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The Effect of the Inquiry Learning Model on Mathematics Learning Outcomes

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Abstract
The purpose of this study is to determine the effect of Mathematics learning outcomes on learning using the Inquiry model. This study is a true experimental design study. The sampling technique employs the Probability Sampling type, specifically Cluster Sampling (Area Sampling). The sample in this study The subjects were 3rd grade students of Mangunsari 04 Elementary School, Salatiga City, as the experimental class and Mangunsari 07 Elementary School as the control class, with a total of 49 students. Data collection was conducted using observation, documentation, and testing methods. Data analysis using descriptive techniques and statistical analysis. The results of the study indicate that there is a significant influence on mathematics learning outcomes using the Inquiry learning model. This is shown after the t-test was conducted, the calculated F value was 0.390, and the significance level was 0.536 or > 0.05. The calculated F value was greater than 0.05; therefore, F was significant. The use of the inquiry learning model emphasized student activities in the learning process, allowing students to find their own answers to a problem being studied.

Keywords: *Inquiry Learning Model, Mathematics learning outcomes*

Abstrak
Tujuan penelitian ini adalah untuk mengetahui pengaruh hasil belajar Matematika terhadap pembelajaran menggunakan model Inkuiri. Penelitian ini merupakan penelitian dengan desain eksperimental murni. Teknik pengambilan sampel yang digunakan adalah Probability Sampling, yaitu Cluster Sampling (Area Sampling). Sampel dalam penelitian ini adalah siswa kelas III SD Mangunsari 04, Kota Salatiga sebagai kelas eksperimen dan SD Mangunsari 07 sebagai kelas kontrol dengan total 49 siswa. Pengumpulan data dilakukan dengan metode observasi, dokumentasi, dan tes. Analisis data menggunakan teknik deskriptif dan analisis statistik. Hasil penelitian menunjukkan bahwa terdapat pengaruh signifikan terhadap hasil belajar Matematika dengan menggunakan model pembelajaran Inkuiri. Hal ini ditunjukkan setelah uji t diperoleh nilai F hitung sebesar 0,390 dan tingkat signifikansi 0,536 atau > 0,05. Nilai F hitung > 0,05 berarti F signifikan, dengan penggunaan model pembelajaran Inkuiri yang menekankan aktivitas siswa dalam proses pembelajaran untuk dapat menemukan jawaban sendiri terhadap suatu masalah yang dipelajari.
Kata Kunci: *Model Pembelajaran Inkuiri, Hasil Belajar Matematika*

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INTRODUCTION

Mathematics plays a vital role in everyday life, as it often requires mathematical skills to solve problems, such as measuring, counting, and weighing. Mathematics should be taught to all students, starting from elementary school, to equip them with logical, analytical, systematic, critical, and creative thinking skills, as well as the ability to collaborate. These competencies are essential for students to acquire, manage, and utilize information to survive in ever-changing, uncertain, and competitive environments.

Mathematics, according to Amir, A (2014) says that Mathematics is abstract ideas given symbols, so mathematical concepts must be understood first before manipulating these symbols. As a subject, mathematics has an important role in shaping the character and way of thinking of students. According to Sinaga, R (Jeheman et al., 2019) it is very inappropriate if mathematics is said to live for itself, but mathematics has a universal role for other sciences and in the development of modern technology.

It is proper that learning mathematics should be gradual and sequential in a systematic manner and based on previous experiences. According to Firmansyah, D (Ruseffendi, 1991), "Learning mathematics is learning concepts starting from real concrete objects intuitively, then at higher stages, the concept is taught again in a more abstract form using a more general formula used in mathematics". Based on several expert opinions, it can be concluded that Mathematics is a learning process that starts from real, concrete objects and continues at higher stages, then the concept is taught again in a more abstract form. by using understandable formulas to be able to follow the development of modern technology.

Current mathematics instruction tends to be feared by students. Many students struggle with solving math problems; teachers simply lecture, explain, give examples, and assign homework. Teachers rarely engage in discussions about the material presented. Only a few students understand the teacher's explanations, while others don't. Students who don't understand the teacher's explanations generally don't dare ask questions. Therefore, strategies are needed to engage students in mathematics learning.

Primary and Secondary Education (Permendikdasmen) Number 13 of 2025 concerning Philosophical Foundations states that Education must develop higher-order thinking skills such as the ability to analyze and synthesize, so that students are able to understand and face complex challenges, especially in mathematics learning. This is in line with NCTM (Nyala et al., 2016) which states that the undeniable fact that problem solving is one of the process standards that is quickly becoming key in mathematics learning.

Current mathematics instruction tends to be feared by students. Many students struggle with solving math problems; teachers simply lecture, explain, give examples, and assign homework. Teachers rarely engage in discussions about the material presented. Only a few students understand the teacher's explanations, while others don't. Students who don't understand the teacher's explanations generally don't dare ask questions. Therefore, strategies are needed to engage students in mathematics learning.

One component that influences student engagement and contributes to the success of a learning process is the learning model. Selecting and using the right model can stimulate student activity and critical thinking, which in turn impacts learning outcomes. However, most teachers still use conventional teaching methods, such as lectures and question-and-answer methods. This is even though many learning models and methods can encourage students to be more active in participating in learning activities.

Based on field observations by taking samples of two Public Elementary Schools in the Kartini Cluster, namely through interviews with grade 3 teachers of Mangunsari 04 Public Elementary School, Salatiga City as an experimental class, students who actively participate in Mathematics learning are only 10 people out of a total of 25 students, or in other words the level of student activity in participating in Mathematics learning is very less than expected and learning is still centered on the teacher. The cause is the lack of parental attention to the development of children, especially in participating in learning at school, because the majority of parents work as street vendors.

Teachers have not implemented innovative learning models, but only use conventional methods in the sense of lectures, questions and answers, and assignments. The lack of student interest in learning mathematics, and from the results of my observations, it turns out that during the learning process, it only takes place monotonously. During the learning process, many students are busy playing with their classmates and do not listen to the teacher who is explaining the material in front of the class because it is ingrained in the students' minds that mathematics is a difficult subject to learn. Student learning outcomes are affected by the conditions described above, seen in the learning outcomes of approximately 60% of students out of a total of 25 students with a KKM of 70.

Field observations and interviews at Mangunsari 07 Elementary School, Salatiga City, as a control class, revealed that only 65% of 24 students had achieved a minimum passing grade (KKM) of 70 in Mathematics. Teachers continued to use conventional methods, including lectures, Q & A sessions, and assignments. Many students were busy playing with their deskmates and throwing papers at each other while the teacher presented the material. Many students disliked and considered mathematics difficult, leading them to pay little attention to the teacher's explanations.

Judging from the actual conditions in the field, there is a gap between ideal and actual conditions at SDN Mangunsari 04 and SDN Mangunsari 07 in Salatiga City, which causes a problem, namely the failure to achieve completeness of student learning outcomes. A *treatment* in learning is needed in the form of the application of varied learning models/methods. Choosing the right learning model can generate better learning activities and student learning outcomes.

Various creative learning models can improve students' abilities in mathematics. One learning model that can be applied to improve student learning outcomes is *inquiry-based learning. Inquiry-based* learning provides students with the opportunity to think critically in solving problems presented by the teacher. *Inquiry-based learning*, or discovery learning, provides students with the opportunity to discover concepts for themselves through experimentation.

Inquire is one of the models of learning that is closely related to placing students as active learning subjects, which is in line with the opinion of Siagian, RE F and Nurfitriyanti. M (Mulyasa 2003:234) states that " *The inquiry* model is a model that can lead students to realize what has been obtained during the learning process. Meanwhile, according to Jufri (2013) states that *inquiry* is a process that develops basic scientific abilities and includes observing, classifying, calculating, formulating hypotheses, making spatial and temporal relations, measuring, interpreting data, designing experiments, and so on.

It is hoped that through the *Inquiry model,* students will be able to analyze and critique a given problem themselves so that they will be able to solve various problems they face. The *Inquiry Model* is expected to encourage students to understand the many problems, then think about how students can conduct an authentic investigation and be able to investigate problems that require real solutions to real problems.

Apart from being able to improve students' critical thinking, learning using the Inquiry model *emphasizes the* problem-solving process. Based on the background described above, the formulation of the problem studied in this study is "Is there a positive and significant influence on the Mathematics learning outcomes of grade 3 students of SD Negeri Mangunsari o4 in learning using the *Inquiry model?"*

METHOD

This research is an experimental study, using *a true experimental design*. The design used is *a Nonequivalent Control Group Design*. This design is used because only in this design are the experimental group and the control group not selected randomly (Sugiyono, 2009: 116). This study used two classes: one as the experimental class and one as the control class. The research design is described as follows: which is presented in table 1.

Table 1 Research Design

Group	*Pretest*	Independent Variable	*Posttest*
Experiment	O_1	X_1	O_2
Control	O_3		O_4

Information:
O_1 = pretest score of experimental class
O_2 = posttest value of experimental class
O_3 = pretest value of control class
O_4 = posttest score of control class
Experiment = experimental class
Control = control class

The population used in this study was the 3rd-grade students of Gugus Kartini, Salatiga City, semester G odd school year 2025/2026. The sampling technique used was the *Cluster Sampling technique* (Area Sampling). After the sampling was carried out, it was obtained SD Negeri Mangunsari 04 as the experimental class was given *the Inquiry learning model* and SD Negeri Mangunsari 07 as the control class was given the conventional method.

The data collection methods in this study were documentation, observation, and testing. The documentation method was used to obtain initial ability data from the students who were part of the research sample. Meanwhile, the testing method was used to obtain data on student learning outcomes on the perimeter of squares and rectangles using descriptive test questions that had been previously piloted. The learning outcomes measured consisted of two stages: the initial stage obtained from *pretest scores* and the final stage with *posttest scores.*

The pretest was conducted before treatment was given; the purpose of the pretest was to determine the initial abilities of students' learning outcomes. *The posttest* was conducted after treatment was given using the *Inquiry Learning* *model*. The purpose of *the posttest was to determine the effect of the Inquiry* Learning model on mathematics learning outcomes. The observation method was used to observe student activities during the learning process. The data analysis techniques used in this study were (1) normality testing using the technique of *Shapiro-Wilk*, (2) homogeneity test using the *Levene test*, and (3) *independent sample t-test*.

RESULTS AND DISCUSSION

Based on the results of the analysis at the initial stage through the *Shapiro-Wilk* test with a significance level of 5% using *SPSS,* it is known that the *pretest values* of the experimental class and the control class are significant. This can be seen in the *Shapiro-Wilk column* if $\sum$ <50 shows figures of 0.325 > 0.05 and 0.229 > 0.05. where the figure has exceeded the significance figure of 0.05 and is normally distributed, as shown in Table 2, namely the results of *the pretest* normality test for the experimental class and the following control class.

Table 2 Results of *the pretest* normality test for the experimental class and control class

Tests of Normality							
	factor	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	Df	Sig.
Pretest value	1	**,167**	**25**	**,069**	**,955**	**25**	**,325**
	2	**,200**	**24**	**,014**	**,947**	**24**	**,229**
a. Lilliefors Significance Correction							

The results of the normality test analysis on the *posttest* data are normally distributed. This can be seen from the significant data in the *Shapiro-Wilk column* if $\sum$ <50 shows the numbers 0.573 and 0.613 where these numbers have exceeded the significance number of >0.05, shown in Table 3, namely the results of *the posttest normality* test *for* the experimental class and the following control class.

Table 3 Results of the *post -test* normality test for the experimental class and the control class

Tests of Normality							
	Factor	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
		Statistics	Df	Sig.	Statistics	Df	Sig.
Posttest value	1	**,105**	**25**	**,200** *	**,967**	**25**	**,573**
	2	**,105**	**24**	**,200** *	**,968**	**24**	**,613**
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

After the normality test in the form of normal distribution of data is fulfilled, the researcher then conducts a homogeneity test or the level of data equality by conducting a homogeneity test. Through the data homogeneity test in the output table *of the Test of Homogeneity of Variances* with a significance level of 5%, a significance number is obtained. is for the probability *based on mean* = 0.733, for *based on median* = 0.989, then for *based on median and with adjusted df* = 0.989, and probability *based on trimmed mean* = 0.735. The conclusion of the data obtained is homogeneous, because the probability of the data population > 0.05, shown in Table 4, namely the homogeneity test *of the* experimental class and the control class. following.

***Table* 4 Homogeneity test *P* retest Experimental Class and Control Class**

Test of Homogeneity of Variance					
		Levene Statistics	df1	df2	Sig.
Pretest value	Based on Mean	**,117**	**1**	**47**	**,733**
	Based on Median	**,000**	**1**	**47**	**,989**
	Based on Median and with adjusted df	**,000**	**1**	**40,794**	**,989**
	Based on the trimmed mean	**,116**	**1**	**47**	**,735**

Based on *the posttest* value, it shows a significance figure *based on mean* = 0.536, *based on median* = 0.560, *based on median and with adjusted df* = 0.560, and probability *based on trimmed mean = 0.555. The overall probability value shows a significance figure > 0.05, so it can be concluded that the population of posttest* data for the experimental and control groups has the same or homogeneous variance, shown in Table 5, namely the *posttest* homogeneity test for the experimental class and the control class. following.

***Table* 5 Posttest Homogeneity Test Experimental Class and Control Class**

Test of Homogeneity of Variance					
		Levene Statistics	df1	df2	Sig.
Posttest value	Based on Mean	**,390**	**1**	**47**	**,536**
	Based on Median	**,344**	**1**	**47**	**,560**

	Based on Median and with adjusted df	**,344**	**1**	**45,819**	**,560**
	Based on trimmed mean	**,353**	**1**	**47**	**,555**

Based on the calculation of student learning outcomes in the experimental and control classes, in summary, the results of the t-test calculations were carried out with SPSS *using* the *Independent sample T-Test*. The calculation of the difference test for the average pretest and posttest learning outcomes is in Table 6 below.

Table 6 Results of the Difference Test for the Average *Pretest Scores* of the Experimental Class and the Control Class

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
pretest value	Equal variances assumed	**,117**	**,733**	**3,150**	**47**	**,003**	**12,033**	**3,820**	**4,349**	**19,718**
	Equal variances not assumed			**3,144**	**46,067**	**,003**	**12,033**	**3,828**	**4,329**	**19,738**

Based on Table 6, the calculated F result of Levene test is 0.117 with a probability of 0.733 > 0.05, which means that both populations have the same variance or in other words, both classes are homogeneous, thus the analysis of the t-test difference test of the *pretest value* of the experimental class and the control class must use the assumption of *equal variance assumed*. Based on Table 6, it can be seen that the t value is 3.150 with a significance probability of 0.003 < 0.05, so it can be concluded that H0 is rejected, meaning there is an influence of *the Inquiry* learning model on the mathematics learning outcomes of grade 3 students of Mangunsari 04 Elementary School, Salatiga City. The average difference is 12.033.

Table 7 Results of the Difference Test for Average *P-test Values* experimental class and the control class

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
posttest value	Equal variances assumed	**,390**	**,536**	**8,438**	**47**	**,000**	**27,175**	**3,221**	**20,696**	**33,654**
	Equal variances not assumed			**8,409**	**45,083**	**,000**	**27,175**	**3,232**	**20,666**	**33,684**

Based on Table 7, the calculated F result of Levene test is 0.390 with a probability of 0.536 > 0.05, which means that both populations have the same variance or in other words, both classes are homogeneous, thus the analysis of the t-test difference test of the *posttest value* of the experimental class and the control class must use the assumption of *equal variance assumed*. Based on Table 7, it can be seen that the t value is 8.438 with a significance probability of 0.000 < 0.05, so it can be concluded that H0 is rejected, meaning there is an influence of *the Inquiry learning model* on the mathematics learning outcomes of grade III students of Mangunsari 04 Elementary School, Salatiga City. The average difference is 27.175.

The results of *the Inquiry* learning model in the experimental class were better than the learning outcomes using conventional methods in the control class. This is because in experimental learning, students are more active in learning to find formulas, understand formulas for use in solving problems, discuss problem solving, and present the results of discussions in front of the class.

The learning process in the experimental class uses *the Inquiry* learning model, which is able to create an interesting learning atmosphere with the independence of students to find their own solutions to their problems, which is able to encourage students to be active. Student activeness can be seen when many students actively ask questions about the material on the perimeter of squares and rectangles, group discussions run well, and students do the assignments given by the teacher seriously and earnestly.

During the learning process, students are allowed to find the formula for the perimeter of a square and a rectangle by measuring the square and rectangular shapes provided by the teacher. Before students measure the square and rectangular shapes to find their perimeter, students are invited to hypothesize first about the square and rectangular shapes that each student has received.

After that, students write the results of their hypotheses in the worksheet. Then, students are formed into groups that have been randomized by the teacher to test the hypotheses through group work. Students are given time to discuss finding the results of the hypotheses they have made with their groups, then write the results of their hypotheses in a worksheet. The teacher asks one of the group representatives to present the results in front of the class under the supervision of the teacher, and the teacher provides a conclusion at the end of the lesson.

In this learning, the teacher only acts as a guide and facilitator who directs and guides students if they experience difficulties in the discovery process.

Learning using this inquiry model is very interesting and is felt by students to be very enjoyable and not monotonous. Students' enthusiasm in receiving learning is very high, students are very excited when given the opportunity to be able to measure squares and rectangles themselves directly. The group work opportunities provided by the teacher are carried out well by students. Students together in groups can work together and help each other to get the best results from measuring squares and rectangles.

Student-teacher interactions ran smoothly, and groups experiencing difficulties were encouraged to ask questions. Both teachers and students provided positive feedback throughout the learning process, which makes students more interested in learning mathematics, so that the activeness of students in the experimental class is higher than that of students in the control class.

students are seen more as objects than subjects. In this case, the teacher provided fewer opportunities for students to develop creative, objective, and logical thinking skills, leading to a tendency toward passivity. However, in this conventional learning method, the teacher provided a discussion.

Before the students engaged in the discussion, the teacher first gave a lecture on the formulas for the perimeter of squares and rectangles and a short Q & A session. Then, the students were divided into groups determined by the teacher to work on practice problems on the perimeter of squares and rectangles. This resulted in students not absorbing the knowledge gained, resulting in lower *posttest results* in the control class compared to the experimental class.

The results of the final data analysis of the experimental class and the control class showed that the test results of the experimental class for students taught using *the Inquiry model learning.* better than the control class for students taught using conventional methods due to several things including the following : (1) Students in learning using *Inquiry* are more critical in finding information and teaching materials regarding the formula for the perimeter of squares and rectangles from the activity of measuring squares and rectangles, 2) students in learning using *Inquiry* are more active in asking questions about material that has not been understood, namely the perimeter of squares and rectangles, either asking their group mates or the teacher compared to the class that applies conventional methods, 3) students in learning using *Inquiry* are more active in discussing than students using conventional methods so that students really understand the mathematical concept of the perimeter of squares and rectangles which is directly linked to the process of finding it themselves in measuring activities.

The results of this study are in line with the results of research by Sudiasa, IW (2012) stated that learning mathematics using the Inquiry learning model makes students get higher grades compared to using conventional methods. Fadli (2019) said that learning using the inquiry model can bring out the ability to think critically and actively. The inquiry learning model is able to improve students' understanding of mathematical concepts through the steps in the learning model, where students are encouraged to find problems themselves and provide answers to those problems (Hulu et al, 2023).

CONCLUSION

Based on the results of the research and discussion, it was found that there is an influence on the mathematics learning outcomes of students who are taught using the *inquiry learning model* with students who are taught using conventional learning methods. This can be proven after the *t-test was* conducted, the calculated F result was 0.390 , the significance level or probability was 0.536, because the probability of 0.536 > 0.05, with the use of the *inquiry learning model* which emphasizes student activities in the learning process to be able to find their own answers to a problem being studied. In contrast to learning using conventional methods, teachers place students more as objects and not as subjects, so Ha is accepted and H0 rejected, meaning that there is a positive and significant influence of learning outcomes in the *Inquiry learning model* on the learning outcomes of grade 3 Mathematics compared to using mathematical abilities learned using conventional methods, on the material of the perimeter of squares and rectangles.

REFERENCES

Amir, A. (2014). Pembelajaran Matematika SD Dengan Menggunakan Media Manipulatif. Forum Pedagogik, 6 (1), 72-89. Di unduh dari http://jurnal.uinsyahada.ac.id/index.php/JP/article/view/166/148.

Fadli, F. (2019). Penerapan Metode Inquiri dalam Meningkatkan Keterampilan Berpikir Kritis dan Keaktifan Belajar Siswa Pada Mata Pelajaran Pai DI Mts Al-Amin pekalongan, 4 (1), 19-26. Di unduh dari http://repository.uingusdur.ac.id/120/.

Firmansyah, D. (2015). Pengaruh Strategi Pembelajaran dan Minat Belajar Terhadap Hasil Belajar Matematika, Jurnal Pendidikan Unsika, 3 (1), 34-44. Di unduh dari https://journal-fkip.unsika.ac.id/index.php/judika/article/view/199.

Hulu, dkk. (2023). Studi Model Pembelajaran Inquiri terhadap Pemahaman Konsep Matematika Siswa, 2 (1), 152-159. Di unduh https://www.educativo.marospub.com/index.php/journal/article/view/97.

Jufri, A. 2013. Belajar dan Pembelajaran Sains. Bandung: Pustaka Rineka Cipta

Nyala, J., Assuah, C., Ayebo, A., & Tse, N. (2016). The Prevalent Rate Of Problem-Solving Approach In Teaching Mathematics In Ghanaian Basic Schools. *Internasional Journal Of Research In Education And Science*, 2(2), 2148-9955. Di unduh dari https://www.ijres.net/index.php/ijres/article/view/122.

Permendikdasmen. (2025). Peraturan Menteri Pendidikan, Kebudayaan, Riset, dan Teknologi Nomor 12 Tahun 2024 Tentangg Kurikulum Pada Pendidikan Anak Usia Dini, Jenjang Pendidikan Dasar, dan Jenjang Pendidikan Menengah. Jakarta: Permendikdasmen.

Siagian, R. E. F dan Nurfitriyanti. M. (2015). Metode Pembelajaran Inquiry dan Pengaruhnya Terhadap Hasil Belajar Matematika Ditinjau Dari Kreativitas Belajar, 2 (1), 35-44. Di unduh dari https://journal.lppmunindra.ac.id/index.php/Formatif/article/view/85/83.

Sinaga, R. (2023). Pengaruh Pendekatan Matematika Realistik Terhadap Hasil belajar Matematika Siswa. Jurnal Pendidikan, Sosial dan Sains, 3 (1), 52-55. Di unduh dari https://ejournal.yana.or.id/index.php/algebra/article/view/834.

Sudiasa, I. W. (2012). Pengaruh Model Pembelajaran Inquiri dan Kemampuan Numerik Terhadap Hasil Belajar Matematika, 45 (3), 263-271. Di unduh dari https://ejournal.undiksha.ac.id/index.php/JPP/article/view/1841.

Sugiyono. 2009. Statistika Untuk Penelitiaan. Bandung. Alfabeta