

## The influence of mathematical disposition and gender on the numerical ability of Grade X students of SMAN 1 Bae Kudus

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### ABSTRACT

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The background of this study is the lack of mathematical disposition of students and different genders towards the numerical abilities of class X students of SMAN 1 Bae Kudus. This study aims to (1) determine the influence of mathematical disposition on the numerical abilities of class X students of SMAN 1 Bae Kudus; (2) knowing the influence of gender on the numerical ability of class X students of SMAN 1 Bae Kudus; (3) knowing the influence of mathematical and gender dispositions together on the numerical abilities of class X students of SMAN 1 Bae Kudus. The types and approaches of research used are correlation and quantitative. This study was conducted in class XE8 involving 32 students. The results showed that: (1) there was a positive and significant influence of mathematical disposition on numerical ability with a significant contribution of  $0.000 < \alpha < 0.05$ , (2) there was no positive and significant influence of gender on numerical ability because the significance value was  $0.975 > 0.05$ , and (3) there is a positive influence and the significant mathematical disposition and gender together to the numerical ability of significance values of  $0.000 < \alpha < 0.05$  and a percentage of 61.1%.

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## Introduction

Learning is a process or effort made by everyone to obtain changes in knowledge, skills, attitudes, behaviors, and various positive values as an experience from various materials that have been studied. The definition of learning can also be interpreted as everything related to psychic activities carried out by each individual so that later the behavior of the individual will be different before and after learning. Changes in behavior or what is commonly referred to as a response occurs due to new experiences such as having intelligence/knowledge after learning (Djamaluddin, 2019).

The word learning is a combination of two activities, namely learning, and teaching. (Ahmad, 2013) Learning activities reviewed methodologically tend to be more dominant in

learners, while teaching when viewed as instructional is done by the teacher, so the term learning is a summary of the words learning and teaching.

Mathematics learning is a teaching and learning process carried out by teachers and students to develop students' thinking creativity so that they can improve their thinking skills and acquire new knowledge to improve good mastery of mathematics lessons (Magfur, 2016). Mathematics is dubbed the queen and servant of science because the development of mathematics does not depend on other sciences but rather other sciences that use or depend on mathematics a lot. Learners perceive mathematics as a difficult subject, due to its abstract nature. This may be because students cannot do math problems, lack confidence in learning mathematics, students are less persistent or diligent in finding solutions to the math problems they are given, or could be because students' curiosity in learning mathematics is still low. This makes students' views on mathematics look difficult to understand and causes students to be less interested in learning mathematics (Nurfitriyanti, 2017).

Mathematical disposition is one of the internal factors that can determine a person's success in learning mathematics. Students who have a high enough disposition will be more enthusiastic and diligent when facing problems in mathematics. Students feel more challenged and feel that they have a responsibility to their learning so that they can develop good habits in mathematics. A mathematical disposition is the productive or positive attitude of a person who views mathematics as something logical and can be useful (Sumarmo, 2012). Low mathematical disposition because students consider mathematics unnecessary in everyday life. Students find math difficult, unimportant, and unpleasant. Students find mathematics difficult because students lack a confident, persistent, and tenacious attitude and a lack of interest in students to relearn or search for other relevant sources. Students also feel that mathematics is unimportant and useless because they do not have an attitude of appreciating and appreciating the role of mathematics (Puspitasari, 2017). Students who have a high mathematical disposition will be more enthusiastic about solving mathematical problems.

The gender factor of students or what is commonly called gender can also influence learning mathematics. Each student has different abilities including abilities in mathematics. So, men and women have different abilities in mathematics. In general, male students are the same as female students, but male students have better abstraction power than female students so it can be said that male students are better than female students in mathematics, because in general mathematics is related to abstract understandings (Wahyuni, 2018). Therefore, male and female students have differences in learning mathematics.

Numerical ability is one of the internal factors in learning mathematics. If students have numerical abilities then the learning objectives of mathematics can be achieved. People who have high numerical abilities will find it easier to understand mathematics lessons. Numerical ability is a person's ability to reason (logic) and the ability to operate numbers in mathematics, be able to find relationships between one thing and another using abstract thinking concepts, and the ability to classify and categorize mathematical information. So the numerical ability is the ability of a person to categorize abstract concepts that he has when using numbers. Numerical in this case is a person's ability to process, apply and make conclusions with numbers. The numerical ability has a significant relationship with mathematics learning outcomes (Kartiwi, 2011).

Based on the results of preliminary observations at SMAN 1 Bae Kudus, the mathematical disposition is also still lacking because students lack interest in mathematics lessons so a

positive view of mathematics is not good and there are differences between male and female students in learning mathematics and students' numerical abilities are still not good, students still have difficulties in operating mathematics related to the operation of numbers in mathematics. This is the interest of researchers to investigate "The Effect of Mathematical and Gender Dispositions on the Numerical Ability of Class X Students of SMAN 1 Bae Kudus".

Based on the identification of the problem and the limitations of the problem that has been described, the following problem formulation is obtained: (1) Is there any influence of mathematical disposition on the numerical ability of class X students of SMAN 1 Bae Kudus? (2) Is there any gender influence on the numerical ability of grade X students of SMAN 1 Bae Kudus? (3) Is there any influence of mathematical and gender dispositions together on the numerical abilities of grade X students of SMAN 1 Bae Kudus?

The objectives of this development research are as follows: (1) aims to determine the influence of mathematical disposition on the numerical ability of class X students of SMAN 1 Bae Kudus, (2) knowing the influence of gender on the numerical ability of class X students of SMAN 1 Bae Kudus, and (3) knowing the influence of mathematical and gender dispositions together on the numerical abilities of class X students of SMAN 1 Bae Kudus.

## **Method**

The methodology used in this study is quantitative with the type of correlation research. The research variables used are (1) free variables mathematical and gender dispositions while bound variables are (2) numerical abilities. The population in this study was class X students of SMAN 1 Bae Kudus which numbered 392 and used the Probability Sampling Technique in the form of Simple Random Sampling to take a sample of class XE8 which amounted to 32 students.

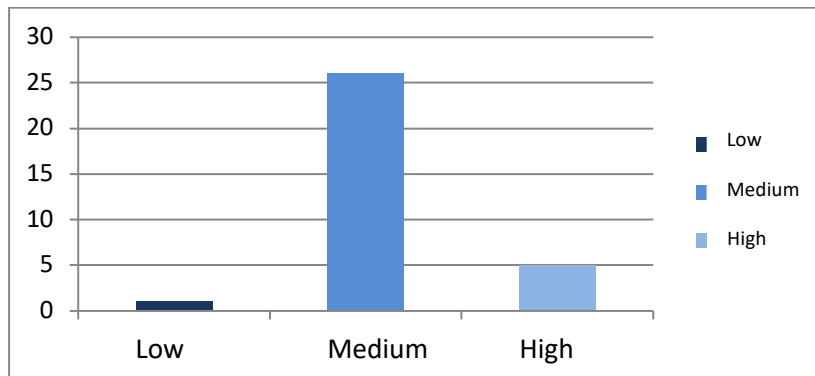
The technique of collecting mathematical disposition variable data using questionnaires is 22 statements, gender through direct observation to find out male and female students, and numerical ability variables using tests totaling 15 questions. Before the mathematical disposition questionnaire and numerical ability test are tested in the study, validity, and reliability tests are carried out first. Data analysis techniques consist of prerequisite tests and hypothesis tests. The prerequisite tests used are the normality test, multicollinearity test, and heteroscedasticity test. The hypothesis tests used are multiple regression, f test, and t-test.

## **Results and discussion**

Research has been carried out with the results that there is an influence of mathematical disposition on numerical ability. It can be known by using the analysis of the t-test test obtained t count (7.086) > t table (2.045) so the null hypothesis is rejected, The conclusion is that mathematical disposition affects the numerical ability The value of coefficients and t counts is positive so that mathematical disposition has a positive effect on numerical ability. Based on the previous description, it can be seen that mathematical disposition exerts an influence on numerical abilities. This illustrates that the better the mathematical disposition of students in learning mathematics, the higher the student's numerical ability.

The categories of the tendency of mathematical disposition of students are as follows.

- a. High category, if the score is more than 81,
- b. Medium category, if the score is between 57 and 81, and
- c. Low category, if the score is less than 57.

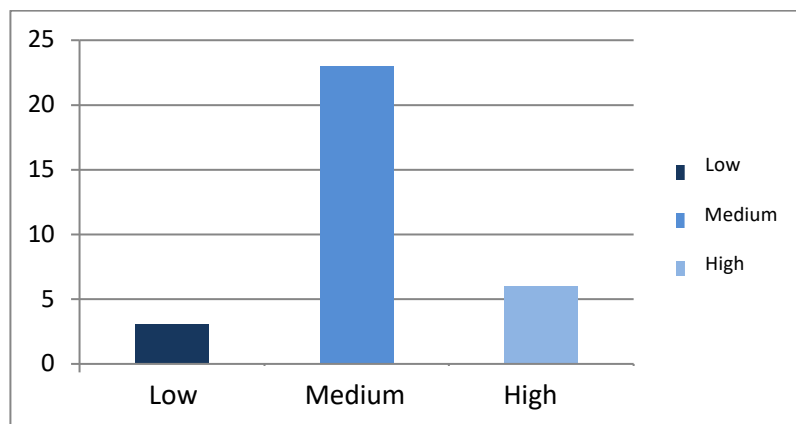


**Figure 1.** Diagram of the tendency of mathematical disposition of students.

Based on Figure 1, the mathematical disposition of students in mathematics learning can be seen that 5 students are in a high tendency, 26 students are in the medium tendency category and 1 student is in the low tendency category. From these data, it can be concluded that the mathematical disposition of class X students of SMAN 1 Bae Kudus in mathematics learning tends to be moderate. This is proven by the presence of most students or 81.25% of students are in the moderate category.

The categories of numerical ability tendencies are as follows.

- a. High category, if the score is more than 83
- b. Medium categories, if the score is between 60 and 83, and
- c. Low category, if the score is less than 60.



**Figure 2.** Diagram of tendency of students' numerical abilities

Based on Figure 2, students' numerical ability in mathematics learning can be seen as 6 students are in a high tendency, 23 students in the medium tendency category, and 3 students have a low numerical ability. From these data, it can be concluded that the numerical ability of class X students of SMAN 1 Bae Kudus in mathematics learning tends to be moderate. This is proven by the presence of most students or 75% of students in the moderate category.

Numerical ability is closely related to mathematical disposition because mathematical disposition is one of the factors that determine success in learning mathematics. A student who has a high disposition will be more persistent and tenacious in dealing with more challenging mathematical problems and will be more responsible for their learning and always develop good

habits in mathematics. Mathematical disposition has to do with how students solve math problems, whether they solve them with confidence, perseverance, interest, and flexible thinking to find various alternatives to solving problems (Haliana et al., 2019).

The gender data obtained for gender variables are only divided into male and female. Based on the data above, it can be seen that male respondents are 31% and female respondents are 69% of the total number of respondents. In this study, gender did not have a very significant influence on numerical ability. This is evident from the results of research that states gender does not influence numerical abilities. Here is a summary of the analysis of the influence of gender on numerical ability. From the analysis that has been carried out, it can be known that  $t$  count (0.31) <  $t$  table (2.045) so the null hypothesis is accepted. The conclusion is that gender does not affect numerical ability.

Gender cannot be a benchmark that can master numerical abilities. Both men and women have the same opportunity to be able to master the basic abilities of this mathematics. The observations made also agree with the results of the calculation, that men and women have the same opportunity and ability to be able to master a certain skill or ability if they are willing to make an effort. Thus, a person's success or failure in mastering something is not determined by his gender. Therefore, no human being should say that women are above their abilities and below those of men (Nurkhafifah et al., 2020).

**Table 1.** Results of multiple regression analysis

Model	Coefficients <sup>a</sup>				t	Sig.	Collinearity Statistics	
	Unstandardized Coefficients		Standardized Coefficients				Tolerance	VIF
	B	Std. Error	Beta					
1 (Constant)	19.275	9.181			2.099	.045		
MathDisposition	.752	.106	.798		7.086	.000	.988	1.012
Gender	.086	2.760	.003		.031	.975	.988	1.012

a. Dependent Variable: Numerical Ability

The third hypothesis of this study is that there is an influence of mathematical disposition and gender together on numerical ability. To find out whether the hypothesis is correct or not, researchers use double regression analysis and obtain equations, namely  $Y = 19.275 + 0.752X_1 + 0.086X_2$  then performed the test F. The influence of mathematical disposition and gender together on numerical ability can be known from the value of  $f$  count 25.385 and  $f$  table by 3.3 because  $f$  calculates > of  $f$  table and significance  $0.000 < 0.05$  then hypothesis zero is rejected, so mathematical disposition and gender are jointly expressed to affect numerical ability while how much of the percentage of influence of mathematical disposition and gender in together with the numerical ability can be seen from the value of  $R^2$  (adjusted R square) is 0.611. So the contribution of influence from independent variables together is 61.1% while the remaining 38.9% is influenced by other factors that are not studied.

Students must have a personality to solve problems. Mathematical dispositions relate to how learners perceive and solve mathematical problems: whether confident, diligent, interested, or open-minded to explore various problem-solving strategies. students who have a high mathematical disposition will be more persistent, and tenacious in the face of more challenging problems and will be more responsible for their own learning (Zanthy & Sa'adah, 2019).

That there is a difference in ability between girls and boys. In the early childhood period to elementary school, talented male students and talented female students had relatively the same number. Whereas in adolescence there is a decline, in about the age of twelve years talented male students number more than talented female student participants, and in adulthood, the ratio of numbers between talented men becomes very different. This is because women experience puberty faster than men. As a result, female students tend to perform low and this tendency often becomes habitual in puberty (Malenda et al., 2018). Thus, mathematical and gender dispositions affect numerical ability.

### **Conclusion**

There is a positive and significant influence between mathematical dispositions on numerical ability in grade X students of SMAN 1 Bae Kudus for the 2022/2023 school year. This is indicated by the obtained value  $t$  count (7.086)  $>$   $t$  table (2.045). From the regression calculation, it is known that if the mathematical disposition is increased by 1 unit, the numerical ability will increase by 0.752 units.

There was no positive and significant influence between gender and numerical ability in grade X students of SMAN 1 Bae Kudus for the 2022/2023 school year indicated by  $t$  count (0.31)  $<$   $t$  table (2.045). As for the value of gender regression to numerical ability is at a significance level of 0.975 and  $>$  of 0.05, gender does not affect numerical ability.

There is a positive and significant influence between mathematical dispositions and gender together on numerical ability in grade X students of SMAN 1 Bae Kudus for the 2022/2023 school year. The magnitude of the influence of mathematical disposition and gender together on numerical ability is at a significance level of  $0.000 < 0.05$  so it can be said to be very significant. As for how much the percentage of the influence of mathematical disposition and gender together on numerical ability can be seen from the value of the coefficient of determination or the value of the R square. Based on the output of the  $R^2$  (adjusted R square) value, a value of 0.611 was obtained, so the contribution of the influence of the independent variables of mathematical disposition and gender together was 61.1%, while 38.9% was influenced by other factors that were not studied.

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