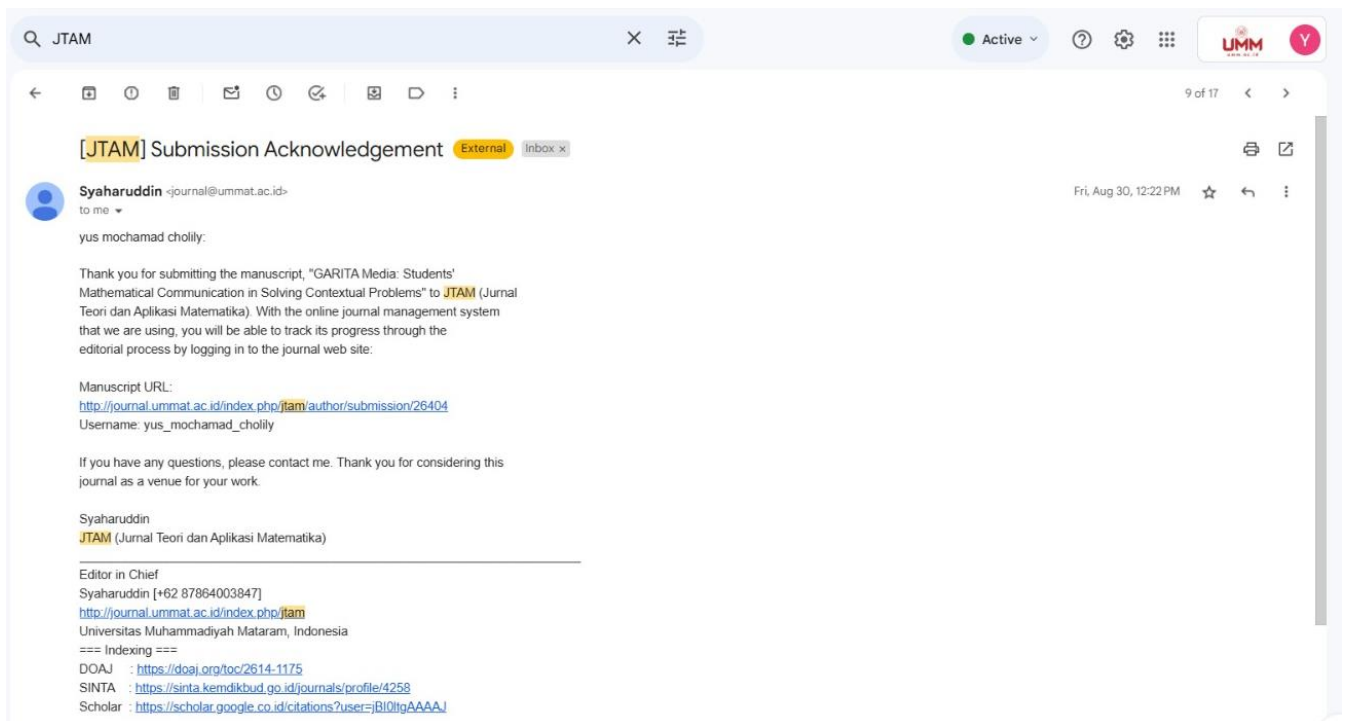


## 1. Submitting the Article (30 August 2024)



The screenshot shows an email interface with a search bar containing 'JTAM'. The email is titled '[JTAM] Submission Acknowledgement' and is marked as 'External' and 'Inbox x'. It is from Syaharuddin <journal@ummat.ac.id> to yus mochamad cholily, dated Fri, Aug 30, 12:22 PM. The body of the email contains the following text:

Thank you for submitting the manuscript, "GARITA Media: Students' Mathematical Communication in Solving Contextual Problems" to **JTAM** (Jurnal Teori dan Aplikasi Matematika). With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:

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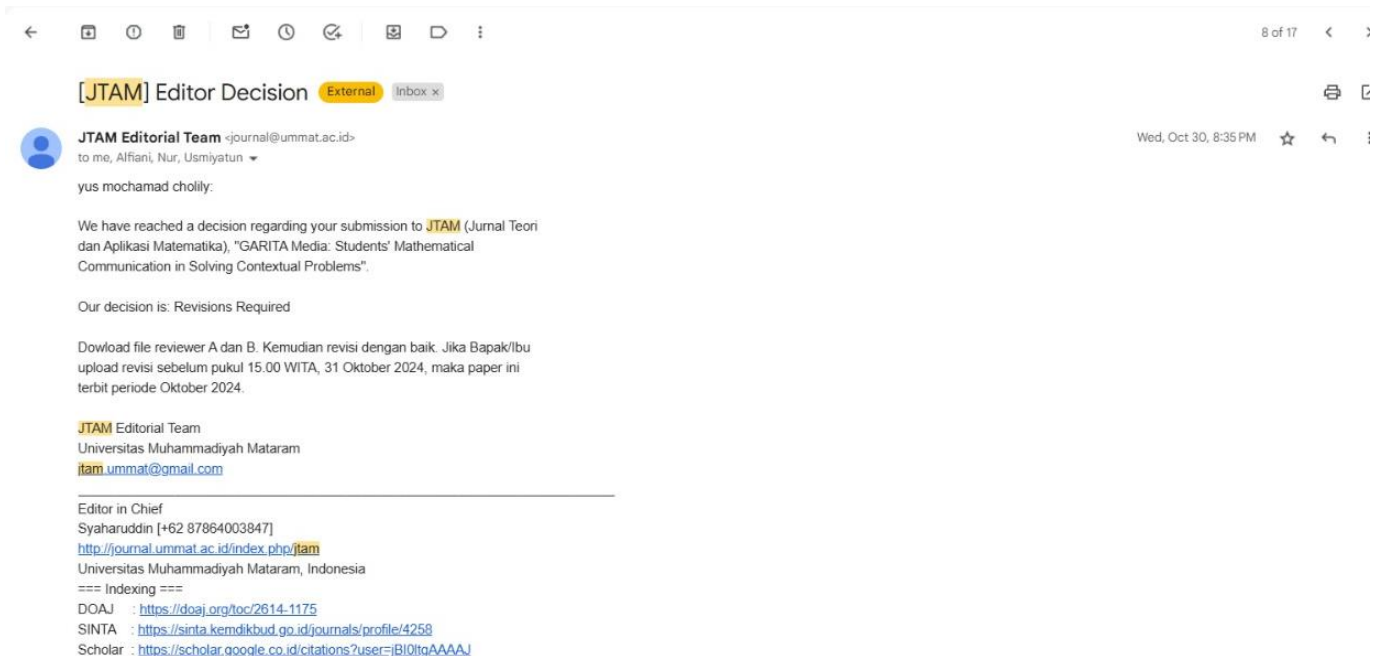
If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

Syaharuddin  
**JTAM** (Jurnal Teori dan Aplikasi Matematika)

---

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## 2. Editor Reply for the First Revision (30 October 2024)



The screenshot shows an email interface with a search bar containing 'JTAM'. The email is titled '[JTAM] Editor Decision' and is marked as 'External' and 'Inbox x'. It is from the JTAM Editorial Team <journal@ummat.ac.id> to yus mochamad cholily, dated Wed, Oct 30, 8:35 PM. The body of the email contains the following text:

We have reached a decision regarding your submission to **JTAM** (Jurnal Teori dan Aplikasi Matematika), "GARITA Media: Students' Mathematical Communication in Solving Contextual Problems".

Our decision is: Revisions Required

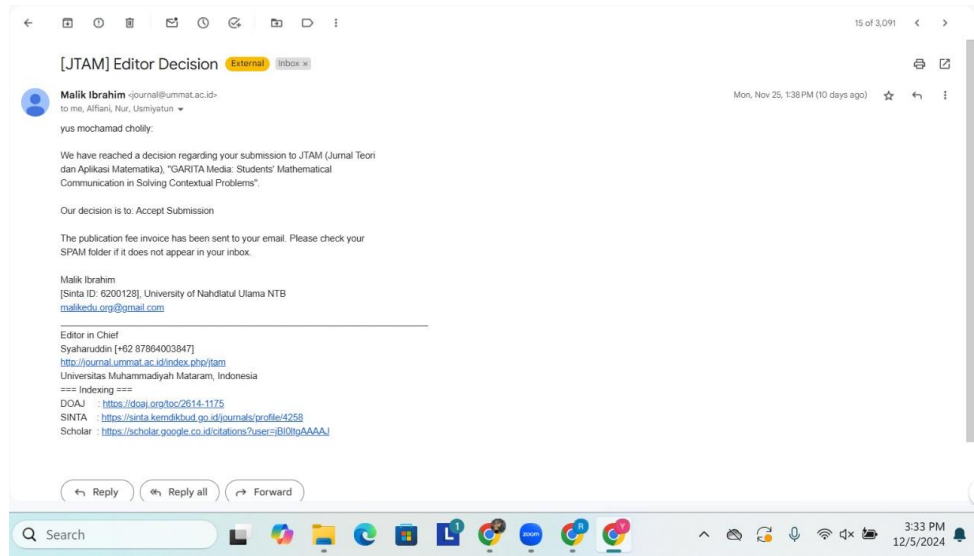
Download file reviewer A dan B. Kemudian revisi dengan baik. Jika Bapak/Ibu upload revisi sebelum pukul 15.00 WITA, 31 Oktober 2024, maka paper ini terbit periode Oktober 2024.

**JTAM** Editorial Team  
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### 3. Editor Reply for Accepting the Revision (25 Nov 2024)



### 4. The Article Acceptance and the Payment (26 Nov 2024)



## Letter of Acceptance

Number: JTAM/XI/09.01.25

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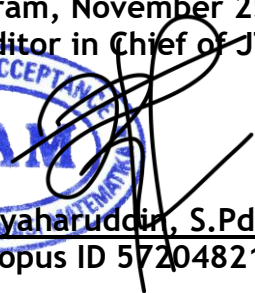
Name : Syaharuddin  
Position : Editor in Chief  
Journal : JTAM (Jurnal Teori dan Aplikasi Matematika)  
ISSN : p-ISSN 2597-7512 | e-ISSN 2614-1175  
Indexed : DOAJ, SINTA (Grade 2), EBSCO, ICI Copernicus, Google Scholar, Moraref, Neliti, Portal Garuda, BASE, EuroPub, WorldCat, CrossRef, Dimensions

The editor team has checked the revisions from the authors, so this paper is **accepted**.

Authors : Yus Mochamad Cholily, Alfiani Athma Putri Rosyadi, Nur Suciati, Usmiyatun  
Title : GARITA Media: Students' Mathematical Communication in Solving Contextual Problems  
Paper ID : 26404  
Affiliation : Muhammadiyah University of Malang  
Period : Vol. 9, No. 1, January 2025

Mataram, November 25, 2024

Editor in Chief of JTAM



**Dr. Syaharuddin, S.Pd., M.Si**  
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**DITERIMA DARI:**

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### Submission

Authors: Alfiani Athma Putri Rosyadi, Yus Mochamad Cholily, Nur Suciati, Usmiyatun Usmiyatun  
 Title: GARITA Media: Students' Mathematical Communication in Solving Contextual Problems  
 Original file: 26404-81187-1-SM.DOCX 2024-08-30  
 Supp. files: None  
 Submitter: yus mochamad cholily  
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### Submission Metadata

#### Authors

Name: Alfiani Athma Putri Rosyadi  
 Affiliation: Mathematics Education/Post Graduate, Muhammadiyah University of Malang  
 Country: Indonesia  
 Bio Statement: —  
 Email: Yus Mochamad Cholily  
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SUMMARY REVIEW EDITING

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 Title: GARITA Media: Students' Mathematical Communication in Solving Contextual Problems  
 Section: Articles  
 Editor: Malik Ibrahim

### Peer Review

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Review Version: 26404-81189-2-RV.DOCX 2024-10-05  
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 Last modified: 2024-10-30  
 Uploaded file: Reviewer A 26404-83505-1-RV.DOCX 2024-10-12  
 Reviewer B 26404-84573-1-RV.DOCX 2024-10-30

### Editor Decision

Decision: Accept Submission 2024-11-25  
 Notify Editor: Editor/Author Email Record 2024-11-25  
 Editor: 26404-83215-1-ED.DOCX 2024-10-05  
 Author: 26404-85852-1-ED.DOCX 2024-11-19  
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# GARITA Media: Students' Mathematical Communication in Solving Contextual Problems

## ABSTRACT

### Article History:

Received: D-M-20XX  
Revised: D-M-20XX  
Accepted: D-M-20XX  
Online: D-M-20XX

### Keyword:

Keyword1:  
Mathematical  
Communication Skills  
Keyword2: Cotextual  
Problems  
Keyword3: GARITA  
Keyword4:  
Etc...



Based on observation results, the mathematical communication skills of 6th-grade elementary school students are still relatively low. This can be seen during classroom learning activities or when taking exams, when they are faced with contextual story problems they have difficulty understanding and solving them.

The implementation of this research activity aims to see effect the relationship between GARITA media and the mathematical communication skills of 6th-grade elementary school students, as shown through the results of contextual problem assignment scores. Apart from looking at the connection between GARITA media and mathematical abilities, this research was conducted to increase students' understanding in solving contextual problems. GARITA media is a media in the form of story images which have the role of helping to illustrate the problems in story problems, making it easier for students to understand the content of contextual problems and solve them.

This research uses quantitative methods with quasi-experiments. The population of this study were students at SD Muhammadiyah 3 IKROM Wage Sidoarjo. This research activity took data from 29 Zahrawi 6th grade students as the control group and 30 Haitam 6th grade students as the experimental group. The result of this research data was obtained by carrying out a post-test in the form of a contextual question test and a student response questionnaire. The data analysis techniques used in this research are normality test, homogeneity test, and hypothesis test. This shows a significant difference in the mathematical communication skills of students who received treatment using GARITA assistance with students who did not receive treatment. The homogeneity test result shows that homogeneity data based on post-test data shows a figure  $< 0,05$ . Hypothesis testing shows a significant influence based on the result of the independent sample t-test  $< 0,05$ . So, the result of this research indicates that GARITA media can influence the improvement of students' mathematical communication skills in solving contextual problems.

<https://doi.org/10.31764/jtam.vXiY.ZZZ>

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## A. INTRODUCTION

Ability is an individual's capacity to carry out various tasks in an activity. Mathematical ability is the ability that is used to carry out many mental activities, think, analyze, and solve student problems in solving mathematical story problems (Widarti, 2013). Mathematics communication is a way for students to express and express mathematical ideas unwritten or written to express everyday events, either in the form of pictures, tables, diagrams, formulae, demonstrations, or connecting real objects (Baswid, 2020). Mathematical communication skill are the ability to communicate the connection of an idea that occurs in the student's learning environment with several activities including copying, studying, observing, associating

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evaluating ideas, symbols, terms and mathematical explanations, where there is transfer/delivery of messages that explain about mathematics learning materials (Maulinda & Zamli, 2020).

In everyday life, we often encounter various information presented in various symbols and numbers which represent the content of the information. To make it easier for us to make conclusions about the information presented, we must have the ability to understand the information. Contextual problem is a problem that is still related to the surrounding environment and is experienced by students using mathematical methods the solution can be determined (Kusnawan dkk., 2017). Contextual problems are problems that are in sync with the conditions experienced by students and are also in sync with real life and are close to students (Wijanata & Sufiana, 2021). The usefulness of contextual problem solving is that it can teach students to determine a problem and construct the problem as a real problem to determine how to solve it by applying it with mathematical skills.

A. —

To make it easier for us to draw conclusions about the information presented, we must have the ability to understand it. Ability is an innate skill or expertise that you are born with, which can be used as a provision to solve a problem and can be realized in real action (Damayanti & Afriansyah, 2018). Communication skills are needed to solve and clarify problems (Setiyani, Putri, et al., 2020). Advances in science and technology are supported by primary knowledge, namely mathematics (Sugianto et al., 2022). Mathematics provides solutions in the form of conceptual analogies with various topics (Baiduri & Suliani, 2020). Mathematical communication skills make a real contribution to improving the economic welfare of individuals and the general public. One ability to transfer information about ideas is mathematical communication skills (Sekaryanti et al., 2022). This increase in welfare is obtained from the individual's ability to use mathematics in daily life. Mathematics is knowledge not only found in school but also in life; for this reason, mathematics is studied from elementary school to university level (Paroqi et al., 2020).

At the beginning of taking the PISA test, Indonesia's score was 371, and in 2003, Indonesia's score increased to 382. Indonesia's score was 393 in 2006 and reached 402 in 2009. After 2009, Indonesia's score never increased again, and the lowest point obtained was 371 in 2018 (Sri Hartatik, 2020). With students' low ability to understand contextual problems, teachers use media to improve their understanding with GARITA media. Learning media is used to convey a message so that it does not cause errors in interpreting and wrong conclusions in drawing. This is the definition of story images (Munirah dkk., 2019). GARITA media is a medium used by teachers in the form of pictures containing stories to convey abstract material into more concrete forms with the aim of making learning material easier to accept and understand so that students can more easily solve various forms of contextual problems in learning.

Based on observation, the mathematical communication skills of of 6th-grade elementary school students are still relatively low. It can be seen that during classroom learning activities or when taking exams, around 90% of students have difficulty completing and take a very long time to understand and study contextual questions. The results of daily grades and contextual story question work exams were around 87% of students got low points. Based on the results of interviews, around 75% of students said they had difficulty understanding the meaning of the story questions so they were confused about taking steps to solve the story questions. Most of the story questions in

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mathematics learning are too many in the form of written text and are presented in one direction so that the learning is less interesting for students. Based on observations, the mathematical communication skills of 6th grade elementary school students are still relatively low. This can be seen during classroom learning activities or when taking exams, when they are faced with contextual story questions, they have difficulty solving them, and it takes a very long time to understand and study the questions; the result of daily grades and exams when working on contextual story questions, many students still experience errors, only a few children get their work close to correct. Apart from observation, they also have difficulty understanding the meaning of the story problem through interviews, so they are confused about taking steps to solve the problem. Most of the story questions in mathematics learning are too many in the form of written text and are delivered in one direction, making the learning less attractive for students. Because mathematics is an abstract learning, natural objects are needed to help students, especially elementary school students, understand (Gistituati & Atikah, 2022). Several studies have determined students' abilities in solving contextual story problems. Including a description of the student's mathematical communication skills in solving contextual story problems (Kurniawan et al., 2017) and using a contextual approach in solving story problems as in the research title Potential of Student's Formal Mathematical Reasoning in Solving Contextual Story Problems (Deni et al. n.d.). Profile of Students' Mathematical Communication Ability in Solving Story Problems whose research aims to describe students' mathematical abilities does not aim to improve students' mathematical abilities. (Ma'rifah et al., 2020). Meanwhile, there is also research that discusses the influence of peer tutors in improving students' mathematical abilities in the research titled The Effect of Peer Tutor Learning Models on elementary school students. (Hayati et al., 2019).

Learning media in learning activities provides many benefits, it can facilitate interaction between teachers and students so that learning activities will be of higher quality, and the material delivered will be right on target according to the learning objectives desired by the teacher. (Nuryamah dkk., 2016). GARITA media is a medium used to convey learning material as a benefit: 1. creating a meaningful and varied learning atmosphere. 2. increasing students' concentration in learning. 3. the material delivered by the teacher will be easier for students to understand. 4. Make it easier for teachers to convey abstract material into more concrete ones.

Several studies have determined students' abilities in solving contextual story problems. Including a description of the student's mathematical communication skills in solving contextual story problems (Kurniawan et al., 2017). and using a contextual approach in solving story problems as in the research title Potential of Student's Formal Mathematical Reasoning in Solving Contextual Story Problems (Deni et al. n.d.). Profile of Students' Mathematical Communication Ability in Solving Story Problems whose research aims to describe students' mathematical abilities does not aim to improve students' mathematical abilities. (Ma'rifah et al., 2020). Meanwhile, there is also research that discusses the influence of peer tutors in improving students' mathematical abilities in the research titled The Effect of Peer Tutor Learning Models on elementary school students. (Hayati et al. 2019) Students' mathematical communication skills in solving contextual story problems are generally still relatively low. Profile of Students' Mathematical Communication Ability

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in Solving Story Problems whose research aims to describe students' mathematical abilities does not aim to improve students' mathematical abilities. (Ma'rifah et al., 2020). This research concludes that students with low abilities have poor communication skills because they cannot write down what they know correctly. Meanwhile, there is also research that discusses the influence of peer tutors in improving students' mathematical abilities in the research titled The Effect of Peer Tutor Learning Models on elementary school students. (Hayati et al., 2018). This research concludes that discussion activities in the peer tutoring model can improve abilities student communication improved communication can be seen from learning achievement. Students with good communication in discussion activities tend to have better grades compared to students who are less active.

This research activity was carried out to determine the effect of GARITA media on students' mathematical communication skills in solving contextual story problems better. This research activity was carried out to determine the effect of GARITA media on students' mathematical communication skills by increasing students' understanding in solving contextual problems better. Before solving story problems, the essential skills that students must master are understanding and studying the story problem itself so that students can determine the steps in solving the problem. Before solving story problems, the essential skills that students must master are understanding and studying the story problem itself so that students can determine the steps in solving the problem.

Several studies have determined students' abilities in solving contextual story problems. Including a description of the student's mathematical communication skills in solving contextual story problems (Kurniawan et al., 2017) and using a contextual approach in solving story problems as in the research title Potential of Student's Formal Mathematical Reasoning in Solving Contextual Story Problems (Deni et al. n.d.). Profile of Students' Mathematical Communication Ability in Solving Story Problems whose research aims to describe students' mathematical abilities does not aim to improve students' mathematical abilities. (Ma'rifah et al., 2020). Meanwhile, there is also research that discusses the influence of peer tutors in improving students' mathematical abilities in the research titled The Effect of Peer Tutor Learning Models on elementary school students. (Hayati et al., 2018)

## B. METHODS

Research means a theory that aims to improve the theory being studied using a rational and systematic method (Rukminingsih et al., 2020). Quantitative methods, qualitative methods, classroom action research, and mixed methods are examples of several problem-solving methods in educational research. The quantitative method is a way of collecting data through research instruments like populations and samples. Meanwhile, the qualitative method uses data collection and retrieval by interacting directly with the research object, and the results do not go through statistical procedures. The experimental research method is carried out to determine how much influence treatment under controlled conditions has on something else (Munirah et al., 2019).

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Meanwhile, experimental research is used in learning to determine whether or not a treatment affects learning activities using approaches, strategies, methods, or learning media. The experimental method referred to here is to measure how much influence GARITA media has on students' mathematical communication skills in solving contextual story problems.

This research uses instruments in the form of questionnaires and evaluation tests. The questionnaire was used as a validity and reliability test for GARITA media. The validation method for GARITA media is carried out by providing validation questionnaires and GARITA media to experts, that is media experts and material experts. A Likert scale rating scale was used to analyze the validation data (Nur Aini & Sulistyani, 2019)

**Table 1.** Eligibility Criteria Interval

| No | Validation Criteria | Validity Level Categories | Information                      |
|----|---------------------|---------------------------|----------------------------------|
| 1  | 85.01-100 %         | Very Valid                | Can be used                      |
| 2  | 70.01-85 %          | Valid                     | Can be used with minor revisions |
| 3  | 50.01-70 %          | Less Valid                | It is recommended not to use     |
| 4  | 01.00 – 50%         | Invalid                   | Can't be used                    |

The type of research used in this research is Quasi-Experimental, where the design of this research is determined by a post-test design using a control group without random assignment, namely determining two sample classes as research subjects. The groups were divided into one class, the experimental group, and another class, the control group. The design of the learning activities was that the experimental group was given treatment by providing material using GARITA media. In contrast, the material was given in the control group without using GARITA media. After the post-test is carried out, the results of the student's work are assessed.

The assessment result data is processed using hypothesis testing by comparing evidence of post-test data from the experimental and control groups. The contextual story problem material is limited to the material on the surface area of the mathematics learning space for 6<sup>th</sup> grade elementary school semester 2.

This research uses instruments in the form of questionnaires and evaluation tests in the form of story questionnaires to determine the level of student response.

Meanwhile, evaluation is given to test students' level of thinking skills. The questionnaire will be measured using a 1-4 scale consisting of four alternative answers: Strongly Agree, Agree, Disagree, and Strongly Disagree. (Setiyani et al., 2020). The criteria for student responses when using GARITA media to solve contextual story questions can be seen in the table below.

**Table 21.** Criteria for student responses to GARITA media

| Number | Percentage | Criteria    |
|--------|------------|-------------|
| 1.     | 90-100     | Very good   |
| 2.     | 80-89      | Good        |
| 3.     | 70-79      | Pretty good |
| 4.     | 60-69      | Not good    |

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| 5. | < 60 | Bad |
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This research was carried out at one of the Muhammadiyah elementary schools in Sidoarjo, namely Muhammadiyah 3 Elementary School IKROM Wage Sidoarjo, by taking data from two classes. The first class as an experimental group had 30 students, and the second class as a control group had 29 students. This research was conducted in depth regarding student's mathematical abilities in solving contextual story problems. The data obtained will be collected, and the results will be compared between the results of working on story questions without the help of story pictures and the results of working on story questions using the help of story pictures.

Data collection in this research can be seen in the following table.

**Table 23.** Research Design

| Sampling  | Group      | Treatment | Post-test |
|-----------|------------|-----------|-----------|
| Nonrandom | Experiment | X         | Y2        |
| Nonrandom | Control    | -         | Y2        |

The research instruments used were contextual story questions without GARITA and story questions using GARITA. When carrying out the post-test, each group of students, both the control and experimental groups, was directed to work on contextual story questions. Experimental group post-test story question



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Mr Bimo's family is conducting a birthday party for their only child, Ane. His birthday party was held at his new house. At that moment, Ane invited all her classmates. Several of her classmates, including Alya, Angga, and Mirna, have prepared gifts for Ane. Alya prepared a doll gift, which was put in a cube-shaped box with sides measuring 30 cm. Meanwhile, Angga has prepared a gift packaged in a block-shaped gift in a block-shaped gift box measuring 20 cm long, 10 cm wide, and 8 cm high. Unlike the gift Mirna prepared, a pyramid-shaped alarm clock measuring 24 cm high, the alarm clock was put in a triangular prism-shaped box with each upright side painted pink, and the base and lid sides painted blue. The Mirna's prism is about 30 cm high, with an equilateral triangular base measuring 22 cm and a height of 18 cm. They can't wait to give gifts for Ane's birthday immediately.

Based on the story above, then:

- 1.—What is the minimum area of wrapping paper that Alya and Angga must prepare?
- 2.—How many cm<sup>2</sup> is Mirna's gift box painted pink?

### Normality Test

This determines whether the data comes from a normally distributed population or is within a normal distribution. The Normality Test is required to determine the type of statistics used in subsequent data analysis. Then, the Normality test is determined using the Kolmogrov-Smirnov Test with SPSS 25 for Windows. The basis for decision-making in the normality test includes the following: 1) the sig value or significance or probability is  $< 0,05$ , then the distribution is not normal, and 2) the sig value or significance or probability  $> 0.05$ , then the distribution is normal.

### Homogeneity Test

Homogeneity testing was conducted to determine whether some of the data used as research samples had variances that were not much different in diversity.

**Table 43. Summary of Mathematical Ability Analysis**

| Homogeneity Test   | Calculate $X^2$ value | Table $X^2$ values criteria 0.05 | Decision $H_0$    |
|--|-----------------------|----------------------------------|-------------------|
| Mathematical abilities in control and experimental classes | 0.3425203             | 3,841                            | $H_0$ is accepted |

Homogeneity in this study will be tested by comparing post-test score data from each group using the Barlett Test statistical analysis (Nuryadi et al., 2017).

### Hypothesis testing

Hypothesis testing is necessary to determine the success of the research. This hypothesis is determined by determining a temporary conclusion after providing a treatment based on appropriate theories. Determining this hypothesis is called the Working Hypothesis ( $H_1$ ). To determine the effectiveness of the working hypothesis, it is necessary to hold a Comparative Hypothesis, namely by using the Null Hypothesis ( $H_0$ ). Hypothesis testing is carried out after normality, and homogeneity tests are carried out. Parametric statistical tests with the independent sample t-test type are chosen if the data is usually distributed and homogeneous. (Hasanah et al., 2023) The test results criteria :

Accept  $H_1$ : The GARITA media significantly influences students' mathematical communication skills.

If the result is sig. (2-tailed)  $< 0.05$ , then a decision can be made that  $H_1$  is accepted, namely that there is a significant influence on the treatment of providing GARITA media during classroom learning activities on student's mathematical communication skills.

## C. RESULT AND DISCUSSION

### RESULTS

The expected research results focus on the initial research objective: to discover how GARITA media influences students' mathematical abilities in solving contextual problems|

#### Application of GARITA media in solving contextual problems

This research was conducted at SD Muhammadiyah 3 IKROM Wage. This research uses class VI as the population. The sample from this research was taken from two classes,

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namely the control class and the experimental class. GARITA media is applied to calculate the surface area of spatial figures.

In the introductory stage, the researcher started the lesson by greeting the students, praying before starting the lesson, checking the students' attendance, and providing motivation for studying the material on the surface area of geometric shapes. Then, convey the benefits of calculating the surface area of spatial figures in daily life.

The core activities in learning are carried out at several meetings, including :

Meeting 1: Get to know the shape of space and its surface area

The first action in this activity was the researcher dividing the student into several groups. Then, the researcher gave several spatial image media to each group. Each group member was asked to independently observe the characteristics of the spatial structure and guess its name.

Meeting 2 Determine the surface area of the spatial figure

The first action in this activity was the researcher dividing the students into several groups. Then, the researcher gave several spatial image media to each group. To observe the surface area of the space, students carry out this activity by writing the shape of the side (surface) of all the parts on the spatial drawing that has been prepared.

Meeting 3 Calculate the surface area of the spatial figure.

The action in this activity was that the researcher first divided the students into several groups. Then, the researcher gave several pictures of spatial media to each group. Each group member is asked to observe how to calculate the surface area of spatial structure. Students carry out this activity by writing down the steps to calculate the surface area on a prepared spatial image and worksheet containing GARITA media and continuing by filling in a student response questionnaire.

#### Normality test results

Normality test results are calculated to determine whether the data is normally distributed. The normality test result is presented in the following table.

**Table 45.** Normality test results

| Mathematics Learning Outcomes | Class        | Kolmogorov-Smirnova |    |      | Shapiro-Wilk |    |      |
|-------------------------------|--------------|---------------------|----|------|--------------|----|------|
|                               |              | Statistics          | Df | Sg   | Statistics   | Df | Sg   |
|                               | Control      | ,147                | 29 | ,109 | ,964         | 29 | ,419 |
|                               | Experimental | ,156                | 29 | ,060 | ,956         | 30 | ,242 |

The normality test result in the table shows the result of the data; the sig value or probability of each group is > 0.05, then the data is usually distributed.

#### Homogeneity test results

The homogeneity test results were calculated to determine whether the two groups used in the study were homogeneous. The homogeneity test results using the Barlett test formula are described in the following table.

**Table 65.** Summary of Mathematical Ability Analysis

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| Homogeneity test   | Calculated value | $X^2$ value | Table $X^2$ criteria 0.05 | Decision $H_0$ |
|--|------------------|-------------|---------------------------|----------------|
| Mathematical abilities in control and experimental classes | 0.3425203        |             | 3,841                     | $H_0$ Accepted |

Analysis results of calculated  $X^2$  values  $< X^2$  table. The data from the two groups is homogenous, and it is necessary to carry out further tests, namely the independent sample t-test.

### Hypothesis test results

Calculation of the hypothesis results using the independent t-test was carried out to find out whether there was a significant influence on the treatment of using GARITA media on students' mathematical communication skills.

The results of the independent t-sample test can be seen in the table below:

**Table 76. Independent T-test results**

| Post Test |    |      |             |
|-----------|----|------|-------------|
| t         | Df | Sig  | Information |
| -2,783    | 57 | ,007 | significant |

Based on the hypothesis test calculations in the table, the sig-independent T-test value shows  $0.007 < 0.05$ . This provides information that GARITA media influences students' mathematical communication skills.

### Student replies to GARITA media.

The responses from Control and Experiment class students were obtained from data from a questionnaire with ten questions using a 1-4 Likert scale.

The questionnaire was given after students carried out post-test activities at the last meeting of research activities. The questionnaire scores were then analyzed to determine students' responses to using GARITA media to solve contextual questions. Descriptive data on the questionnaire responses from experimental class students are presented in the following table.

**Table 78. Descriptive data on the responses of experimental class students**

| No. | Statements   | $\Sigma$ score | Percentage (%) | Criteria    |
|-----|--|----------------|----------------|-------------|
| 1.  | The learning atmosphere is pleasant when the teacher explains the learning material  | 97             | 81             | Good        |
| 2.  | The surface area of spatial figures is easier to understand using image media  | 103            | 86             | Good        |
| 3.  | The presence of image media with a problem-based approach increases my curiosity in studying surface area material and makes me more active in class | 95             | 79             | Pretty good |

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|-----|---|-----|----|-------------|
| 4.  | I prefer learning using image media when working on contextual questions.   | 100 | 83 | Good        |
| 5.  | I can more easily determine the steps to solve the contextual problems given.   | 94  | 78 | Pretty good |
| 6.  | The existence of assignments on the worksheet to solve contextual problems with the help of pictures makes it easier for me to understand the questions | 96  | 80 | Good        |
| 7.  | Worksheets on contextual problems on the surface area of geometric figures with the help of pictures can arouse my curiosity in solving this problem    | 90  | 75 | Pretty good |
| 8.  | I can do contextual questions well.   | 89  | 74 | Pretty good |
| 9.  | It is easier for me to design a solution to the contextual problem.   | 91  | 76 | Pretty good |
| 10. | I prefer learning mathematics using worksheets with the help of pictures  | 99  | 83 | Good        |

Most students said that using GARITA media helped them more easily understand the learning material so that it would be easier for them to determine the steps in solving contextual problems, and learning activities were more enjoyable, thereby increasing students' activeness in learning in class. GARITA media further increases students' interest in studying mathematics because it is not monotonous just in the form of numbers

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Meanwhile, descriptive data from the questionnaire responses from control class students are presented in the table below.

**Table 89.** Descriptive data on the responses of control class students

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| No. | Statements   | $\Sigma$ score | Percentage (%) | Criteria |
|-----|--|----------------|----------------|----------|
| 1.  | The learning atmosphere is pleasant when the teacher explains the learning material  | 54             | 47             | not good |
| 2.  | The surface area of spatial figures is easier to understand without image media  | 50             | 43             | not good |
| 3.  | Without image media, the problem-based approach increases my curiosity in studying surface area material and makes me more active in class | 54             | 47             | not good |

|     |   |    |    |          |
|-----|---|----|----|----------|
| 4.  | I prefer learning using image media when working on contextual questions  | 97 | 84 | Good     |
| 5.  | I can more easily determine the steps to solve the contextual questions given, even without the help of image media   | 56 | 48 | not good |
| 6.  | Having assignments on the worksheet to solve contextual problems without using pictures made it easier for me to understand the questions                         | 52 | 45 | not good |
| 7.  | Worksheet about contextual problems regarding the surface area of geometric shapes without the help of pictures can arouse my curiosity in solving these problems | 54 | 47 | not good |
| 8.  | I can do contextual questions well  | 58 | 50 | not good |
| 9.  | It is easier for me to design a solution to solve the contextual problem  | 57 | 49 | not good |
| 10. | I prefer learning mathematics using worksheets without using pictures   | 49 | 42 | not good |

Most students said that they had difficulty understanding the material and determining the steps without using media assistance. Students also conveyed that the learning atmosphere was unpleasant, resulting in inactivity in learning

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## DISCUSSION

Researchers use GARITA media to increase students' understanding of solving contextual problems regarding the surface area of spatial figures. To improve student learning outcomes, it is necessary to use exciting and innovative learning media. (Mujahadah et al., 2021).

Post-test activities were conducted to determine students' mathematical communication skills in solving contextual story problems. The research was conducted using contextual problems because it is hoped that they can be applied in students' daily lives, such as opinions (Ulfa & Saputra, 2019). The mathematics learning must be relevant and related to students' lives.

The results generally show that the average post-test score for calculating the surface area of spatial figures using GARITA media is higher. The use of learning media can increase students' understanding of the material (Wahyuni & Ananda, 2022). The GARITA media given to students is included in visual media. After concrete media, visual media is the easiest to observe and see (Mujahadah et al., 2021).

Data were obtained based on the results of the independent T-test, which showed significant differences in the mathematical abilities of students using GARITA media. The use of appropriate media can have the effect of raising students learning motivation so



that it can improve students' understanding and learning outcomes. (Sirait & Apriyani, 2021).

The average score in the experimental class during the posttest showed higher results than the average posttest score in the control class. This research can also be proven based on the results of hypothesis testing, which shows that students' mathematical communication skills using GARITA learning media significantly influence learning outcomes. The average of the experimental class at the post-test was better than that of the control class. GARITA media is effectively used in learning to solve contextual problems.

This increase occurred with treatment using GARITA media during direct learning activities to independently answer or complete contextual story questions. The test is conducted with an evaluation in the form of a description question using contextual story questions, such as the opinion. (Sina et al., 2019) To improve students' ability to develop their mathematical knowledge, there needs to be stimulation by providing a good communication process.

Regarding research, student responses can be adjusted to the opinion that learning will be more fun and make students more active due to media use. (Saufi & Rizka, 2021). A group of students was given treatment with GARITA media assistance when solving contextual problems. Most students said that using GARITA media helped them understand the learning material more efficiently, making it easier to determine the steps in solving contextual problems, and learning activities were more enjoyable. Thereby increasing student activity in classroom learning. GARITA media further increases students' interest in studying mathematics because it is not monotonous, just in the form of numbers. The display of images in contextual story problems has been proven to increase students' interest in studying mathematics.

## D. CONCLUSION AND SUGGESTIONS

### CONCLUSION

Based on research conducted at SD Muhammadiyah 3 IKROM Wage Sidoarjo and research data at 30 experimental class students when learning using GARITA media were tested using hypothesis testing, processing, analysis, and discussion, it can be concluded effect it improves students' mathematical communication skills; this is based on test results. Hypothesis testing shows that the Sig independent T test value shows 0,007 < 0,05. This provides information that the mathematical communication skills of students who use GARITA media during post tests and learning activities have increased significantly when compared to students who do not use GARITA media. Statistically, it shows that there is an influence of GARITA media on students' thinking abilities in solving contextual problems. Based on the results of the independent T-test data results show that the GARITA media used has an effect on students' mathematical abilities

The increase in mathematical communication can be seen from students' learning outcomes in solving contextual problems, material on the surface area of shapes, and the

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excellent response for groups who use GARITA media when carrying out activities to solve contextual problems.

## SUGGESTIONS

The researcher's recommendation for readers and researchers is to develop more interesting GARITA media to improve students' mathematical communication skills and to be able to use IT-based media So that it can be more engaging and increase students' curiosity. Based on several findings when carrying out research, GARITA media can use more straightforward information by conveying the theme so that students are more focused and more accessible in solving contextual problems.

## ACKNOWLEDGEMENT

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# GARITA Media: Students' Mathematical Communication in Solving Contextual Problems

## ABSTRACT

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The implementation of this research activity aims to see the relationship between GARITA media and the mathematical communication skills of 6th-grade elementary school students, as shown through the results of contextual problem assignment scores. This research uses quantitative methods with quasi-experiments. The population of this study were students at SD Muhammadiyah 3 IKROM Wage Sidoarjo. This research activity took data from 29 Zahrawi 6<sup>th</sup> grade students as the control group and 30 Haitam 6<sup>th</sup> grade students as the experimental group. The result of this research data was obtained by carrying out a post-test in the form of a contextual question test and a student response questionnaire. The data analysis techniques used in this research are normality test, homogeneity test, and hypothesis test. This shows a significant difference in the mathematical communication skills of students who received treatment using GARITA assistance with students who did not receive treatment. The homogeneity test result shows that homogeneity data based on post-test data shows a figure  $< 0,05$ . Hypothesis testing shows a significant influence based on the result of the independent sample t-test  $< 0,05$ . So, the result of this research indicates that GARITA media can influence the improvement of students' mathematical communication skills in solving contextual problems.



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## A. INTRODUCTION

To make it easier for us to draw conclusions about the information presented, we must have the ability to understand it. Ability is an innate skill or expertise that you are born with, which can be used as a provision to solve a problem and can be realized in real action (Damayanti & Afriansyah, 2018). Communication skills are needed to solve and clarify problems (Setiyani, Putri, et al., 2020). Advances in science and technology are supported by primary knowledge, namely mathematics (Sugianto et al., 2022). Mathematics provides solutions in the form of conceptual analogies with various topics (Baiduri & Suliani, 2020). Mathematical communication skills make a real contribution to improving the economic welfare of individuals and the general public. One ability to transfer information about ideas is mathematical communication skills (Sekaryanti et al., 2022). This increase in welfare is obtained from the individual's ability to use mathematics in daily life. Mathematics is knowledge not only found in school but also in life; for this reason, mathematics is studied from elementary school to university level (Paroqi et al., 2020).

At the beginning of taking the PISA test, Indonesia's score was 371, and in 2003,

**Commented [RA1]:** We recommend adding a clearer explanation of "GARITA media" to ensure that readers fully understand this concept. This additional clarification will help provide better context and understanding of the media used in the study.

**Commented [RA2]:** Please structure the background into a minimum of seven paragraphs, with each paragraph consisting of at least seven lines and three relevant references. Paragraphs 1, 2, and 3 should focus on discussing the research variables contained in your study title. Paragraphs 4, 5, and 6 should address previous studies that are relevant to your research. The final paragraph, paragraph 7, should elaborate on the research objectives you aim to achieve.

Additionally, please review the references you have used, as we found that some references have not been formatted using a Manager Reference, APA Style.

Indonesia's score increased to 382. Indonesia's score was 393 in 2006 and reached 402 in 2009. After 2009, Indonesia's score never increased again, and the lowest point obtained was 371 in 2018 (Sri Hartatik, 2020). Based on observations, the mathematical communication skills of 6th-grade elementary school students are still relatively low. This can be seen during classroom learning activities or when taking exams; when they are faced with contextual story questions, they have difficulty solving them, and it takes a very long time to understand and study the questions; the result of daily grades and exams when working on contextual story questions, many students still experience errors, only a few children get their work close to correct. Apart from observation, they also have difficulty understanding the meaning of the story problem through interviews, so they are confused about taking steps to solve the problem. Most of the story questions in mathematics learning are too many in the form of written text and are delivered in one direction, making the learning less attractive for students. Because mathematics is an abstract learning, natural objects are needed to help students, especially elementary school students, understand (Gistituati & Atikah, 2022)

This research activity was carried out to determine the effect of GARITA media on students' mathematical communication skills in solving contextual story problems better. Before solving story problems, the essential skills that students must master are understanding and studying the story problem itself so that students can determine the steps in solving the problem. Before solving story problems, the essential skills that students must master are understanding and studying the story problem itself so that students can determine the steps in solving the problem.

Several studies have determined students' abilities in solving contextual story problems. Including a description of the student's mathematical communication skills in solving contextual story problems (Kurniawan et al., 2017) and using a contextual approach in solving story problems as in the research title Potential of Student's Formal Mathematical Reasoning in Solving Contextual Story Problems (Deni et al. n.d.). Profile of Students' Mathematical Communication Ability in Solving Story Problems whose research aims to describe students' mathematical abilities does not aim to improve students' mathematical abilities. (Ma'rifah et al., 2020). Meanwhile, there is also research that discusses the influence of peer tutors in improving students' mathematical abilities in the research titled The Effect of Peer Tutor Learning Models on elementary school students. (Hayati et al., 2018)

## B. METHODS

Research means a theory that aims to improve the theory being studied using a rational and systematic method (Rukminingsih et al., 2020). Quantitative methods, qualitative methods, classroom action research, and mixed methods are examples of several problem-solving methods in educational research. The quantitative method is a way of collecting data through research instruments like populations and samples. Meanwhile, the qualitative method uses data collection and retrieval by interacting directly with the research object, and the results do not go through statistical procedures. The experimental research method

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is carried out to determine how much influence treatment under controlled conditions has on something else (Munirah et al., 2019).

Meanwhile, experimental research is used in learning to determine whether or not a treatment affects learning activities using approaches, strategies, methods, or learning media. The experimental method referred to here is to measure how much influence GARITA media has on students' mathematical communication skills in solving contextual story problems.

The type of research used in this research is Quasi-Experimental, where the design of this research is determined by a post-test design using a control group without random assignment, namely determining two sample classes as research subjects. The groups were divided into one class, the experimental group, and another class, the control group. The design of the learning activities was that the experimental group was given treatment by providing material using GARITA media. In contrast, the material was given in the control group without using GARITA media. After the post-test is carried out, the results of the student's work are assessed. The assessment result data is processed using hypothesis testing by comparing evidence of post-test data from the experimental and control groups. The contextual story problem material is limited to the material on the surface area of the mathematics learning space for 6<sup>th</sup> grade elementary school semester 2.

This research uses instruments in the form of questionnaires and evaluation tests in the form of story questionnaires to determine the level of student response. Meanwhile, evaluation is given to test students' level of thinking skills. The questionnaire will be measured using a 1-4 scale consisting of four alternative answers: Strongly Agree, Agree, Disagree, and Strongly Disagree. (Setiyani, Fitriyani, et al., 2020). The criteria for student responses when using GARITA media to solve contextual story questions can be seen in the table below.

**Table 1.** Criteria for student responses to GARITA media

| Number | Percentage | Criteria    |
|--------|------------|-------------|
| 1.     | 90-100     | Very good   |
| 2.     | 80-89      | Good        |
| 3.     | 70-79      | Pretty good |
| 4.     | 60-69      | Not good    |
| 5.     | < 60       | Bad         |

This research was carried out at one of the Muhammadiyah elementary schools in Sidoarjo, namely Muhammadiyah 3 Elementary School IKROM Wage Sidoarjo, by taking data from two classes. The first class as an experimental group had 30 students, and the second class as a control group had 29 students. This research was conducted in depth regarding student's mathematical abilities in solving contextual story problems. The data obtained will be collected, and the results will be compared between the results of working on story questions without the help of story pictures and the results of working on story questions using the help of story pictures.

Data collection in this research can be seen in the following table.

**Table 2.** Research Design

| Sampling  | Group      | Treatment | Post-test |
|-----------|------------|-----------|-----------|
| Nonrandom | Experiment | X         | Y2        |

|           |         |   |    |
|-----------|---------|---|----|
| Nonrandom | Control | - | Y2 |
|-----------|---------|---|----|

The research instruments used were contextual story questions without GARITA and story questions using GARITA. When carrying out the post-test, each group of students, both the control and experimental groups, was directed to work on contextual story questions. Experimental group post-test story question



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Mr Bimo's family is conducting a birthday party for their only child, Ane. His birthday party was held at his new house. At that moment, Ane invited all her classmates. Several of her classmates, including Alya, Angga, and Mirna, have prepared gifts for Ane. Alya prepared a doll gift, which was put in a cube-shaped box with sides measuring 30 cm. Meanwhile, Angga has prepared a gift packaged in a block-shaped gift in a block-shaped gift box measuring 20 cm long, 10 cm wide, and 8 cm high. Unlike the gift Mirna prepared, a pyramid-shaped alarm clock measuring 24 cm high, the alarm clock was put in a triangular prism-shaped box with each upright side painted pink, and the base and lid sides painted blue. The Mirna's prism is about 30 cm high, with an equilateral triangular base measuring 22 cm and a height of 18 cm. They can't wait to give gifts for Ane's birthday immediately.

Based on the story above, then:

1. What is the minimum area of wrapping paper that Alya and Angga must prepare?
2. How many cm<sup>2</sup> is Mirna's gift box painted pink?

### Normality Test

This determines whether the data comes from a normally distributed population or is within a normal distribution. The Normality Test is required to determine the type of statistics used in subsequent data analysis. Then, the Normality test is determined using the Kolmogorov-Smirnov Test with SPSS 25 for Windows. The basis for decision-making in the normality test includes the following: 1) the sig value or significance or probability is  $< 0,05$ , then the distribution is not normal, and 2) the sig value or significance or probability  $> 0.05$ , then the distribution is normal.

### Homogeneity Test

Homogeneity testing was conducted to determine whether some of the data used as research samples had variances that were not much different in diversity.



**Table 3. Summary of Mathematical Ability Analysis**

| Homogeneity Test   | Calculate $X^2$ value | Table $X^2$ values criteria 0.05 | Decision $H_0$    |
|--|-----------------------|----------------------------------|-------------------|
| Mathematical abilities in control and experimental classes | 0.3425203             | 3,841                            | $H_0$ is accepted |

Homogeneity in this study will be tested by comparing post-test score data from each group using the Barlett Test statistical analysis (Nuryadi et al., 2017).

#### **Hypothesis testing**

Hypothesis testing is necessary to determine the success of the research. Hypothesis testing is carried out after normality, and homogeneity tests are carried out. Parametric statistical tests with the independent sample t-test type are chosen if the data is usually distributed and homogeneous. (Hasanah et al., 2023) The test results criteria :

Accept  $H_1$ : The GARITA media significantly influences students' mathematical communication skills.

If the result is sig. (2-tailed)  $< 0.05$ , then a decision can be made that  $H_1$  is accepted, namely that there is a significant influence on the treatment of providing GARITA media during classroom learning activities on student's mathematical communication skills.

### **C. RESULT AND DISCUSSION**

#### **RESULTS**

The expected research results focus on the initial research objective: to discover how GARITA media influences students' mathematical abilities in solving contextual problems.

#### **Application of GARITA media in solving contextual problems**

This research was conducted at SD Muhammadiyah 3 IKROM Wage. This research uses class VI as the population. The sample from this research was taken from two classes, namely the control class and the experimental class. GARITA media is applied to calculate the surface area of spatial figures.

In the introductory stage, the researcher started the lesson by greeting the students, praying before starting the lesson, checking the students' attendance, and providing motivation for studying the material on the surface area of geometric shapes. Then, convey the benefits of calculating the surface area of spatial figures in daily life.

The core activities in learning are carried out at several meetings, including :

Meeting 1: Get to know the shape of space and its surface area

The first action in this activity was the researcher dividing the student into several groups. Then, the researcher gave several spatial image media to each group. Each group member was asked to independently observe the characteristics of the spatial structure and guess its name.

Meeting 2 Determine the surface area of the spatial figure

The first action in this activity was the researcher dividing the students into several groups. Then, the researcher gave several spatial image media to each group. To observe the surface area of the space, students carry out this activity by writing the shape of the side (surface) of all the parts on the spatial drawing that has been prepared.

Meeting 3 Calculate the surface area of the spatial figure.

The action in this activity was that the researcher first divided the students into several groups. Then, the researcher gave several pictures of spatial media to each group. Each group member is asked to observe how to calculate the surface area of spatial structure. Students carry out this activity by writing down the steps to calculate the surface area on a prepared spatial image and worksheet containing GARITA media and continuing by filling in a student response questionnaire.

**Normality test results**

Normality test results are calculated to determine whether the data is normally distributed. The normality test result is presented in the following table.

**Table 4.** Normality test results

|                               |                    | Kolmogorov-Smirnova |    |      | Shapiro-Wilk |    |      |
|-------------------------------|--------------------|---------------------|----|------|--------------|----|------|
|                               |                    | Statistics          | Df | Sg   | Statistics   | Df | Sg   |
| Mathematics Learning Outcomes | Class Control      | ,147                | 29 | ,109 | ,964         | 29 | ,419 |
|                               | Class Experimental | ,156                | 29 | ,060 | ,956         | 30 | ,242 |

The normality test result in the table shows the result of the data; the sig value or probability of each group is > 0.05, then the data is usually distributed.

**Homogeneity test results**

The homogeneity test results were calculated to determine whether the two groups used in the study were homogeneous. The homogeneity test results using the Barlett test formula are described in the following table.

**Table 5.** Summary of Mathematical Ability Analysis

| Homogeneity test   | Calculated value | X <sup>2</sup> Table criteria | X <sup>2</sup> values | Decision H <sub>0</sub> |
|--|------------------|-------------------------------|-----------------------|-------------------------|
| Mathematical abilities in control and experimental classes | 0.3425203        | 3,841                         | 0.05                  | H <sub>0</sub> Accepted |

Analysis results of calculated X2 values <X2 table. The data from the two groups is homogenous, and it is necessary to carry out further tests, namely the independent sample t-test.

**Hypothesis test results**

Calculation of the hypothesis results using the independent t-test was carried out to find out whether there was a significant influence on the treatment of using GARITA media on students' mathematical communication skills.

The results of the independent t-sample test can be seen in the table below:

**Table 6.** Independent T-test results

| Post Test |    |      |             |
|-----------|----|------|-------------|
| t         | Df | Sig  | Information |
| -2,783    | 57 | ,007 | significant |

Based on the hypothesis test calculations in the table, the sig-independent T-test value shows  $0.007 < 0.05$ . This provides information that GARITA media influences students' mathematical communication skills.

#### Student replies to GARITA media.

The responses from Control and Experiment class students were obtained from data from a questionnaire with ten questions using a 1-4 Likert scale.

The questionnaire was given after students carried out post-test activities at the last meeting of research activities. The questionnaire scores were then analyzed to determine students' responses to using GARITA media to solve contextual questions. Descriptive data on the questionnaire responses from experimental class students are presented in the following table.

**Table 7.** Descriptive data on the responses of experimental class students

| No. | Statements  | $\Sigma$<br>score | Percentage<br>(%) | Criteria    |
|-----|---|-------------------|-------------------|-------------|
| 1.  | The learning atmosphere is pleasant when the teacher explains the learning material   | 97                | 81                | Good        |
| 2.  | The surface area of spatial figures is easier to understand using image media   | 103               | 86                | Good        |
| 3.  | The presence of image media with a problem-based approach increases my curiosity in studying surface area material and makes me more active in class    | 95                | 79                | Pretty good |
| 4.  | I prefer learning using image media when working on contextual questions.   | 100               | 83                | Good        |
| 5.  | I can more easily determine the steps to solve the contextual problems given.   | 94                | 78                | Pretty good |
| 6.  | The existence of assignments on the worksheet to solve contextual problems with the help of pictures makes it easier for me to understand the questions | 96                | 80                | Good        |
| 7.  | Worksheets on contextual problems on the surface area of geometric figures with the help of pictures can arouse my curiosity in solving this problem    | 90                | 75                | Pretty good |
| 8.  | I can do contextual questions well.   | 89                | 74                | Pretty good |
| 9.  | It is easier for me to design a solution to the contextual problem.   | 91                | 76                | Pretty good |
| 10. | I prefer learning mathematics using worksheets with the help of pictures  | 99                | 83                | Good        |

**Commented [RA5]:** Please describe the contents of Table 7 and Table 8.

Meanwhile, descriptive data from the questionnaire responses from control class students are presented in the table below.

**Table 8.** Descriptive data on the responses of control class students

| No. | Statements  | $\Sigma$<br>score | Percentage<br>(%) | Criteria |
|-----|---|-------------------|-------------------|----------|
| 1.  | The learning atmosphere is pleasant when the teacher explains the learning material   | 54                | 47                | not good |
| 2.  | The surface area of spatial figures is easier to understand without image media   | 50                | 43                | not good |
| 3.  | Without image media, the problem-based approach increases my curiosity in studying surface area material and makes me more active in class                        | 54                | 47                | not good |
| 4.  | I prefer learning using image media when working on contextual questions  | 97                | 84                | Good     |
| 5.  | I can more easily determine the steps to solve the contextual questions given, even without the help of image media   | 56                | 48                | not good |
| 6.  | Having assignments on the worksheet to solve contextual problems without using pictures made it easier for me to understand the questions                         | 52                | 45                | not good |
| 7.  | Worksheet about contextual problems regarding the surface area of geometric shapes without the help of pictures can arouse my curiosity in solving these problems | 54                | 47                | not good |
| 8.  | I can do contextual questions well  | 58                | 50                | not good |
| 9.  | It is easier for me to design a solution to solve the contextual problem  | 57                | 49                | not good |
| 10. | I prefer learning mathematics using worksheets without using pictures   | 49                | 42                | not good |

## DISCUSSION

Researchers use GARITA media to increase students' understanding of solving contextual problems regarding the surface area of spatial figures. To improve student

learning outcomes, it is necessary to use exciting and innovative learning media. (Mujahadah et al., 2021).

Post-test activities were conducted to determine students' mathematical communication skills in solving contextual story problems. The research was conducted using contextual problems because it is hoped that they can be applied in students' daily lives, such as opinions (Ulfa & Saputra, 2019). The mathematics learning must be relevant and related to students' lives.

The results generally show that the average post-test score for calculating the surface area of spatial figures using GARITA media is higher. The use of learning media can increase students' understanding of the material (Wahyuni & Ananda, 2022). The GARITA media given to students is included in visual media. After concrete media, visual media is the easiest to observe and see (Mujahadah et al., 2021).

Data were obtained based on the results of the independent T-test, which showed significant differences in the mathematical abilities of students using GARITA media. The use of appropriate media can have the effect of raising students learning motivation so that it can improve students' understanding and learning outcomes. (Sirait & Apriyani, 2021).

The average score in the experimental class during the posttest showed higher results than the average posttest score in the control class. This research can also be proven based on the results of hypothesis testing, which shows that students' mathematical communication skills using GARITA learning media significantly influence learning outcomes. The average of the experimental class at the post-test was better than that of the control class. GARITA media is effectively used in learning to solve contextual problems.

This increase occurred with treatment using GARITA media during direct learning activities to independently answer or complete contextual story questions. The test is conducted with an evaluation in the form of a description question using contextual story questions, such as the opinion. (Sina et al., 2019) To improve students' ability to develop their mathematical knowledge, there needs to be stimulation by providing a good communication process.

Regarding research, student responses can be adjusted to the opinion that learning will be more fun and make students more active due to media use. (Saufi & Rizka, 2021). A group of students was given treatment with GARITA media assistance when solving contextual problems. Most students said that using GARITA media helped them understand the learning material more efficiently, making it easier to determine the steps in solving contextual problems, and learning activities were more enjoyable. Thereby increasing student activity in classroom learning. GARITA media further increases students' interest in studying mathematics because it is not monotonous, just in the form of numbers. The display of images in contextual story problems has been proven to increase students' interest in studying mathematics.

#### **D. CONCLUSION AND SUGGESTIONS**

##### **CONCLUSION**

Based on research conducted at SD Muhammadiyah 3 IKROM Wage Sidoarjo and research data, processing, analysis, and discussion, it can be concluded effect it improves students' mathematical communication skills; this is based on test results. The increase in mathematical communication can be seen from students' learning outcomes in solving contextual problems, material on the surface area of shapes, and the excellent response for groups who use GARITA media when carrying out activities to solve contextual problems.

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### SUGGESTIONS

The researcher's recommendation for readers and researchers is to develop more interesting GARITA media to improve students' mathematical communication skills and to be able to use IT-based media So that it can be more engaging and increase students' curiosity. Based on several findings when carrying out research, GARITA media can use more straightforward information by conveying the theme so that students are more focused and more accessible in solving contextual problems.

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## GARITA Media: Students' Mathematical Communication in Solving Contextual Problems

### ABSTRACT

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The implementation of this research activity aims to see the relationship between GARITA media and the mathematical communication skills of 6th-grade elementary school students, as shown through the results of contextual problem assignment scores. This research uses quantitative methods with quasi-experiments. The population of this study were students at SD Muhammadiyah 3 IKROM Wage Sidoarjo. This research activity took data from 29 Zahrawi 6<sup>th</sup> grade students as the control group and 30 Haitam 6<sup>th</sup> grade students as the experimental group. The result of this research data was obtained by carrying out a post-test in the form of a contextual question test and a student response questionnaire. The data analysis techniques used in this research are normality test, homogeneity test, and hypothesis test. This shows a significant difference in the mathematical communication skills of students who received treatment using GARITA assistance with students who did not receive treatment. The homogeneity test result shows that homogeneity data based on post-test data shows a figure  $< 0,05$ . Hypothesis testing shows a significant influence based on the result of the independent sample t-test  $< 0,05$ . So, the result of this research indicates that GARITA media can influence the improvement of students' mathematical communication skills in solving contextual problems.

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**Commented [User3]:** Please reorganize this section by following these guidelines:  
 Paragraph 1: Discuss the importance of information comprehension and mathematical communication skills, with supporting citations.  
 Paragraph 2: Explain the relationship between mathematical communication skills and problem solving, and its impact on individual and societal well-being.  
 Paragraph 3: Provide background on mathematics learning in Indonesia, such as low PISA scores, along with data showing students' weaknesses in understanding contextual problems.  
 Paragraph 4: Present observations and interviews that show 6th grade students' difficulties with story problems, as well as factors that contribute to their lack of interest in learning math.  
 Paragraph 5: Introduce GARITA media as an approach to improve mathematical communication skills in story problems.  
 Paragraph 6: Present a literature review of similar research highlighting contextual methods and the use of peer tutors in improving math skills.  
 Paragraph 7: Present the purpose of the study without references, focusing on how this study will test the effectiveness of GARITA media in addressing mathematical communication problems among Grade 6 students.

### A. INTRODUCTION

To make it easier for us to draw conclusions about the information presented, we must have the ability to understand it. Ability is an innate skill or expertise that you are born with, which can be used as a provision to solve a problem and can be realized in real action (Damayanti & Afriansyah, 2018). Communication skills are needed to solve and clarify problems (Setiyani, Putri, et al., 2020). Advances in science and technology are supported by primary knowledge, namely mathematics (Sugianto et al., 2022). Mathematics provides solutions in the form of conceptual analogies with various topics (Baiduri & Suliani, 2020). Mathematical communication skills make a real contribution to improving the economic welfare of individuals and the general public. One ability to transfer information about ideas is mathematical communication skills (Sekaryanti et al., 2022). This increase in welfare is obtained from the individual's ability to use mathematics in daily life. Mathematics is knowledge not only found in school but also in life; for this reason, mathematics is studied from elementary school to university level (Paroqi et al., 2020).

At the beginning of taking the PISA test, Indonesia's score was 371, and in 2003,



Indonesia's score increased to 382. Indonesia's score was 393 in 2006 and reached 402 in 2009. After 2009, Indonesia's score never increased again, and the lowest point obtained was 371 in 2018 (Sri Hartatik, 2020). Based on observations, the mathematical communication skills of 6th-grade elementary school students are still relatively low. This can be seen during classroom learning activities or when taking exams; when they are faced with contextual story questions, they have difficulty solving them, and it takes a very long time to understand and study the questions; the result of daily grades and exams when working on contextual story questions, many students still experience errors, only a few children get their work close to correct. Apart from observation, they also have difficulty understanding the meaning of the story problem through interviews, so they are confused about taking steps to solve the problem. Most of the story questions in mathematics learning are too many in the form of written text and are delivered in one direction, making the learning less attractive for students. Because mathematics is an abstract learning, natural objects are needed to help students, especially elementary school students, understand (Gistituati & Atikah, 2022)

This research activity was carried out to determine the effect of GARITA media on students' mathematical communication skills in solving contextual story problems better. Before solving story problems, the essential skills that students must master are understanding and studying the story problem itself so that students can determine the steps in solving the problem. Before solving story problems, the essential skills that students must master are understanding and studying the story problem itself so that students can determine the steps in solving the problem.

Several studies have determined students' abilities in solving contextual story problems. Including a description of the student's mathematical communication skills in solving contextual story problems (Kurniawan et al., 2017) and using a contextual approach in solving story problems as in the research title Potential of Student's Formal Mathematical Reasoning in Solving Contextual Story Problems (Deni et al. n.d.). Profile of Students' Mathematical Communication Ability in Solving Story Problems whose research aims to describe students' mathematical abilities does not aim to improve students' mathematical abilities. (Ma'rifah et al., 2020). Meanwhile, there is also research that discusses the influence of peer tutors in improving students' mathematical abilities in the research titled The Effect of Peer Tutor Learning Models on elementary school students. (Hayati et al., 2018)

## B. METHODS

Research means a theory that aims to improve the theory being studied using a rational and systematic method (Rukminingsih et al., 2020). Quantitative methods, qualitative methods, classroom action research, and mixed methods are examples of several problem-solving methods in educational research. The quantitative method is a way of collecting data through research instruments like populations and samples. Meanwhile, the qualitative method uses data collection and retrieval by interacting directly with the research object, and the results do not go through statistical procedures. The experimental research method

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is carried out to determine how much influence treatment under controlled conditions has on something else (Munirah et al., 2019).

Meanwhile, experimental research is used in learning to determine whether or not a treatment affects learning activities using approaches, strategies, methods, or learning media. The experimental method referred to here is to measure how much influence GARITA media has on students' mathematical communication skills in solving contextual story problems.

The type of research used in this research is Quasi-Experimental, where the design of this research is determined by a post-test design using a control group without random assignment, namely determining two sample classes as research subjects. The groups were divided into one class, the experimental group, and another class, the control group. The design of the learning activities was that the experimental group was given treatment by providing material using GARITA media. In contrast, the material was given in the control group without using GARITA media. After the post-test is carried out, the results of the student's work are assessed. The assessment result data is processed using hypothesis testing by comparing evidence of post-test data from the experimental and control groups. The contextual story problem material is limited to the material on the surface area of the mathematics learning space for 6<sup>th</sup> grade elementary school semester 2.

This research uses instruments in the form of questionnaires and evaluation tests in the form of story questionnaires to determine the level of student response. Meanwhile, evaluation is given to test students' level of thinking skills. The questionnaire will be measured using a 1-4 scale consisting of four alternative answers: Strongly Agree, Agree, Disagree, and Strongly Disagree. (Setiyani, Fitriyani, et al., 2020). The criteria for student responses when using GARITA media to solve contextual story questions can be seen in the table below.

**Table 1.** Criteria for student responses to GARITA media

| Number | Percentage | Criteria    |
|--------|------------|-------------|
| 1.     | 90-100     | Very good   |
| 2.     | 80-89      | Good        |
| 3.     | 70-79      | Pretty good |
| 4.     | 60-69      | Not good    |
| 5.     | < 60       | Bad         |

This research was carried out at one of the Muhammadiyah elementary schools in Sidoarjo, namely Muhammadiyah 3 Elementary School IKROM Wage Sidoarjo, by taking data from two classes. The first class as an experimental group had 30 students, and the second class as a control group had 29 students. This research was conducted in depth regarding student's mathematical abilities in solving contextual story problems. The data obtained will be collected, and the results will be compared between the results of working on story questions without the help of story pictures and the results of working on story questions using the help of story pictures.

Data collection in this research can be seen in the following table.

**Table 2.** Research Design

| Sampling  | Group      | Treatment | Post-test |
|-----------|------------|-----------|-----------|
| Nonrandom | Experiment | X         | Y2        |

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|           |         |   |    |
|-----------|---------|---|----|
| Nonrandom | Control | - | Y2 |
|-----------|---------|---|----|

The research instruments used were contextual story questions without GARITA and story questions using GARITA. When carrying out the post-test, each group of students, both the control and experimental groups, was directed to work on contextual story questions. Experimental group post-test story question



Mr Bimo's family is conducting a birthday party for their only child, Ane. His birthday party was held at his new house. At that moment, Ane invited all her classmates. Several of her classmates, including Alya, Angga, and Mirna, have prepared gifts for Ane. Alya prepared a doll gift, which was put in a cube-shaped box with sides measuring 30 cm. Meanwhile, Angga has prepared a gift packaged in a block-shaped gift in a block-shaped gift box measuring 20 cm long, 10 cm wide, and 8 cm high. Unlike the gift Mirna prepared, a pyramid-shaped alarm clock measuring 24 cm high, the alarm clock was put in a triangular prism-shaped box with each upright side painted pink, and the base and lid sides painted blue. The Mirna's prism is about 30 cm high, with an equilateral triangular base measuring 22 cm and a height of 18 cm. They can't wait to give gifts for Ane's birthday immediately.

Based on the story above, then:

1. What is the minimum area of wrapping paper that Alya and Angga must prepare?
2. How many cm<sup>2</sup> is Mirna's gift box painted pink?

### Normality Test

This determines whether the data comes from a normally distributed population or is within a normal distribution. The Normality Test is required to determine the type of statistics used in subsequent data analysis. Then, the Normality test is determined using the Kolmogorov-Smirnov Test with SPSS 25 for Windows. The basis for decision-making in the normality test includes the following: 1) the sig value or significance or probability is  $< 0,05$ , then the distribution is not normal, and 2) the sig value or significance or probability  $> 0.05$ , then the distribution is normal.

### Homogeneity Test

Homogeneity testing was conducted to determine whether some of the data used as research samples had variances that were not much different in diversity.

**Table 3. Summary of Mathematical Ability Analysis**

| Homogeneity Test   | Calculate $X^2$ value | Table $X^2$ values criteria 0.05 | Decision $H_0$    |
|--|-----------------------|----------------------------------|-------------------|
| Mathematical abilities in control and experimental classes | 0.3425203             | 3,841                            | $H_0$ is accepted |

Homogeneity in this study will be tested by comparing post-test score data from each group using the Barlett Test statistical analysis (Nuryadi et al., 2017).

### Hypothesis testing

Hypothesis testing is necessary to determine the success of the research. Hypothesis testing is carried out after normality, and homogeneity tests are carried out. Parametric statistical tests with the independent sample t-test type are chosen if the data is usually distributed and homogeneous. (Hasanah et al., 2023) The test results criteria :

Accept  $H_1$ : The GARITA media significantly influences students' mathematical communication skills.

If the result is sig. (2-tailed)  $< 0.05$ , then a decision can be made that  $H_1$  is accepted, namely that there is a significant influence on the treatment of providing GARITA media during classroom learning activities on student's mathematical communication skills.

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## C. RESULT AND DISCUSSION

### RESULTS

The expected research results focus on the initial research objective: to discover how GARITA media influences students' mathematical abilities in solving contextual problems.

#### Application of GARITA media in solving contextual problems

This research was conducted at SD Muhammadiyah 3 IKROM Wage. This research uses class VI as the population. The sample from this research was taken from two classes, namely the control class and the experimental class. GARITA media is applied to calculate the surface area of spatial figures.

In the introductory stage, the researcher started the lesson by greeting the students, praying before starting the lesson, checking the students' attendance, and providing motivation for studying the material on the surface area of geometric shapes. Then, convey the benefits of calculating the surface area of spatial figures in daily life.

The core activities in learning are carried out at several meetings, including :

Meeting 1: Get to know the shape of space and its surface area

The first action in this activity was the researcher dividing the student into several groups. Then, the researcher gave several spatial image media to each group. Each group member was asked to independently observe the characteristics of the spatial structure and guess its name.

Meeting 2 Determine the surface area of the spatial figure

The first action in this activity was the researcher dividing the students into several groups. Then, the researcher gave several spatial image media to each group. To observe the surface area of the space, students carry out this activity by writing the shape of the side (surface) of all the parts on the spatial drawing that has been prepared.

Meeting 3 Calculate the surface area of the spatial figure.

The action in this activity was that the researcher first divided the students into several groups. Then, the researcher gave several pictures of spatial media to each group. Each group member is asked to observe how to calculate the surface area of spatial structure. Students carry out this activity by writing down the steps to calculate the surface area on a prepared spatial image and worksheet containing GARITA media and continuing by filling in a student response questionnaire.

**Normality test results**

Normality test results are calculated to determine whether the data is normally distributed. The normality test result is presented in the following table.

**Table 4.** Normality test results

|                               |                    | Kolmogorov-Smirnova |    |      | Shapiro-Wilk |    |      |
|-------------------------------|--------------------|---------------------|----|------|--------------|----|------|
|                               |                    | Statistics          | Df | Sg   | Statistics   | Df | Sg   |
| Mathematics Learning Outcomes | Class Control      | ,147                | 29 | ,109 | ,964         | 29 | ,419 |
|                               | Class Experimental | ,156                | 29 | ,060 | ,956         | 30 | ,242 |

The normality test result in the table shows the result of the data; the sig value or probability of each group is > 0.05, then the data is usually distributed.

**Homogeneity test results**

The homogeneity test results were calculated to determine whether the two groups used in the study were homogeneous. The homogeneity test results using the Barlett test formula are described in the following table.

**Table 5.** Summary of Mathematical Ability Analysis

| Homogeneity test   | Calculated value | X <sup>2</sup> Table criteria | X <sup>2</sup> values | Decision H <sub>0</sub> |
|--|------------------|-------------------------------|-----------------------|-------------------------|
| Mathematical abilities in control and experimental classes | 0.3425203        | 3,841                         | 0.05                  | H <sub>0</sub> Accepted |

Analysis results of calculated X2 values <X2 table. The data from the two groups is homogenous, and it is necessary to carry out further tests, namely the independent sample t-test.

**Hypothesis test results**

Calculation of the hypothesis results using the independent t-test was carried out to find out whether there was a significant influence on the treatment of using GARITA media on students' mathematical communication skills.

The results of the independent t-sample test can be seen in the table below:

**Table 6.** Independent T-test results

| Post Test |    |      |             |
|-----------|----|------|-------------|
| t         | Df | Sig  | Information |
| -2,783    | 57 | ,007 | significant |

Based on the hypothesis test calculations in the table, the sig-independent T-test value shows  $0.007 < 0.05$ . This provides information that GARITA media influences students' mathematical communication skills.

#### Student replies to GARITA media.

The responses from Control and Experiment class students were obtained from data from a questionnaire with ten questions using a 1-4 Likert scale.

The questionnaire was given after students carried out post-test activities at the last meeting of research activities. The questionnaire scores were then analyzed to determine students' responses to using GARITA media to solve contextual questions. Descriptive data on the questionnaire responses from experimental class students are presented in the following table.

**Table 7.** Descriptive data on the responses of experimental class students

| No. | Statements  | $\Sigma$<br>score | Percentage<br>(%) | Criteria    |
|-----|---|-------------------|-------------------|-------------|
| 1.  | The learning atmosphere is pleasant when the teacher explains the learning material   | 97                | 81                | Good        |
| 2.  | The surface area of spatial figures is easier to understand using image media   | 103               | 86                | Good        |
| 3.  | The presence of image media with a problem-based approach increases my curiosity in studying surface area material and makes me more active in class    | 95                | 79                | Pretty good |
| 4.  | I prefer learning using image media when working on contextual questions.   | 100               | 83                | Good        |
| 5.  | I can more easily determine the steps to solve the contextual problems given.   | 94                | 78                | Pretty good |
| 6.  | The existence of assignments on the worksheet to solve contextual problems with the help of pictures makes it easier for me to understand the questions | 96                | 80                | Good        |
| 7.  | Worksheets on contextual problems on the surface area of geometric figures with the help of pictures can arouse my curiosity in solving this problem    | 90                | 75                | Pretty good |
| 8.  | I can do contextual questions well.   | 89                | 74                | Pretty good |
| 9.  | It is easier for me to design a solution to the contextual problem.   | 91                | 76                | Pretty good |
| 10. | I prefer learning mathematics using worksheets with the help of pictures  | 99                | 83                | Good        |

Meanwhile, descriptive data from the questionnaire responses from control class students are presented in the table below.

**Table 8.** Descriptive data on the responses of control class students

| No. | Statements  | $\Sigma$ score | Percentage (%) | Criteria |
|-----|---|----------------|----------------|----------|
| 1.  | The learning atmosphere is pleasant when the teacher explains the learning material   | 54             | 47             | not good |
| 2.  | The surface area of spatial figures is easier to understand without image media   | 50             | 43             | not good |
| 3.  | Without image media, the problem-based approach increases my curiosity in studying surface area material and makes me more active in class                        | 54             | 47             | not good |
| 4.  | I prefer learning using image media when working on contextual questions  | 97             | 84             | Good     |
| 5.  | I can more easily determine the steps to solve the contextual questions given, even without the help of image media   | 56             | 48             | not good |
| 6.  | Having assignments on the worksheet to solve contextual problems without using pictures made it easier for me to understand the questions                         | 52             | 45             | not good |
| 7.  | Worksheet about contextual problems regarding the surface area of geometric shapes without the help of pictures can arouse my curiosity in solving these problems | 54             | 47             | not good |
| 8.  | I can do contextual questions well  | 58             | 50             | not good |
| 9.  | It is easier for me to design a solution to solve the contextual problem  | 57             | 49             | not good |
| 10. | I prefer learning mathematics using worksheets without using pictures   | 49             | 42             | not good |

## DISCUSSION

Researchers use GARITA media to increase students' understanding of solving contextual problems regarding the surface area of spatial figures. To improve student

learning outcomes, it is necessary to use exciting and innovative learning media. (Mujahadah et al., 2021).

Post-test activities were conducted to determine students' mathematical communication skills in solving contextual story problems. The research was conducted using contextual problems because it is hoped that they can be applied in students' daily lives, such as opinions (Ulfa & Saputra, 2019). The mathematics learning must be relevant and related to students' lives.

The results generally show that the average post-test score for calculating the surface area of spatial figures using GARITA media is higher. The use of learning media can increase students' understanding of the material (Wahyuni & Ananda, 2022). The GARITA media given to students is included in visual media. After concrete media, visual media is the easiest to observe and see (Mujahadah et al., 2021).

Data were obtained based on the results of the independent T-test, which showed significant differences in the mathematical abilities of students using GARITA media. The use of appropriate media can have the effect of raising students learning motivation so that it can improve students' understanding and learning outcomes. (Sirait & Apriyani, 2021).

The average score in the experimental class during the posttest showed higher results than the average posttest score in the control class. This research can also be proven based on the results of hypothesis testing, which shows that students' mathematical communication skills using GARITA learning media significantly influence learning outcomes. The average of the experimental class at the post-test was better than that of the control class. GARITA media is effectively used in learning to solve contextual problems.

This increase occurred with treatment using GARITA media during direct learning activities to independently answer or complete contextual story questions. The test is conducted with an evaluation in the form of a description question using contextual story questions, such as the opinion. (Sina et al., 2019) To improve students' ability to develop their mathematical knowledge, there needs to be stimulation by providing a good communication process.

Regarding research, student responses can be adjusted to the opinion that learning will be more fun and make students more active due to media use. (Saufi & Rizka, 2021). A group of students was given treatment with GARITA media assistance when solving contextual problems. Most students said that using GARITA media helped them understand the learning material more efficiently, making it easier to determine the steps in solving contextual problems, and learning activities were more enjoyable. Thereby increasing student activity in classroom learning. GARITA media further increases students' interest in studying mathematics because it is not monotonous, just in the form of numbers. The display of images in contextual story problems has been proven to increase students' interest in studying mathematics.

#### **D. CONCLUSION AND SUGGESTIONS**

##### **CONCLUSION**



Based on research conducted at SD Muhammadiyah 3 IKROM Wage Sidoarjo and research data, processing, analysis, and discussion, it can be concluded effect it improves students' mathematical communication skills; this is based on test results. The increase in mathematical communication can be seen from students' learning outcomes in solving contextual problems, material on the surface area of shapes, and the excellent response for groups who use GARITA media when carrying out activities to solve contextual problems.

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**Commented [User8]:** It is recommended that the conclusion section concludes by linking the research results back to the original purpose of the research. For example, if the main objective of the research was to look at the effectiveness of GARITA media, the conclusion should explicitly assert that this objective has or has not been achieved.

## SUGGESTIONS

The researcher's recommendation for readers and researchers is to develop more interesting GARITA media to improve students' mathematical communication skills and to be able to use IT-based media So that it can be more engaging and increase students' curiosity. Based on several findings when carrying out research, GARITA media can use more straightforward information by conveying the theme so that students are more focused and more accessible in solving contextual problems.

## ACKNOWLEDGEMENT

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