



# Implementation of Accelerated Learning Model with Interactive Media Assistance for Mathematics Problem-Solving Ability

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**Abstract.** The aim of this research is to determine the differences in mathematical problem solving abilities taught using the Accelerated Learning model assisted by interactive media and using the direct learning model assisted by interactive media on quadratic equations material. The research method used was an experiment with a Posttest Only Control Group Design. The population of this study was all students in class IX of SMP Negeri 8 Gorontalo City for the 2023/2024 academic year consisting of 6 classes totaling 143 students and the research sample was taken from two classes using simple random sampling. Class IX-6 was obtained as the experimental class and class IX-5 as the control class. The results of the analysis prerequisite tests in this research show that the two data are normally distributed and homogeneous so it is continued by using that test and obtaining the results of *t*-count *t*-table, namely 2.5990 < 2.0106, so  $H_0$  is rejected, so the results of the research carried out show that mathematical problem solving abilities are higher after learning using the Accelerated Learning model compared to using the direct learning model. Thus, it can be concluded that the Accelerated Learning model is more effective in terms of students' mathematical problem solving abilities.

**Keywords:** accelerated learning model, interactive media, mathematics problem-solving ability

## 1 Introduction

Mathematics is an exact science that we learn from elementary, middle and high school. According to Tahir, mathematics is a science that can help students develop their talents, ways of thinking and reasoning powers [1]. The reason is that mathematical data prepares students to solve mathematical problems in the real world. NCTM sets five standards of mathematical ability that students must have, namely problem solving ability, communication ability, connection ability, reasoning ability and representation ability. These five standards have an important role in the mathematics curriculum.

Students will be able to make learning decisions to solve difficulties through teaching problem solving [2]. Despite the fact that problem solving skills are very important in learning mathematics, students find it difficult to solve mathematical problems. This

is in accordance with the statement by Ristyaningsih that students' mathematical problem solving abilities are an important component in the mathematics learning process [3]. Furthermore, Machmud said that solving mathematical problems is a skill that children must learn because humans will never escape everyday challenges [4]

Based on the results of the Programme for International Student Assessment (PISA) survey, it shows that the problem solving abilities of students in Indonesia in learning mathematics are still relatively low. PISA results 2018 shows that Indonesia is ranked 72nd out of 77 participating countries with an average score of 379. With this score, students are only able to solve level 1 and level 2 questions from the 6 highest levels.

Where at level 1, students can answer questions that cover the usual context with the relevant information all available and the question also explained clearly. Meanwhile, at level 2, students can interpret and recognize situations in contexts that require direct conclusions only. This proves that student achievement in Indonesia is still low in problem solving abilities on non-routine questions. With the results of the PISA survey which states that problem solving abilities in Indonesia, which are still relatively low, can be improved through mathematics learning at school, especially in solving mathematical problems [5].

Based on observations and interviews conducted with mathematics teachers at SMP Negeri 8 Gorontalo City towards the end of February 2023, the use of learning media is still relatively limited. Teachers often use Microsoft Power Point, and the learning model still uses a direct learning model to support the teaching and learning process, causing students to become bored and uninterested when studying mathematics. Apart from that, it is known that quadratic equations are a subject that is always considered difficult and often causes students to fail. This is because students in this subject do not yet understand how determine formulas or develop mathematical modeling. As a result, when students solve quadratic equation problems, they face difficulties.

To overcome this, teachers must choose learning resources that will help the learning process in the classroom. According to Sude, media plays a role in supporting the learning process, one of which is overcoming student boredom in learning [6]. This can be overcome with learning media that presents material and theory in an abstract manner. This is in accordance with Ramadhani's statement that in a learning process, the role of the media It is quite important to facilitate the learning process [7]. The learning media used can help increase the effectiveness and efficiency of the learning process. In addition, the use of learning media can make the learning environment produced in the classroom more interesting for students.

Interactive media is one type of learning media that can be used. According to Yanto, interactive media is a type of learning media that can develop relationships between users and learning media through mutual actions and reactions in the learning process [8].

Apart from choosing learning media, teachers must also choose an appropriate model. This is in line with Nasution who states that the correct learning model will make it easier for students to understand the material that will be given [9]. Therefore, to achieve learning objectives, teachers must choose a learning model that is appropriate to the material during the teaching and learning process. The Accelerated Learning Model is one of the learning models that can be used.

Accelerated Learning was chosen because it allows students to learn naturally using learning techniques that suit their personality, allows students to solve mathematical problems with their own understanding and of course in a comfortable learning environment. According to Asrawati, with the Accelerated Learning model students learn in their own way that suits their individual character, students learn using techniques that suit their learning style, in the most natural way for the students themselves, because learning in a natural way will be easier, allowing for a faster learning process [10]. Apart from that, research Qomario shows that Accelerated Learning can have a positive impact on students' mathematical problem solving abilities [11].

This research was then directed to examine the impact of using the Accelerated Learning model assisted by interactive media on mathematical problem solving abilities. The formulation of the research problem is whether there is a significant difference between mathematical problem solving abilities that use the Accelerated Learning model and learning that uses the conventional model.

## 2 Method

This research uses an experimental research method with Posttest Only Control Group Design which was carried out in August of the 2023/2024 academic year. Individuals in this study were divided into two groups that received different treatment: the experimental group and the control group. The experimental class was taught using the Accelerated Learning model with interactive media, while the control class was taught using direct learning with interactive media. There are two variables in this research, namely the independent variable and the dependent variable. In this research the independent variable is Accelerated Learning, while the dependent variable is mathematical problem solving ability.

The population of this study was taken from all class IX students of SMP Negeri 8 Gorontalo City who were separated into six classes with a total of 143 individuals. In this study, two classes were taken as samples using a simple random sampling procedure. Where IX-6 was obtained as the experimental class and IX-5 was obtained as the control class.

The data needed for this research is data on the ability to solve mathematical problems with quadratic equations. Data were collected using test instruments in the form of essays given to two classes after being given treatment. The final test (post-test) was used in this research to assess mathematical problem solving abilities. The instruments provided are first validated and tested for reliability. The construct validity and empirical validity tests were used, while the reliability test used the Cronbach's Alpha correlation formula.

Two data analysis techniques were used in this research: descriptive statistical analysis and inferential statistical analysis. Descriptive statistical analysis is carried out by calculating the mode, median, mean, variance and standard deviation, which are then represented in the form of a histogram. For inferential statistical analysis, the Liliefors test was used to assess the normality of the data, the F test was used to calculate the homogeneity of variance, and the t test was used to test the hypothesis.

### 3 Result and Discussion

#### 3.1 Result

To find out whether solving abilities are different, a posttest was carried out in the experimental class whose learning used Accelerated Learning assisted by interactive media and the control class used conventional learning assisted by interactive media. The results of the two tests were processed using the t test.

Before carrying out this test, a data normality test is first carried out to find out whether the data is normally distributed or not. Based on the results of data normality calculations at a significance level of 0.05 for both groups of data, the  $L_{count}$  and  $L_{table}$  value was obtained which resulted in  $H_0$  being accepted. Acceptance of  $H_0$  means that the research data comes from a normally distributed population, and vice versa.

The results of data normality calculations are shown in Table 1.

**Table 1.** Results of data normality calculation.

Class	N	$L_{count}$	$L_{table}$	Criteria
Experiment	25	0.123024	0.1772	Accept $H_0$
Control	25	0.106402		Accept $H_0$

Then a homogeneity of variance test was carried out. Data homogeneity testing is carried out with the aim of finding out whether the research data has homogeneous variance or not. Based on the results of calculating homogeneity of variance at a significance level of 0,05 for both groups of data, the  $F_{count} < F_{table}$  value was obtained, resulting in  $H_0$  being accepted, which means that the data groups from both classes have homogeneous variances. The results of calculating homogeneity of variance can be seen in Table 2.

**Table 2.** Results of post-test data homogeneity calculations.

Data	Class	N	Variance	$F_{count}$	$F_{table}$	Criteria
Post-test	E	25	61.94	1.104	1.9838	Accept $H_0$
	C	25	56.10			Accept $H_0$

The two-sample t test was used to see the effect of learning using the Accelerated Learning model with the help of interactive media on mathematical problem solving abilities in quadratic equation material. The results of the two-sample t test calculation can be seen in Table 3.

Based on Table 3, it can be seen that  $t_{table} = 2.0106$  with degrees of freedom (dk) = 48 at a significance level of 0.05 from the t distribution table,  $t_{count} = 2,5990$ . Because  $t_{count} > t_{table}$ , namely  $2.599 > 2.0106$ ,  $H_0$  is rejected.

Thus, the alternative hypothesis states that the average difference in students' mathematical problem solving abilities taught using the Accelerated Learning model assisted

**Table 3.** Hypothesis test result.

Class	Average	Variance	Dk	$L_{count}$	$L_{table}$
Experiment	65.88	61.94	48	2.5992	0.1016
Control	60.24	56.10			

by interactive media is higher than the average mathematical problem solving abilities taught using conventional learning assisted by interactive media.

### 3.2 Discussion

The Accelerated Learning model is a model that can overcome the weaknesses that occur during learning in the classroom, where when in previous classes using direct learning students would become more passive, whereas in learning using Accelerated Learning students would become more active. This happens because of the Accelerated Learning model Learning contains learning steps that will make students more active, especially in the fourth step, namely Triggering the memory. In this step, students will be asked questions related to the material that has been presented at the beginning of the lesson to ensure that they really understand and remember the material that has been taught. From the previous explanation it can be seen that when learning using the Accelerated Learning model it will make students more motivated in learning. As stated by Kusuma & Ramadoni, Accelerated Learning is learning that makes students motivated, makes learning more meaningful by creating a pleasant learning atmosphere and directly involving both physically and mentally in the learning process [12].

During the learning process it was divided into 3 meetings for the experimental class. At the first meeting, students were instructed to download interactive media applications on their respective cellphones and then the researcher explained the guidelines for using interactive media. Next, the teacher directs students to find information for themselves about the material they will study through interactive media and if there is something they do not understand, they are welcome to ask the teacher. Then the teacher divides the students into several groups and distributes the LKPD they will work on and presents it to the class. However, this is what differentiates this model with another learning model, namely when students are working on LKPD, the teacher will ask questions about the material they have received at the beginning of learning with the aim of triggering their memory regarding the material.

Meanwhile, for treatment in classes that apply direct learning, the teacher will explain the material fully and after that will distribute the assignments that will be carried out by students. In the learning process teachers and students appear to lack interaction. Learning in this class still seems monotonous, because students will become more passive and only listen to what the teacher gives.

### 3.3 Conclusion

Based on the results of research and data analysis, there is a difference between the mathematical problem solving abilities of students who are taught using the Accelerated

learning model assisted by interactive media and the mathematical problem solving abilities taught using conventional learning models assisted by interactive media.

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