

GARITA Media: Students' Mathematical Communication in Solving Contextual Problems

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ABSTRACT

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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 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.



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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 students' problems in solving mathematical story problems (Widarti, 2013). Mathematical 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, formulas, demonstrations, or connecting real objects (Rasyid, 2020). Mathematical communication skills 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, evaluating ideas, symbols, terms and mathematical explanations, where there is a transfer/delivery of messages that explain about mathematics learning materials (Melinda & Zainil, 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 (Kurniawan 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 (Wiranata & Sujana, 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

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 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 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. Because mathematics is an abstract learning, natural objects are needed to help students, especially elementary school students, understand (Gistituati & Atikah, 2022).

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, and (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). Students' mathematical communication skills in solving contextual story problems are generally still relatively low. 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). 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 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.

B. METHODS

Research means a theory that aims to improve the theory being studied using a rational and systematic method (Rukminingsih et al., 2020). 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). 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 6th grade elementary school semester 2. 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 2.

Table 2. 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 3.

Table 3. 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.

1. 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.

2. 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, as shown in Table 4.

Table 4. 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).

3. 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

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

1. 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.

2. 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 5.

Table 5. 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.

3. 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 6.

Table 6. Summary of Mathematical Ability Analysis

Homogeneity test	Calculated 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 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.

4. 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 7.

Table 7. 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.

5. 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 8.

Table 8. Descriptive data on the responses of experimental class students

No.	Statements	Σ 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
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. Meanwhile, descriptive data from the questionnaire responses from control class students are presented in the Table 9.

Table 9. Descriptive data on the responses of control class students

No.	Statements	Σ 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

No.	Statements	Σ score	Percentage (%)	Criteria
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. 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

Based on research conducted at SD Muhammadiyah 3 IKROM Wage Sidoarjo at 30 experimental class students when learning using GARITA media were tested using hypothesis testing, 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 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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