response. Stimulus includes anything that can trigger learning activities, such as thoughts, feelings, or other stimuli perceived through the senses. Meanwhile, response refers to the reactions exhibited by students during learning, whether in the form of thoughts, feelings, or actions (Firliani et al., 2019). One of the topics in mathematics that trains the ability and skills to think in an orderly and systematic way is number patterns (Wabang et

al., 2023). By studying number patterns, students are required to be meticulous, focused, and think creatively in identifying the problems (Susanti & Setianingsih, 2019).

The researcher's observation in the eighth-grade class showed that the classroom atmosphere during the last hours of learning, from 1:00 PM to 3:00 PM WITA, tended to be less conducive. The classroom appeared noisy, with some students feeling sleepy, bored, and having difficulty focusing on their learning. As a result, students' ability to understand the material became suboptimal. This impact was reflected in the low mathematics learning outcomes, where many students' final test scores did not meet the Minimum Completeness Criteria (KKTP) of 66.

An alternative solution to address this issue is to apply ice-breaking activities in mathematics learning. According to Ratnasari et al (2023), ice breaking is an activity that can relieve tension, stiffness, and boredom, making the classroom environment more conducive. This means that applying ice-breaking activities during lessons can help students regain enthusiasm and motivation to learn. The goal of ice breaking is to ease tense situations, making them more relaxed, and to improve students' concentration, making the learning process more active. Ice breaking should be done within a short time, around 5 minutes, because it is not the main focus of the learning process, but rather a supporting activity to create a more enjoyable learning experienc*e* (Arta et al., 2020). Further Deswati et al (2020), revealed that ice breaking makes the environment more enjoyable, which helps students become interested and fully focused during learning. As concluded by Titi Pujiarti (2022), the application of ice breaking has a significant impact on the mathematics learning outcomes of students in grade V at SD Negeri Mpuri. Additionally, research by Devi et al., (2022) mentioned that the use of ice breaking has an effect on the interest and learning outcomes of mathematics students in class XI at SMK Wira Harapan. Furthermore, research conducted by Idris Jafar et al., (2023) concluded that ice breaking has an influence on students' learning motivation.

## Method

This study uses a quasi-experimental method with a posttest-only control group design, which means that the test is given after the treatment or delivery of the material. The experimental class applies planned ice-breaking activities, while the control class does not implement any planned ice-breaking activities. The research population consists of 339 students, divided into 11 classes. The sample was purposively selected, choosing 2 classes that have mathematics lessons from 1:00 PM to 3:00 PM WITA and have no significant difference in their odd semester final exam scores. Based on the initial observation, it was found that two classes had mathematics lessons in the afternoon, namely class VIII-B and VIII-F. Then, to assess the students' initial ability, a balance test was conducted on the odd semester mathematics exam scores in both classes.

Data were collected through a test in the form of essay questions. Before the test was administered in the study, it was first given to a trial class to evaluate the difficulty index,

discrimination index, and reliability. The results of the difficulty index test showed that 1 question was easy, and 4 questions were of medium difficulty. Then, the discrimination index test showed that 5 questions were significant, and the reliability test result obtained a calculated r-count of 0.882, indicating that the questions were reliable. After the research, the post-test data were analyzed using descriptive and inferential statistical analysis techniques. Descriptive statistical analysis included the mean, standard deviation, variance, maximum value, and minimum value, while the inferential analysis used a t-test. Before performing the t-test, the research data underwent normality and homogeneity tests. The normality test was conducted using the Shapiro-Wilk method, while the homogeneity test was performed using Levene's test. After both tests were conducted and met the required assumptions, the data were analyzed using a two-sample independent t-test.

## Results and Discussion

### *The Result of the Research*

The research was conducted from February 1 to 23, 2024, at SMP Negeri 2 Samarinda. During the study, there were 2 classes that received different treatments: the experimental class, which applied ice-breaking activities in the learning process, and the control class, which did not implement ice-breaking activities. The research was conducted over 3 meetings for each class, and the post-test was administered after the lesson concluded in the third meeting.

### Description and Analysis of Students' Initial Ability Data

The students' initial ability was measured based on their odd semester scores for the 2023/2024 academic year, with class VIII-B being the experimental class and class VIII-F as the control class. The following is a table describing the data on students' initial abilities.

**Table 1.** Descriptive Statistics of Students' Initial Ability Data

| Descriptive Statistics | Experiment Class | Control Class |
|---|---|---|
| Means | 44,34 | 45,10 |
| Standard Deviation | 11,307 | 17,239 |
| Variance | 127,846 | 297,197 |
| Top Rated | 65 | 93 |
| Lowest Value | 20 | 18 |
| Number of Students | 32 | 30 |

From Table 1, it can be seen that the average scores of both classes are not significantly different. However, to ensure the significance of the difference in the initial abilities of students between the two classes, it is necessary to test the equality of their means. Before that, a normality test was conducted first using the Shapiro-Wilk test with the assistance of JASP 0.18.3.

**Table 2.** Normality Test of Students' Initial Ability

| Dependent Variable | Class | *Statistic* | *p* |
|---|---|---|---|
| Mathematics Final Exam Results | Experiment | 0,969 | 0,480 |
| | Control | 0,958 | 0,270 |

Table 2 shows the probability values for the initial ability data of the experimental class and the control class, which are 0.480 and 0.270, respectively. Based on these test results, the probability values for each class are greater than 0.05, indicating that the distribution of the students' initial ability data is normal. After ensuring that the data distribution is normal, the testing continued with a homogeneity test using Levene's test, assisted by the JASP 0.18.3 software.

**Table 3.** Homogeneity Test of Students' Initial Ability

| F | $df_1$ | $df_2$ | *p* |
|---|---|---|---|
| 3,901 | 1 | 60 | 0,053 |

In Table 3, it is shown that the probability value is 0.053 > 0.05. This indicates that the initial ability data of the students is homogeneous. After confirming that the normality and homogeneity assumptions are met, hypothesis testing was then carried out. The hypothesis test was conducted using a two-tailed t-test to determine whether there was a significant difference between the initial abilities of the experimental class and the control class. The results of the hypothesis test are presented below.

**Table 4.** Independent Sample T-Test for Students' Initial Ability

| | t | Df | *p* |
|---|---|---|---|
| Mathematics Final Exam Results | -0,205 | 60 | 0,838 |

After analyzing the data using the JASP 0.18.3 program, it was found that the probability value of the hypothesis test was 0.838, which is greater than 0.05, leading to the acceptance of $H_0$. Therefore, the students in the experimental class and the control class have equivalent initial abilities.

**Description and Analysis of Student Mathematics Learning Outcomes**

After the treatment was given to both sample classes, the following is a description of the students' mathematics learning outcomes data.

**Table 5.** Descriptive Statistics of Student Mathematics Learning Outcomes Data

| Descriptive Statistics | Experiment Class | Control Class |
|---|---|---|
| Means | 66,625 | 56,267 |
| Standard Deviation | 19,159 | 21,203 |
| Variance | 367,081 | 449,582 |
| Top Rated | 98 | 92 |
| Lowest Value | 30 | 22 |
| Number of Students | 32 | 30 |

In Table 5, it is shown that the average mathematics learning outcomes for students in the experimental class and the control class are 66.625 and 56.267, respectively. This indicates that students in the experimental class achieved higher mathematics learning outcomes compared to those in the control class. However, this needs to be confirmed through inferential analysis using a one-tailed t-test to determine whether the implementation of ice breaking has a positive effect on students' mathematics learning outcomes. Before that, a normality test was conducted using the Shapiro-Wilk test with JASP 0.18.3.

**Tabel 6.** Normality Test of Mathematics Learning Outcomes Data

| Dependent Variable | Class | *Statistic* | *p* |
|---|---|---|---|
| Mathematics Learning Outcomes | Experiment | 0,959 | 0,255 |
| | Control | 0,949 | 0,161 |

In Table 6, the probability values from the normality test of the mathematics learning outcomes data for the experimental and control classes are 0.255 and 0.161, respectively. From these tests, the probability values for both classes are greater than 0.05, indicating that the data distribution is normal. Then, to determine the homogeneity of the data, a Levene's test for homogeneity was conducted.

**Table 7.** Homogeneity Test of Student Mathematics Learning Outcomes

| F | $df_1$ | $df_2$ | *p* |
|---|---|---|---|
| 0,452 | 1 | 60 | 0,504 |

Table 7 shows a probability value of 0.504 > 0.05. This indicates that the mathematics learning outcomes data for students in both sample classes are homogeneous. After ensuring that the normality and homogeneity analysis requirements are met, the next step is hypothesis testing to determine whether the average mathematics learning outcomes of students who received ice-breaking learning are better than those of students who received learning without ice-breaking. The hypothesis test was conducted using the JASP 0.18.3 software with a right-tailed t-test.

**Tabel 8.** Independent Sample T-Test of Student Mathematics Learning Outcomes

| | t | Df | *p* |
|---|---|---|---|
| Mathematics Learning Outcomes | 2,020 | 60 | 0,024 |

Based on Table 8, the hypothesis test produced a probability value of 0.024 < 0.05, which indicates the rejection of $H_0$. Therefore, the mathematics learning outcomes of students who received learning with ice breaking are better than those of students who received learning without ice breaking.

***Discussion***

The research findings show that the application of ice breaking has a positive effect on students' mathematics learning outcomes. This is supported by the results of the hypothesis test, which indicate that learning with the implementation of ice breaking leads to better mathematics learning outcomes compared to learning that does not implement ice breaking. These findings are in line with the study by Titi Pujiarti (2022) which states that the use of ice breaking has an impact on the mathematics learning outcomes of fifth-grade students at SD Negeri Mpuri.

Based on the researcher’s observations, the class that applied ice breaking in its lessons had a noticeably different atmosphere compared to the class that did not implement ice breaking. The atmosphere in the experimental class appeared more enjoyable, with students seeming more active and enthusiastic compared to the control class, which did not implement ice breaking. In the control class, the environment seemed noisy, some students appeared sleepy, bored, and hesitant to ask or

answer questions from the teacher. This was observed after the researcher applied the ice breaking treatment in the experimental class. This aligns with the opinion of Pujiarti (2022), who stated that the application of ice breaking evokes a sense of joy in students, which leads to an increase in students' active participation in learning. Additionally, students' ability to understand the material also improved.

In the experimental class, ice breaking was applied twice in each session, at the beginning and in the middle of the lesson. The ice breaking at the start of the lesson was conducted as part of the introductory activities to set the classroom environment. For the introductory ice breaking activity, movements and songs were used, along with variations of clapping. After this ice breaking session, students appeared more relaxed and enthusiastic about learning mathematics. Then, ice breaking was applied again in the middle of the lesson, before group discussions, at times when students seemed bored, sleepy, lazy, or had difficulty concentrating. The type of ice breaking applied in the middle of the lesson was a game that trained students' concentration, linked to the material on number patterns that was being studied. The games included clap-boom-candy, patterned clapping, and number sequencing. During the games, the researcher provided stimuli that could be processed through various senses, such as hearing, sight, and body movements, to enhance student understanding and engagement. This approach aligns with the principles in Thorndike's learning theory, which emphasizes that using various senses to receive and process information can help students understand the teacher's explanation and improve their retention of the material. Additionally, the students' responses, followed by feelings of joy or satisfaction, also support the concept of positive reinforcement in Thorndike's learning theory. After the games, students appeared happy, more active, and refocused on the learning process. Idris Jafar et al., (2023) in their research also revealed that the application of ice breaking is highly effective in focusing students' attention, allowing them to concentrate better during learning.

An interactive classroom environment is another factor that contributed to the higher mathematics learning outcomes of students in the experimental class compared to the control class. When the teacher implemented ice breaking, students appeared more united with their peers. Additionally, students showed more respect for each other even when they made mistakes, and there was a greater sense of camaraderie among them. They were also more willing to ask questions if they didn't understand something. This created an atmosphere where students were able to collaborate effectively during group discussions and felt confident to come forward and present in front of the class. This is in line with the statement made by Katni et al., (2022), who stated that ice breaking can be used to foster an atmosphere of joy, unity, and camaraderie among students. Furthermore, the study by Fauzan & Aripin (2018) concluded that the application of ice breaking can increase students' confidence in learning. These findings are also relevant to the opinion of Irman et al., (2022), who

stated that students' confidence has a positive correlation with their mathematics learning outcomes. Therefore, the application of ice breaking has a positive effect on mathematics learning outcomes.

When conducting research in the experimental class, the researcher encountered several challenges, one of which was the need to adjust the type of ice breaking chosen to the characteristics of the students to meet their needs. This can be addressed by preparing various types of ice breaking as backups. If the planned ice breaking does not go as expected, backup options or modifications to the previously planned ice breaking can be used. The teacher must be creative in adapting the ice breaking activities according to student responses. This is in line with the statement made by Marzatifa et al., (2021), who emphasized that teacher creativity during instruction plays a crucial role in energizing the classroom atmosphere. Teacher creativity is very useful for combining teaching strategies with suitable types of ice breaking, making the teaching and learning activities more diverse and meaningful. Furthermore, the duration of the ice breaking activities, which was not properly managed, and students' difficulty in following the teacher's instructions were also obstacles in this research. Solutions to address these issues include setting a clear time limit for each ice breaking activity, using a timer as a time reminder, and selecting activities related to the lesson material so that the time spent on ice breaking is considered as part of the process for understanding the material. Additionally, a solution to help students understand the teacher’s instructions is to provide concrete examples of how to implement the ice breaking activities.

## Conclusion

Based on the research findings and discussion, it can be concluded that the application of ice breaking has a positive effect on mathematics learning outcomes of class VIII at SMP Negeri 2 Samarinda for the 2023/2024 academic year. This is demonstrated by the comparison of the average mathematics learning outcomes, where students who participated in lessons with the application of ice breaking had higher scores compared to those who did not engage in ice breaking.

## Recommendations

The ice breaking activities applied during the learning sessions can serve as an alternative to create an enjoyable atmosphere and improve mathematics learning outcomes. Therefore, the recommendation for future research is to explore various types of ice breaking that can be integrated into mathematics learning. The findings could provide an explanation of the effectiveness of different types of ice breaking and offer recommendations to educators regarding the most suitable types of ice breaking to implement in the context of mathematics education.

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