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# The Effect of Mathematical Disposition and Learning Style on Learning Motivation and Learning Achievement Online

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**ABSTRACT**
A number of characteristics, such as mathematical inclination and motivation to learn mathematics, must be taken into account during the mathematics learning process. The location of the study was SMPN 1 Tajurhalang. 107 students made up the sample for this study, which was selected using a probability sampling technique and data was gathered through questionnaires. The study variables include learning achievement (Y), learning desire (Z), learning style (X2), and mathematical inclination (X1). Path analysis is the type of data analysis used. The study's conclusions are as follows: (1) mathematical style and disposition directly affect online learning motivation; (2) mathematical style and disposition directly affect online learning achievement; (3) mathematical style and disposition indirectly affect online learning motivation; and (4) mathematical style and disposition indirectly affect mathematical disposition through online geometry learning achievement.

**Keywords:**
Learning Achievement, Learning Motivation, Learning Style, and Mathematical Disposition

## INTRODUCTION

Mathematics, as an important part of human life, serves as the basis for other scientific fields, including chemistry, physics, medicine, economics, and accounting. Mathematics can be used as a basis for the development of science (Ramdani, 2006). In addition, mathematics can also train logical, critical, and systematic thinking skills in solving problems. Learning mathematics can be considered as an intellectual exercise in explaining the relationships and symbols found in mathematics methodically, carefully, and accurately to apply the resulting ideas to the solution of various problems. Many variables affect the quality and quantity of learning (Umiyati, 2021). A number of characteristics, such as mathematical tendencies and motivation to learn mathematics, must be taken into account for the success of the mathematics learning process.

Motivation to learn is an important determinant of the effectiveness of the learning process, in addition to mathematical tendencies. Psychologists define motivation as an inner force that supports and directs attitudes and actions over a long period of time. On the other hand, learning motivation is a general internal drive to learn in order to meet learning goals. The positive and significant influence between Learning Style, Learning Motivation, and Parental Socioeconomic Conditions (Nugroho, 2017). Both mathematical disposition and learning motivation are important factors in achieving learning goals. Friantini (Friantini & Winata, 2020) stated that disposition is the ability to make decisions that have an impact on certain goals in a calm and reasonable manner. On the other hand, mathematical disposition is a person's positive attitude towards the process of learning mathematics (Vira & Aniswita, 2022).

Mathematical disposition can also be interpreted as a strong commitment and self-confidence of students in learning mathematics. Mathematical disposition can be

strengthened by practicing solving mathematical problems and expressions and their solutions (Caron & Markusen, 2016a). In the learning process, it must be recognized that the characteristics of students are very diverse. The independence of each student in learning is one aspect of diversity (Lestari & Harjono, 2021). The pace of learning in class is often hampered by variations in the degree of freedom to learn, which affects students' motivation to learn and tendencies towards mathematics. Researchers want to investigate the impact of mathematical disposition and learning styles on online learning motivation and achievement, based on the tasks given(Fazri, 2023).

## METHOD

Quantitative research is the method employed in this study (Machali, 2021). Based on the positivist ideology, the research methodology employs statistical data analysis to investigate specific populations or samples in order to test preexisting hypotheses. In this study, the Associative approach was employed. a process used to ascertain how two or more variables relate to one another.

The target demographic and the affordable population are the two different categories of people. The 236 pupils enrolled in SMPN 1 Tajurhalang make up the study's affordable population. The 146 pupils enrolled in the VII and VIII grade at SMPN 1 Tajurhalang are the target population. Since the IX grade students had already graduated from school at the time of the investigation, the population in grades VII and VIII was used. A total of 107 students from grades VII and VIII at SMPN 1 Tajurhalang served as the study's samples. The sample method utilized is the Probabilty Sampling methodology (Mohsin, 2021), which ensures that every member of the population chosen for the sample has an equal chance of being chosen.

## RESULTS AND DISCUSSION

### Respondent Description

This study was conducted on students of grade VII and VIII at SMPN 1 Tajurhalang consisting of 2 classes each with a total of 107 students. The researcher collected respondents based on class and gender as follows:

Table 1

| No | Class | Frequency | Percentage |
|---|---|---|---|
| **1** | VII-A | 28 | **26.2%** |
| **2** | VII-B | 27 | **25.2%** |
| **3** | VIII-A | 26 | **24.3%** |
| **4** | VIII-B | 26 | **24.3%** |
| | **Total** | **107** | **100%** |

Based on table 1 of the results of sample data processing, it can be seen that class VII-A has the largest distribution of students with a percentage of 26.2%, followed by class VII-B with a percentage of 25.2%. While the rest are students of class VIII-A and VIII-B who have the same number with a percentage of each class, namely 24.2%.

Table 2

| No | Jenis Kelamin | Frekuensi | Persentase |
|---|---|---|---|
| **1** | Man | 55 | **51%** |
| **2** | Woman | 52 | **49%** |
| | **Total** | | **107100%** |

Based on table 2, the results of processing sample data from gender, it can be seen that of the 107 respondents in this study, 51% were male students. While the remaining 49% were female students.

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## Research Results

To find out whether the questionnaire that was compiled was valid, a validity test was carried out. The results of the validity test processed by the researcher using SPSS software version 22(Fiandini et al., 2024) can be seen in the following table.

Table: 3

| Statement | $r_{count}$ | $r_{tabel}$ | Description |
|---|---|---|---|
| **Statement 1** | 0,478 | 0,374 | Valid |
| **Statement 2** | 0,456 | 0,374 | Valid |
| **Statement 3** | 0,425 | 0,374 | Valid |
| **Statement 4** | 0,450 | 0,374 | Valid |
| **Statement 5** | 0,426 | 0,374 | Valid |
| **Statement 6** | 0,491 | 0,374 | Valid |
| **Statement 7** | 0,611 | 0,374 | Valid |
| **Statement 8** | 0,582 | 0,374 | Valid |
| **Statement 9** | 0,440 | 0,374 | Valid |
| **Statement 10** | 0,394 | 0,374 | Valid |

Table: 4

| Statement | $r_{count}$ | $r_{tabel}$ | Description |
|---|---|---|---|
| **Statement 1** | 0,667 | 0,374 | Valid |
| **Statement 2** | 0,432 | 0,374 | Valid |
| **Statement 3** | 0,418 | 0,374 | Valid |
| **Statement 4** | 0,407 | 0,374 | Valid |
| **Statement 5** | 0,442 | 0,374 | Valid |
| **Statement 6** | 0,485 | 0,374 | Valid |
| **Statement 7** | 0,577 | 0,374 | Valid |
| **Statement 8** | 0,509 | 0,374 | Valid |
| **Statement 9** | 0,486 | 0,374 | Valid |
| **Statement 10** | 0,412 | 0,374 | Valid |

Based on tables 3 and 4, it is known that 107 respondents have a $r_{table}$ of 0.374. Indicators of student perceptions of mathematical disposition, learning styles and learning motivation obtained the results that there are no invalid statements out of 30 statements. The invalid statements are not used or not improved because the valid statements can already represent each indicator listed on the instrument grid.

The Cronbach Alpha value (Caron & Markusen, 2016b) in this study shows the reliability measurement. When a measuring device's Alpha Cronbach value is greater than 0.600, it is considered to be highly reliable. Researchers utilized SPSS version 22 software, which is displayed in the following table, to process the reliability test:

Table: 5

| $r_{count}$ | $\alpha$ | Description |
|---|---|---|
| **0,806** | 0,600 | Reliabel |

Based on the reliability test table above, the results are 0.806 ≥ 0.600 so that the data is declared reliable. To ascertain if the data is regularly distributed or not, the normalcy test is performed. The Kolmogorov Smirnov test is the data normalcy test that is employed; the test findings are as follows:

Table: 6

| ***Model*** | ***Sig.*** | **Criteria** | **Conclusion** |
|---|---|---|---|
| ***Unstandardized Residual*** | 0,100 | *Sig.* > 0,05 | Data berdistribusi normal |

The calculation shows that the significance value of the Unstandardized Residual is 0.100, which is higher than 0.05. Regression analysis can be used as a test because the study's data are regularly dispersed.

To test for heteroscedasticity, the Glejser test regresses the independent variable on the Absolute residual value, or Abs_RES. The results of the heteroscedasticity test with SPSS version 22 are as follows:

Table: 7

| Variabel | *Sig.* | Criteria | Conclusion |
|---|---|---|---|
| **Mathematical Disposition (X)** | 0,576 | $\rho > 0,05$ | No Heteroscedasticity |
| **Learning Motivation (Y)** | 0,051 | $\rho > 0,05$ | No Heteroscedasticity |

The results of the calculation indicate that the significant value (Sig.) exceeds 0.05. Overall, then, it can be said that there isn't a heteroscedasticity issue. Using SPSS version 22 software, the Durbin-Watson test value is used to determine whether autocorrelation is present in this study:

Table: 8

| *R Square* | *Durbin-Watson* |
|---|---|
| **0,324** | 0,928 |

To test the effect of intervening variables, the Path Analysis method is used with the help of SPSS software.

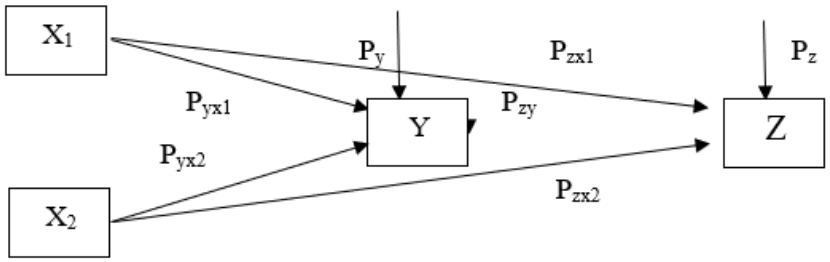


Figure: I

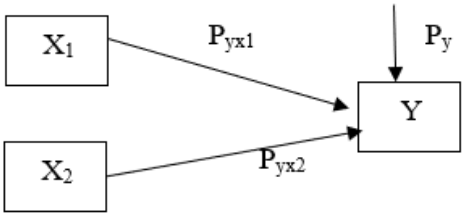


Figure: 2

The Rsquare percentage is 34.6%, or 0.346. This indicates that the variables that act as intervening variables—Mathematical Disposition (X1), Learning Style (X2), and Learning Motivation (Y)—contribute 34.6% to the explanation of changes in the Learning Achievement variable (Z), with other variables not included in this research model accounting for the remaining 65.4%. It may be inferred from the significant probability value of 0.000 <0.05 that learning achievement is influenced by the combination of mathematical disposition, learning style, and learning motivation.

Table: 9

| Variabel | *Unstandardized Coeficients Beta* | *Standardized Coeficients Beta* | t | *Sig.* |
|---|---|---|---|---|
| **Constant** | 1,719 | - | 14,244 | 0,000 |
| **Mathematical Disposition on Learning Achievement** | -0,057 | -0,137 | -1,425 | 0,157 |
| **Learning Style on Learning Achievement** | 0,116 | 0,351 | 4,060 | 0,000 |
| **Learning Motivation on Learning Achievement** | 0,135 | 0,427 | 4,287 | 0,000 |

The standardized beta value of Mathematical Disposition on Learning Achievement of -0.137 is the path value of Pzx1. and Sig value 0.157> 0.05 means that the path analysis coefficient is not significant. So, Mathematical Disposition does not affect Learning Achievement. The path value of Pzx2 is the standardized beta value of learning style on learning achievement, which is 0.351. A Sig value of 0.000 <0.05 suggests that learning achievement is influenced by learning style. The Pzy path's standardized beta value for learning motivation on learning achievement is 0.427, and the relationship between learning motivation and A Sig value of 0.000 <0.05 indicates that the learner is making progress.

Table: 10

| Variabel | *Unstandardized Coefficients Beta* | *Standardized Coefficients Beta* | t | *Sig.* |
|---|---|---|---|---|
| **Constant** | 0,269 | - | 1,382 | 0,170 |
| **Mathematical Disposition on Learning Achievement** | 0,632 | 0,484 | 5,881 | 0,000 |
| **Learning Style on Learning Achievement** | 0,251 | 0,240 | 2,919 | 0,004 |

## Discussion

The standardized beta value of Mathematical Disposition on Learning Achievement of -0.137 is the path value of Pzx1. and Sig value 0.157> 0.05 means that the path analysis coefficient is not significant. So, Mathematical Disposition has no effect on Learning Achievement. The Sig value of 0.000 <0.05 suggests that learning achievement is influenced by learning style and the standardized beta value of 0.351 for Learning Style on Learning Achievement, which is the route value of Pzx2. The value of the Pzy path is the standardized beta value of learning motivation on learning achievement, which is 0.427. Learning achievement is influenced by learning motivation, as indicated by the Sig value of 0.000 <0.05.

1. Direct Influence
   a. Impact of Learning Motivation (Y) on Mathematical Disposition (X1)
      The magnitude of the association between learning motivation and mathematical disposition was found to have a positive direction of influence with a Sig value of 0.000 <0.05 and a regression value of (0.484)2 = 23.4%, according to the data. This demonstrates that learning motivation is significantly impacted by mathematical temperament.
   b. The relationship between learning achievement (Z) and mathematical disposition (X1)
      The findings demonstrated that there is a significant negative correlation, with a Sig value of 0.157>0.05, between the mathematical disposition and learning

achievement, with a regression value of (-0.137)2 = 1.9%. This suggests that learning achievement is not significantly impacted by mathematical propensity. This demonstrates that learning achievement is not significantly impacted by mathematical temperament. This indicates that learning achievement is not directly impacted by mathematical temperament. Effect of Learning Style (X2) on Learning Motivation (Y)

The findings demonstrated that there is a negative direction of influence and a Sig value of 0.004 <0.05 in the link between learning style and learning motivation, with a regression value of (0.240)2 = 5.8%. This demonstrates how learning motivation is significantly impacted by learning style. This demonstrates how learning motivation is significantly impacted by learning style. Regarding the impact of learning styles on learning motivation, these findings are supported by other researchers (Agmila, H. A., 2015).

c. The impact of learning achievement (Z) on learning style (X2)

Following other researchers' findings regarding the influence of learning styles on learning motivation, the findings showed that the degree of learning style influence on learning accomplishment had a positive direction of influence with a Sig value of 0.000 <0.05 and a regression value of (0.351)2 = 12.3%. This suggests that understanding an effective learning style can enhance good learning accomplishment and that learning styles have a major impact on learning achievement.

d. How Learning Achievement (Z) is Affected by Learning Motivation (Y)

The findings demonstrated that the relationship between learning desire and learning achievement had a positive direction of influence with a regression value of (0.427)2 = 18.2% and a Sig value of 0.000 <0.05. This demonstrates that learning achievement is significantly impacted by learning motivation. This demonstrates that learning achievement is significantly impacted by learning motivation. As a result, strong learning achievement can be enhanced by strong learning motivation. Other researchers have verified these findings about the impact of learning motivation on academic accomplishment (Nugroho, T. A., & Sudarma, K. 2017).

2. Indirect Influence

a. Learning achievement (Z) is impacted by mathematical disposition (X1), which is regulated by learning motivation (Y).

The results showed that the relationship between learning accomplishment and mathematical disposition had a regression value of -0.137, the relationship between learning motivation and mathematical disposition had a regression value of 0.484, and the relationship between mathematical achievement and mathematical disposition had a regression value of 0.427. Pzx1 + Pyx1 is the total indirect effect, hence.

Pzy = -0.137 + (0.484) (0.427) = (0.070)2 = 0.5%.

b. The Effect of Learning Style (X2) mediated by Learning Motivation (Y) on Learning Achievement (Z)

According to the findings, the relationship between learning style and learning achievement had a regression value of 0.351, learning style on learning motivation obtained a regression value of 0.240 and learning motivation on

learning achievement obtained a regression value of 0.427. So the total indirect effect is Pzx2 + Pyx2
Pzy = 0.351 + (0.240) (0.427) = (0.453)2 = 20.5%.

c. Learning Motivation (Y) mediates the relationship between Mathematical Disposition (X1) and Learning Style (X2) on Learning Achievement (Z)
The findings indicated that learning motivation acted as a mediating factor between the effects of mathematical inclination and learning style on learning accomplishment, accounting for 34.6% of the variance. Variables outside of the study model accounted for 65.4% of the variance that remained.

## CONCLUSION

Based on the findings of this study, it can be concluded that mathematical disposition and learning style significantly influence students' online learning experiences. Firstly, both mathematical disposition and learning style demonstrate a direct impact on students' motivation in online learning environments. Moreover, these two variables also directly affect students' academic achievement in online settings. This indicates that students with a positive disposition toward mathematics and an adaptive learning style are more likely to stay motivated and perform better in online learning contexts.

Furthermore, the study reveals indirect effects between the variables. Mathematical disposition and learning style contribute to online learning motivation through their interaction with learning achievement, particularly in the context of geometry instruction. Additionally, mathematical disposition itself is indirectly influenced by these two factors through students' performance in online learning. These results highlight the dynamic interplay between cognitive attitudes, preferred learning approaches, and academic outcomes in digital education settings, underlining the importance of developing both affective and strategic dimensions of learning to enhance student success.

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