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Web-Based *Magasing* Media to Improve Students' Mathematical Problem-Solving Skills at the Elementary School Level

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ABSTRAK

Kemampuan pemecahan masalah matematis merupakan suatu kemampuan yang memerlukan keterampilan pemecahan masalah dan kreativitas dalam menyelesaikannya, karena permasalahan dalam matematika terkadang memerlukan penyelesaian yang menggunakan pemikiran kreatif dari siswa. Melalui penggunaan media dalam pembelajaran matematika dapat membantu guru karena media merupakan komponen penting dalam pembelajaran, dan dari penggunaan media. Kegiatan pembelajaran menjadi lebih interaktif dan memicu motivasi belajar peserta yang akan mempengaruhi hasil belajar siswa. Tujuan penelitian ini adalah untuk menganalisis efektivitas penggunaan media Magasing berbasis website untuk meningkatkan kemampuan pemecahan masalah matematis sehingga siswa dapat mengembangkan kemampuannya dalam menyelesaikan masalah yang kompleks secara kritis. Penelitian ini menggunakan penelitian pra-eksperimental dengan desain eksperimen satu kelompok. Sampel dalam penelitian ini adalah 56 siswa sekolah dasar. Pengumpulan data dilakukan dengan membandingkan hasil pre-test dan post-test kelas eksperimen setelah diberi perlakuan menggunakan media. Hasil keefektifan media Magasing berbasis website dilihat dari hasil pre-test dan post-test yang dilakukan dengan menggunakan uji T sampel berpasangan. Dari hasil penelitian yang dilakukan, data pre-test dan post-test diperoleh hasil sebesar 56,03 yang menunjukkan bahwa media Magasing berbasis website efektif meningkatkan kemampuan pemecahan masalah matematis siswa. Berdasarkan hasil penelitian melalui penggunaan media Magasing berbasis website efektif dalam meningkatkan kemampuan pemecahan masalah matematis siswa tingkat sekolah dasar.

ABSTRACT

Mathematical problem-solving ability is an ability that requires problem solving skills and creativity in solving it because problems in mathematics sometimes require solutions that use creative thinking from students. Through the use of media in mathematics learning, it can help teachers because media is an important component in learning, and from the use of media. Learning activities become more interactive and trigger participant learning motivation which will affect student learning outcomes. The purpose of this study is to analyze the effectiveness of using website-based Magasing media to improve mathematical problem-solving skills so that students can develop their ability to solve complex problems critically. This study used pre-experimental research with a one group experimental design. The sample in this study was 56 students in elementary school. Data collection was done by comparing the results of the pre-test and post-test of the experimental class after being treated using the media. The results of the effectiveness of website-based Magasing media are seen from the results of the pre-test and post test conducted using the paired sample T test. From the results of the research conducted, the pre-test and post test data obtained a result of 56.03 which indicates that the website-based *Magasing* media is effective in improving students' mathematical problem-solving skills. Based on the results of this study, through the use of website-based Magasing media is effective in improving the mathematical problem-solving skills of students at the elementary school level.

1. INTRODUCTION

Problem solving is an important tool in teaching and learning mathematics, this is because problem solving ability is one aspect of higher order thinking, and through problem solving children are trained to reason creatively in solving mathematical problems so that children's thinking skills become more developed (Aiyub et al., 2021; Alfayez et al., 2022). Teachers in mathematics classrooms are encouraged to promote problem-solving activities because engaging learners with mathematical tasks for which the procedures and methods of solution are not known in advance can provide opportunities for deeper learning (Narayani, 2019; Rostika & Junita, 2017). Educational documents and curricula in almost all countries mention that learning mathematics is important because teaching and learning mathematics through mathematical problem solving supports the development of deep and conceptual understanding

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for learners so that from problem solving skills learners can solve problems in mathematics, everyday life or other sciences (Fitrianawati et al., 2020; Surur & Tartilla, 2019).

Problem solving is an action taken to solve a problem by defining the problem, determining the main cause of the problem, finding solutions to implement these solutions until the problem can be resolved completely (Gumilang et al., 2019; Handayani et al., 2018). But in reality, the importance of problem solving in mathematics learning is marked by the gap in the skills that a person should have and the changes in the emergence of skill needs throughout the world caused by various processes. As a result, the ability to solve mathematical problems that should be owned in students' real lives is still inversely proportional to the abilities that students should have (Ekowati et al., 2021; Kenedi, 2019). The problem is because in improving problem solving skills, students still experience many obstacles and problems in problem solving. Most of the difficulties experienced include solving real-world tasks where the mathematical information is not explicit (e.g., expressed through or in text), or that require multi-step solutions or simple interpretation of data and statistics in text, tables or graphs, and the results released by PISA in the most recent survey show a skills gap in mathematics with an average of 69% of learners being "at least basically proficient" in mathematics in OECD countries and "beginning to show the ability and initiative to use mathematics in simple real-life situations". This means that on average around 30% of future adults do not have even a low level of mathematical literacy (Ketonen & Hotulainen, 2019; Purwanti et al., 2020).

Problems that occur in mathematical problem solving are also experienced in Indonesia which shows that elementary school students in Medan have difficulty in interpreting the problems given into mathematical form, as well as difficulty in determining mathematical concepts and tend to draw conclusions to perform counting operations on existing numbers without understanding and thinking about what is asked in the problem (Hidayat et al., 2020; Rahmawati & Anwar, 2020). In addition, several researchers in Indonesia also mentioned that students still experience difficulties in terms of problem solving skills in mathematics learning (Kohen et al., 2022; Susanti & Hartono, 2019). From these problems, it can be seen that students only receive results without any reflection related to the underlying mathematics, thus affecting their ability to achieve mathematics learning objectives.

Based on the data in the field that the researchers conducted, it was found that at SD Negeri Kemirirejo 3, the low mathematical problem-solving ability of students was found due to the fact that there were still many students who considered learning mathematics to be difficult so that this resulted in low student learning motivation and affected student learning outcomes. In connection with these problems, it is necessary to deal with existing problems to help students' mathematical problem-solving skills, one of which is through the use of media in learning. This needs to be done because so far math learning rarely uses media so that the interaction between teachers and students becomes lifeless. In addition, in the education curriculum, media is an important component that can help teachers facilitate and help achieve the target learning objectives (Septianto & Hasan, 2017; Virvou et al., 2005).

The use of learning media helps students in developing their knowledge and skills because the media can liven up the student learning atmosphere. Media is part of the construction of mathematics education because media can create and maintain meaning about mathematics education so that students need innovative learning media to help understand the material more easily (Campilla & Castañaga, 2021; Williams et al., 2009). The use of media in learning activities has an influence on student learning motivation. Student learning motivation is one of the important things because the existence of learning motivation will spark students' learning intentions independently so that the desired goals can be achieved. Learning activities that match students' interests can help increase their learning motivation, this is because students feel comfortable and happy. Students who have interest and motivation to learn and carry out high learning activities will be more active than students who lack motivation and interest in learning (Almazova et al., 2021; Winarni et al., 2020).

There are many types of media that have utilized technology in learning activities, such as the use of e-modules, android-based media, YouTube, and the use of Google in learning activities. Another utilization of technology is by utilizing the website in learning activities. The website is one of the results of technological development that can be utilized as an appropriate and suitable media to be used in learning, because the website can provide information and is more easily accessible in various regions because through the website it makes learning activities more enjoyable (Setiadi, 2020; Widodo & Slamet, 2020). Learning that uses website-based media can make learning activities more enjoyable, has a high element of creativity, provides flexibility, speed of information connection and visualization in the learning process. Website is a teaching and learning media that can be used remotely which is efficient, interactive, dynamic, economical and democratic. The website itself provides an opportunity to develop learning and training that is appropriate to the demands and centered on learning (Muharto et al., 2019; Tanti et al., 2021). Website is a collection of pages summarized in a domain or subdomain that contains audio, text, images, and video and can be accessed through a web browser. One of the advantages of website-based media as

learning media is because of its nature as an interactive multimedia that can be used efficiently and can be accessed anywhere and anytime when using website-based media so that this can encourage student motivation in learning (Tanti et al., 2021; Wilson et al., 2019).

Based on this background explanation, researchers are interested in analyze the effectiveness of using website-based magasing media on students' mathematical problem-solving skills, with the aim of knowing the effectiveness of using website-based media on students' mathematical problem-solving skills at the level of students' mathematical problem-solving skills. elementary school level. The novelty of this study website-based magasing media is a media that contains material, as well as game-based questions. Magasing itself is an acronym for Math does not make a headache, magasing media is made with the aim of helping teachers and students in understanding the learning material provided and can improve students' mathematical problem-solving skills.

2. METHOD

This research is a pre-experiment research with a one group pre-test post-test design pattern where in this study it will be known the effectiveness of using website-based media on students' mathematical problem solving skills (Flannelly et al., 2018). The research was conducted at SD Negeri in Kemirirejo 3 Magelang City by involving 56 students in class IV who will be used as an experimental class by using website-based media in mathematics learning activities. Before using the media in learning activities, students first take a pre-test to determine the initial abilities possessed by students. After taking the pre-test, students are given treatment using website-based magasing media, and at the end of the treatment students will later take a post test to determine the effect of using website-based magasing media in learning activities that have been carried out. The results of the effectiveness of using website-based magasing media are seen from the results of the pre-test and post-test those have been carried out by students and the results of the N gain calculation regarding the effectiveness of using website-based magasing media to students in mathematics learning. The categorization used to measure the effect (gain) of website-based Magasing media is show in Table 1.

Table 1. Criteria for Dividing the Value of N Gain Score

N-Gain Score	Category
N gain ≥ 0.7	High
0.3 < N gain < 0.7	Normal
N gain score ≤ 0.7	Low

With the categorization of the effective interpretation of the N Gain Score percent value as show in Table 2.

Table 2. Categorization of the Interpretation of the Effectiveness of the Value N Gain Score

Percentage	Category
< 40	Ineffective
40 – 55	Less effective
56 – 75	Effective enough
>76	Effective

The aspects of students' mathematical problem-solving skills used as a guide by researchers include: 1) Understand the problem clearly; 2) Analyze the form of problem solving; 3) Implement the plan from the form of problem solving; 4) Review and analyze the results obtained. Where aspects of the problem-solving ability are assessed using the problem-solving ability test guidelines is show in Table 3.

Table 3. Assessment Guidelines for Aspects of Mathematical Problem Solving Ability

Problem Solving Steps	Score	Students Answer
Understanding the problem clearly	0	Does not understand the question/no answer
	1	The way the question is interpreted is not correct
	2	Understanding the problem well
Analyzing the form of problem-solving	0	No solution strategy planning
	1	The strategy used is not appropriate
	2	Uses a strategy but the answer is wrong/not continued

Problem Solving Steps	Score	Students Answer
	3	Using strategies leads to the right answer
Implementing the plan	0	No completion
from the form of	1	There is a settlement, but the procedure is not clear
problem-solving	2	Uses one specific correct procedure but gets the calculation wrong
	3	Uses specific procedures and correct results
Reviewing and analyzing	0	No answer check
the results obtained	1	Checks only on the answer calculation process
	2	Checks on process and answers

The results obtained from the pre-test and post-test that have been carried out by students are then analyzed. The data analysis technique used in this study used the paired sample t-test test using the help of SPSS 26.

3. RESULT AND DISCUSSION

Result

This research uses pre-experimental research with a one group experimental design, with data obtained through the results of the pre-test and post-test in the class after being treated using the media. The data obtained is then processed and analyzed by comparing the results of the pretest and post-test that has been done. The experimental class used in this study was the fourth-grade class of SD Negeri Kemirirejo 3 with a total of 56 students. Before being treated, the experimental class was first given an initial test (pretest) to determine the initial ability regarding their mathematical problem-solving skills. After knowing the initial ability of students, then students take part in math learning activities in the classroom using MAGASING media based on website. Learning activities using website-based MAGASING media include learning material to train students' mathematical problem-solving skills. The appearance of the website-based MAGASING media that students and teachers use in math learning activities is show in Figure 1.

Figure 1. Initial Appearance of Website-Based Magasing Media

Learning activities using website-based MAGASING media are inseparable from the 4 aspects of problem-solving skills that are targeted. The 4 aspects include understanding the problem clearly, analyzing the form of problem solving, implementing the plan from the form of problem solving, and reviewing and analyzing the results obtained. After students are given treatment using website-based Magasing media, then students take a test (post-test) to determine the ability of students after being treated using the media. The data related to the pretest and post-test of the results of students' mathematical problem-solving abilities in mathematics learning as show in Table 4.

Table 4. Results of Pre-Test and Posttest of Mathematical Problem Solving Ability

Group	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	56	16	89	44.87	14.096
Post-test	56	53	97	76.02	10.649
Valid N (listwise)	56				

Based on the results of Table 4, the mean of the pre-test and post-test results that have been carried out has increased by 31.15 from initially 44.87 to 76.02 with the highest score of 97 and the lowest score of 89.

Based on data from the pre-test results regarding the initial abilities of students obtained, and when viewed based on the 4 aspects of students' mathematical problem-solving abilities, students still experience problems such as errors in understanding the problems given, errors in planning solutions, to errors in the calculation process. The data from the pre-test results that students have done are show in Figure 2.

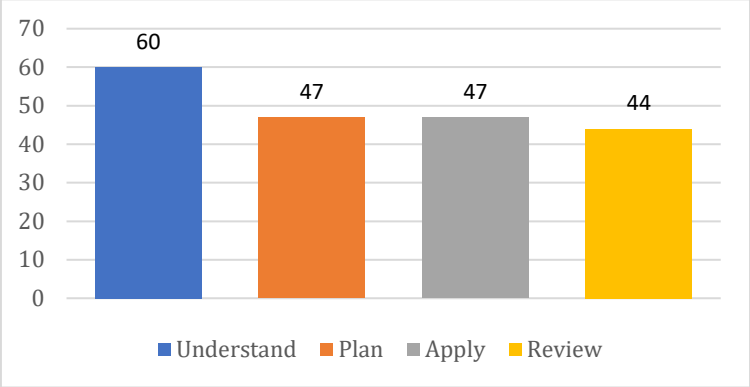

Figure 2. Results of Pre-Test to 4 Aspects of Students' Mathematical Problem-Solving Ability

The data on the 4 aspects of students' mathematical problem solving ability in the post test after using the website-based Magasing media are show in Figure 3.

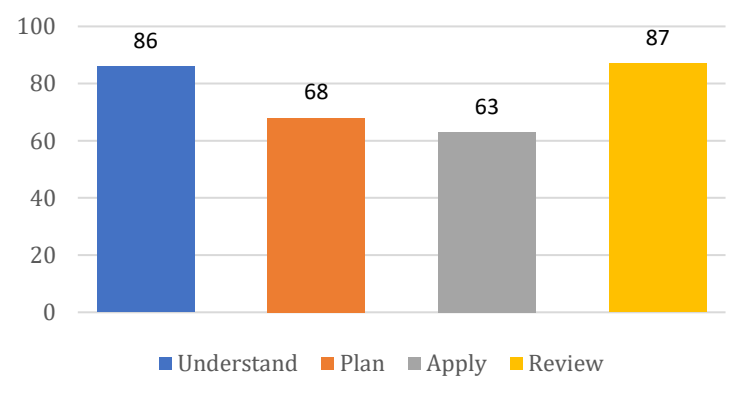

Figure 3. Post-test Results for 4 Aspects of Students' Mathematical Problem-Solving Ability

Base on Figure 3, from each aspect, data on the highest and lowest aspects of students' mathematical problem-solving ability are obtained. Based on the results obtained by students when conducting tests, the following data were obtained in Table 5.

Table 5. Aspects of Mathematical Problem Solving Ability

Question Item	Aspects of Mathematical Problem-Solving Ability			
	Understanding the Problem	Analyze the Problem	Apply the Plan	Review and Analyze Results
1	79	79	-	-
2	82	82	-	-
3	76	76	-	-
4	91	66	66	89
5	88	54	54	85
6	95	74	74	88
7	91	56	56	88
Total average	**86**	**79**	**63**	**87.5**

Based on data from Table 5, the results of pre and posttests that have been carried out, it is obtained that students, if based on indicators of problem-solving ability, experience a significant increase in aspects 1 and 4, while in aspects 2 and 3 students are not very visible, which is due to several factors. From the results of the pre and post-tests carried out, the data obtained that the experimental class experienced an increase in learning outcomes when viewed from the average results where these results increased. After the data from the pretest and post results are carried out, it is then analyzed to find out which class is normally distributed. The experimental class must fulfill the normality test, where the normality test is carried out to determine the sample used in the study comes from a normally distributed population. If the initial ability of students is known to come from a normally distributed population, then the next step is to analyze the effectiveness of using website-based magasing media using the paired sample T test. The experimental class normality test results are show in Table 6.

Table 6. Normality Test Results

Y		Kolmogorov-Smirnov			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Problem Solving Skill	Pretest	0.116	56	0.059	0.917	56	0.001
	Post-test	0.106	56	0.173	0.978	56	0.409

Base on Table 6, the normality test results used are the Kolmogorov-Smirnov normality test, this is because the samples used in the study amounted to 56 samples. Judging from the results of the normality test in the table, the significance results of the pre-test and post-test values of students' mathematical problem-solving abilities are 0.059 and 0.173, where the significance results in the pre-test and post-test both obtained results> 0.05 so it can be concluded that the data on mathematical problem-solving abilities obtained are normally distributed. From the results of the normality test, then analyzed using the paired sample T test to determine the comparison of students' problem-solving abilities when using website-based media in learning activities. The paired sample t-test results are show in Table 7.

Table 7. Paired Sample T-test Results

Paired Samples Test									
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-Tailed)
					Lower	Upper			
Pair I	Pretest Post-test	-31.143	11.136	1.488	-34.125	-28.161	-20.927	55	0.00

Base on Table 7, the results of the paired sample t-test that have been carried out are seen from the results of 2 tailed significance results obtained 0.000 which means the significance results <0.05 so it is concluded that there is a significant difference between the results of the ability to solve mathematical problems carried out between before the pre-test and after the post-test, where it is known that the use of website-based magasing media is effective in improving the mathematical problem-solving skills of students in class IV. After obtaining data on the use of website-based Magasing media, then analyze the average pre-test and post-test scores using the N-Gain score test to obtain data on the effectiveness of using website-based MAGASING media to improve students' mathematical problem-solving skills. The data related to the effectiveness test results are presented in Table 8.

Table 8. Effectiveness Test Results

Class	Frequency	Value N Gain Score		Average Gain Score
		Min	Max	
Experiment	56	21.43	92.68	56.03

Base on Table 8, the average results obtained in the experimental class, the average N gain is 56.03, which indicates that using website-based MAGASING media in mathematics learning activities is quite effective in helping students improve their mathematical problem-solving skills.

Discussion

In the first aspect of mathematical problem-solving ability, it is known that students are said to be able to understand the problem clearly if students fulfill indicators which include identifying the problem and understanding the problem being asked. Based on the results of the pre-test obtained by students, it is known that there are still those who cannot distinguish several types of flat shapes and even found misunderstandings about the name of the shape and the concept of the perimeter of the shape (Khafidatul, 2020; Wardhani et al., 2022). Learner errors regarding the identification of flat shapes can be seen from the number of students who are wrong in mentioning the name of the flat shape, many students are still mistaken about the shape of the flat shape of a parallelogram with a rectangle, but after being given treatment from the post test results it can be seen that students have improved regarding the ability to understand a problem. From the results of the students' work, it is agreed that students, when understanding the concepts in the material being studied, are still often wrong in applying the formulas used to solve mathematical problems (Khasanah et al., 2021; Siregar et al., 2021).

Each aspect of mathematical problem-solving ability is interrelated with each other. If students are unable to understand a problem in the problem, then this will affect the next step. As with problems in the understanding aspect, students were found who failed to understand the problem in the problem so that students were wrong in transforming the information in the problem. From the provision of treatment using the developed media, based on the results of the treatment given, students began to understand the concept of the perimeter of the building and solve problems in accordance with the aspects and indicators of problem solving ability (Khasanah et al., 2021; Ummu et al., 2023). on the 2nd aspect of problem-solving ability students experience these errors because students are unable to convey things that are asked, things that are known and asked, and experience errors in language interpretation. These problems occur because students make mistakes in the first aspect, namely when understanding the meaning of the given problem. Errors made by students in the first aspect will certainly affect other aspects of problem solving ability (Salsabila & Pradipta, 2021; Siregar et al., 2021).

In the aspect of applying students who have experienced problems from the beginning, of course students cannot determine the plan of problem solving so that in applying the plan from the form of problem-solving students will not be able to solve existing problems. The indicator of whether students can apply the plan from the form of problem solving is when students are able to solve the problem according to the plan and students can do the calculations correctly.

In the aspect of reviewing and analysing results, most students still review in terms of the calculation process. If it is felt that the results obtained are appropriate, students consider the results obtained to be correct. However, in the results of the answers to the fourth stage of students' problem-solving abilities in checking and concluding calculations are not seen until the end (only in the process) so that the results obtained by students do not include the units of the shapes used. But overall learners begin to show mathematical problem-solving skills. These results are also reinforced from previous research which found that students did not check their work before collecting it, so that students did not know that they had made mistakes in the final results, errors in procedures or concepts from the results (Salsabila & Pradipta, 2021; Septian et al., 2022).

The research results obtained in the study are in line with the results of research conducted by previous study which states that using web-based media is effective on problem solving skills because through web-based media learning activities can stimulate students' knowledge and problem solving skills (Zaneldin et al., 2019). Other study state through website-based learning media produces practical and effective learning to improve problem solving, said to be practical and effective because through website-based media the teacher's ability to manage learning and learning activities carried out is in the good category and these results affect the learning completeness of students classically achieved (Rasheed et al., 2020). The use of media that is in accordance with the characteristics of students can also affect the effectiveness of media use, as well as research conducted by other study state that through the use of technology-based learning media can increase student involvement, understanding and motivation to learn (Al Mamun et al., 2022).

Based on the data from the results of the calculations carried out in the study, the researchers concluded that using magasing website-based media is quite effective in improving the mathematical problem-solving skills of grade IV elementary school students. The implication of the website-based magasing media used by students and teachers in learning activities contains material, problems in the game to examples of problem solving where the material, problems, and examples can be studied repeatedly by students both at school and at home. Through website media, it also affects the effectiveness of learning activities carried out from the previous teacher using conventional learning activities in learning mathematics to innovations using website-based magasing media and its application in learning activities

is considered as an approach used to transition the scale of students' academic achievement towards progressive assisted educational technology output.

4. CONCLUSION

Based on the results of the research that has been conducted, it is concluded that through website-based Magasing media is quite effective in improving students' mathematical problem-solving skills at the elementary school level. Based on the results of the comparison carried out, the data on students' problem-solving abilities have increased learning outcomes after using website-based Magasing media in learning activities. The advice given is that teachers can make the most of website-based Magasing media in learning activities, and for students can utilize website-based Magasing media in mathematics learning activities both in the school environment and outside of school. The use of these media also has challenges and this is an important factor in designing and implementing effective strategies to ensure the technology used can be used optimally in learning.

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