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THE IMPLEMENTATION OF GOOGLE SITE-ASSISTED DIFFERENTIATION LEARNING MODEL TO IMPROVE MATHEMATICAL REASONING OF CLASS X SENIOR HIGH SCHOOL

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ABSTRACT

Differentiation model learning is an effort to facilitate students' diverse or different backgrounds so that students are able to maximize their abilities. This study aims to improve students' mathematical reasoning using the google site-assisted differentiation learning model. Mathematical reasoning is one that is important for students to master, especially class X. The method in this study was quasi-experimental, with 68 students were participated in this research from SMA PGRI 31 and SMAN 1 Pangalengan. The instruments in this study were 5 questions describing mathematical reasoning. Data were analyzed using SPSS 23 to compare between conventional learning and learning using the google site-assisted differentiation model. The results show that students who have the differentiation model were better than those using conventional learning. This shows that the class using the differentiation learning model has an advantage in reasoning ability. This is because children learn according to their respective abilities because in the differentiation of the teaching provided it is adjusted to the initial ability there is yes ng children need a lot of guidance or Scaffolding, there is a little, there is no guidance so that they are able to maximize the mathematical reasoning that children have. From the results of the study it can be concluded that there is a significant difference between learning using the Google site-assisted differentiation model and conventional learning.

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INTRODUCTION

Mathematical reasoning according to Shurter and Pierce (Dahlan, 2004) explains reasoning as a translation of reasoning which is defined as the process of reaching logical conclusions based on facts and relevant sources. In line with what was expressed by Keraf (Sadiq, 2004) that reasoning or reasoning is a thinking process that tries to relate known facts or evidence to a conclusion. Mathematical reasoning is needed to determine whether a mathematical argument is right or wrong and is also used to build a mathematical argument.

In line with that (Jeannotte,Kieran,2017) stated that "Mathematical reasoning is reasoning about and with the object of mathematics." This means that mathematical reasoning is reasoning about mathematics and involves mathematical objects. Sumarmo (2010) reveals that in general reasoning is classified into two types, namely inductive reasoning and deductive reasoning. As for the components according to (So & Ricci, 2016) reveals that reasoning ability is one part of the ability to think mathematically, part of communication, metacognitive and problem solving, also consists of the ability to make decisions from various situations that are more specific and more urgent by linking them in various schemes. He divided students' mathematical reasoning abilities into four parts, namely: Level 1: Does not understand a reasoning process; Level 2: Having knowledge in the form of models, knowing facts, characteristics and relationships but unable to generate arguments; Level 3: Able to reason and make a weak argument; Level 4: Able to produce strong arguments to support the reasoning they produce.An educator is expected to be able to manage student-biased learning, and must be able to meet the learning needs of students. Every child is born with their own uniqueness (S.Rosdianawati, 2001). As educators, we have an obligation to ensure that every child gets an equal opportunity to learn in the way that best suits them. Through the practice of differentiated learning, students will not only be able to maximize their potential, but they will also be able to learn about various important life values (Lent, 2004). Values about the beauty of difference, respect, a new meaning of success, self-strength, equal opportunity, freedom of learning, and various other important values that will contribute to their development in a more holistic/whole manner. Therefore, it is important for educators to know how this differentiated learning process can be carried out, in ways that allow teachers to be able to manage it effectively. Every school has a diversity of students with different characters, different backgrounds and different ways of learning, so a learning model is needed that facilitates all of this. One learning model that is believed to be able to facilitate the needs of students with different characters is the differentiation learning model. This agrees with (Tarigan et al., 2022) which reveals that the differentiation model can facilitate student learning needs. Likewise, according to Thomlinson (Jatmiko & Putra, 2022) that differentiation learning is an attempt to adjust the learning process in the classroom and meet the individual learning needs of each student. Education must be aware that every child is unique and has characteristics that are different from other children (Sadikovna et al., 2021).

In this study the differentiation learning model is presented using the Google site website. The aim is to arouse students' interest and desire to learn so that learning is not rigid and more fun (Nuryati et al., 2022). On a Google site-based website, teachers can present teaching materials, attendance lists, evaluations, reflections, can also attach files in pdf format, videos from YouTube as well as powerpoints and other materials to make it easier for students to learn (Ciung et al., 2022). According to (Gumilar & Effendi, tt) Educators and students can create and operate these Google sites easily even though their use is less familiar than we use regular websites. In line with that, research results (Aminah et al., 2021) show that more than 80% of participating teachers are able to understand the activities of implementing training on the use

and utilization of the Google site application in making teaching materials, this shows that the Google site website is easy to master and can used for learning.

The sample for this study included 2 classes of class X students in 2 schools in the Pangalengan sub-district, namely SMAN 1 Pangalengan (picture 1) and SMA PGRI 31 Pangalengan (picture 2). The aim is to improve students' mathematical reasoning abilities which are still low, especially for HOTS questions on exponential functions. The results of the PTS assessment showed that more than 70% of students scored below the KKM (table.1).

Table. 1.scores PTS Student

NO	NAME OF SCHOOL	NUMBER of Samples	KKM	MANY STUDENTS			%
				<KKM	= KKM	> KKM	<KKM
1.	SMAN 1 PANGALENGAN	34	70	24	4	6	70.5
2.	SMA PGRI 31 PANGALENGAN	34	75	25	5	4	73.5

Other studies show the low mathematical reasoning of students conveyed by (Sugandi et al., 2021) according to him the mathematical reasoning of IKIP Siliwangi students In solving statistical problems is still low, it can be seen that many students have difficulty when working on non-routine questions. The results of other observations show that junior high school students still lack reasoning when working on straight line equations (Isnaeni et al., 2018).

Figure 1. Learning activities at SMA Negeri 1 Pangalengan

Mathematical reasoning is important for students to master according to (Rohaeti et al., 2019) the goal is for students to be able to conclude several examples of mathematical problems in the form of mathematical patterns of story questions cause and effect and problems and observe and collect data so that students able to apply mathematics. In line with that, Sumarmo in (Sugandi et al., 2020a) states that using reasoning in the pattern and nature of manipulating mathematics in order to make generalizations compile evidence or interpret and explain mathematical ideas or statements. This is further reinforced by the statement (Nurkhaeriyyah et al., 2018) which states that mathematical reasoning is a process of drawing logical conclusions from known or assumed mathematical facts.

Figure 2. Learning Activities at SMA PGRI 31 Pangalengan

In response to this, mathematical reasoning is important for students, in this study it focused more on exponential function material. Based on what was previously explained, the purpose of this study was to improve students' mathematical reasoning using the google site-assisted differentiation learning model on exponential material because previously there had been no research using the google site to convey differentiation learning models.

METHOD

The method in this research is quasi-experimental. Where there were two groups that were given different treatment, the first group was the conventional class or the control class. Meanwhile, the second group was the class in which the concept of a Google Site-assisted differentiated learning model was given.

In the initial activities, both the control class and those who received treatment were given a pretest first to measure the initial abilities of students after learning was carried out, then a post test was carried out to measure the extent of students' mathematical reasoning (Sugandi et al., 2020b). The research design is as follows (Ruseffendi, 2005: 53):

Table. 2. Research Design

O1	X	O2
O1		O2

Description:
O1 = Pretest
O2 = Posttest
X = Google Site Assisted Differentiation Learning (PDGS)

The population in this study were all high school students in Pangalengan District, Kab. Bandung. As for the conventional class sample, 34 students of class X PGRI 31 Pangalengan were randomly selected. The sample for the PDGS class is 34 students of class X at SMA Negeri 1 Pangalengan. The instrument used was a non-routine mathematical reasoning test and for analysis it used SPSS 23.

RESULTS AND DISCUSSION

Results

The following presents the descriptive results of students' mathematical reasoning:

Table. 3. Description of mathematical reasoning

VALUE	Experiment Class (PDGS)			Control class/conventional class		
	N	$\underline{x}$	S	N	$\underline{x}$	S
PRETEST	34	45.82	5.97	34	42.68	7.185
POSTTEST	34	81.09	2.610	34	73.44	3.917
N-GAIN %	34	64.70	6.15	34	52.78	10.06

Based on the data in table 3 and table 4 above, it can be obtained that the average n-gain percent of experimental class data shows a value of 64.70% with criteria quite effective, with a value of n - a minimum gain of 50% and a maximum of 74.19%. Whereas for the control class n-gain

was 52.78% with less effective criteria, with a maximum value of 71.43% and a minimum of 22.22%.

From the descriptive data above, it can be concluded that learning using the differentiation model assisted by Google Google Site is quite effective in increasing students' reasoning abilities at SMA Negeri 1 Pangalengan. Learning using conventional models is less effective in improving students' reasoning abilities at SMA PGRI 31 Pangalengan.

Next, we will carry out a normality test and homogeneity test using SPSS 23 to see whether the data obtained is normally distributed or not. The following are the results of the data normality test using SPSS 23:

Table 5. Test of Normality

		Kolmogorov-Smirnov			Shapiro-Wilk Class		
	for	Statistics	df	Sig.	Statistics	df	Sig.
Ngain Percent	Experiment (GDP)	.122	34	.200*	.962	34	.281
	Control (Conventional)	.135	34	.123	.952	34	.137

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Based on the normal test results (table 5), we use the Kolmogorov-Smirnov method because the number of samples is more than 60, namely 68 people. The experimental class has a lower limit of sig value of 0.200 more than 0.05, so the PDBG experimental class is normally distributed, then the control class has a sig value. 0.123 is more than 0.05, so the experimental class is normally distributed. In conclusion, both classes have a significant value of more than 0.05, so the two classes are normally distributed.

Furthermore, the homogeneity test and Independent t test were carried out.

Table 6. Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
Percent	Experiment (PDBG)	34	64.7027	6.15259	1.05516
	Control (Conventional)	34	52.7851	10.06928	1.72687

Based on table 6 data group statistics the mean value of the experimental class is 64.702 when rounded up to 65% based on the interpretation n gain, the google site-assisted Differentiation Learning in the experimental class is quite effective in improving students' mathematical reasoning, then the mean value of the control class is 52.78 or rounded to 53% indicating that conventional learning is less effective in improving students' mathematical reasoning. So descriptively statistically there is a difference in the effectiveness of learning using the google site assisted differentiation model with conventional learning. Furthermore, to see if the data is significant, the results of the independent t test are presented.

Table.7. Independent sample test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Ngain_persen	Equal variances assumed	6,103	,016	5,889	66	,000	11,91763	2,02372	7,87714	15,95811
	Equal variances not assumed			5,889	54,627	,000	11,91763	2,02372	7,86138	15,97387

Based on the results of table 7, the independent sample test shows that Levene's test data for equality of variance has a significant value of 0.016, the value is below 0.05, so the data from the experimental class and the control class are not homogeneous, but this is not a condition. absolutely to do an independent test sample test. Furthermore, the results of the t-test for equality of means obtained a sig. (2-tailed) 0.000 <0.05 so it can be concluded that there is a significant difference in effectiveness between learning using the differentiation model made from Google sites and conventional learning. This is in line with the results of research (Indah Septa Ayu Laia, 2022a) which states that there is an effect of differentiation learning on student learning outcomes.

Discussion

Based on the results of the pretest analysis, there is no difference in the initial ability of students' mathematical reasoning between those applying the differentiation model and also conventional learning. experiments using the differentiation learning model and those in the control class using conventional learning on the results of the post test it was found that it was concluded that the mathematical reasoning abilities using the differentiation model were better than those using conventional learning. This shows that the class using the differentiation learning model has an advantage in reasoning ability This is because children learn according to their respective abilities because in the differentiation of the teaching provided it is adjusted to the initial ability there is yes ng children need a lot of guidance or Scaffolding, there is a little, there is no guidance so that they are able to maximize the mathematical reasoning that children have, this is in line with research results (Indah Septa Ayu Laia, 2022b) which revealed that there is an effect of differentiating learning strategy treatment on the learning outcomes obtained according to (Pane et al., 2022) the results obtained are that the differentiation learning model has a significant influence on students' creative thinking abilities.

CONCLUSION

Based on the research conducted, it can be concluded that the research data between SMA PGRI 31 Pangalengan and SMA Negeri 1 Pangalengan, which were sampled from class 10, were not homogeneous. whereas conventional learning is less effective at increasing students' reasoning abilities at the end of the study it is concluded that there is a significant difference between learning using Google site-assisted differentiation and conventional learning. Suggestions for further research can be developed by taking 3 sample classes, namely the experimental class in which the differentiation is developed, the second class is the class with the differentiation learning model, and the third class is the conventional class or control class.

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