# The Dominant Factor of Teacher's Role as A Motivator of Students' Interest and Motivation in Mathematics Achievement

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## Abstract

This study aims to identify the most dominant factor of the teacher's role as a motivator that influences students' interest and motivation to perform in mathematics achievement. It is conducted in eighth grade of senior high school with 209 students, consisted of five state schools and two private schools from seven regencies in North Sumatera. The data collecting technique uses questionnaire about students' interest and motivation toward mathematics and teacher's role as motivator. Numerical data on mathematics achievement of students is obtained from school documents. The result of data with path analysis is obtained by dominant factor of teacher's role as motivator that is factor of delivery of learning goal and learning comfort equal to 6.10%, and 6.00% is influenced by the delivery of learning objectives and variations of learning approaches, 5.17% is influenced by the delivery of learning objectives, 5.06% is due to variations in the learning approach, 4.61% is influenced by learning comfort and variation of learning approach, and 4.26% influenced by pleasant class atmosphere.

**Keywords:** motivator, interest and motivation, achievement

## 1. Introduction

Students' learning outcomes are the important element in educational activities, and through students' learning outcomes can be known the national qualification framework (Gallavara et al., 2008), and level of institutional quality (Yung & Hou, 2010). Learning outcomes are characterized by a value scale which expressed as student achievement for a measure of cognitive aspect ability. Student achievement is used as one of measuring tool to know the success of an implementation of education. Achievement can be interpreted as the mastery of students to the subject matter. Learning achievement is the result of interaction from various factors that influence it, either internal or external factors (Ahmadi & Supriyono, 2004). Learning achievement is generally concerned with aspects of knowledge (Arifin, 2011).

Many countries make mathematics as a compulsory lesson in school started from elementary to higher education. Provision of mathematics at every level of education is adapted to the development of science and technology. Up to this present, the results of mathematics learning are still not satisfactory in various countries, including in Indonesia, in the high school level is still less good in terms of rankings when compared with the observed participant countries (PISA, 2014; Walandari & Jailani, 2015). In general, factors affecting students' quality and achievement in mathematics are internal and external factors (Purwanto, 2006; Dalyono, 2009; Slameto, 2010). Based on internal factors, several studies show that simultaneously interest and motivation affect mathematics achievement (Sukada et al., 2013), and motivation has a positive effect on learning interest (Surifah et al., 2016), and partially, interest is important to improve mathematics learning achievement (Lazarides & Ittel, 2012), interest related to academic achievement (Maurice, Dorfler, & Artelt, 2014), and student learning interest significantly influence learning achievement in mathematics (Schiefele & Csikszentmihalyi, 1995; Heinze, Reiss, & Franziska, 2005; Sembiring & Muktar, 2013; Kpolovie et al., 2014; Mutodi & Ngirande, 2014; Siagian, 2015; Lestari, 2015; Tiara, Putri, & Isnani, 2015; Sirait, 2016), Motivation also significantly affects learning achievement in mathematics (Mbugua, 2012: Guvendir, 2016; Lestari, 2015; Basuki, 2015; Cleopatra, 2015; Sumantri & Whardani, 2017).

One of the external factors affecting student achievement is the influence of teacher's role (Yusuf & Dada, 2016). Some of the role of teachers in learning activities are informators, organizers, motivators, directors, initiators, facilitators, mediators, and evaluators (Sardiman, 2011; Sanjaya, 2008) Teacher as a motivator plays a role to

encourage and increase student interest and motivation (Suparlan, 2005; Federici et al., 2016), teachers have an important role to influence students' interest in learning mathematics (Ivowi, 2001), and there is an influence of teacher's role as a motivator on student learning motivation (Sugiasih, 2015)

Based on the above explanation, it shows that the teacher as a motivator is instrumental to influence the interest and motivation of students to excel in mathematics. Therefore, the purpose of this study is to identify the most dominant factor of the teacher's role as a motivator that influenced students' interest and motivation in mathematics achievement. It should be known that it can be done to overcome the problem of mathematics education to get students' learning outcomes better.

## 2. Students' Learning Interest and Motivation

Teachers as a motivator plays role to provide stimulation and encouragement to increase students' interest and motivation. Interests are the awareness, the desire and attention of someone toward a certain object associated with them that is associated with strong feelings (Witherington, 1982; Syah, 2011; Ahmadi, 2003). Interest is a preference in an activity which is implemented through active participation (Slameto, 2010). Therefore, interest is important to be enhanced because learning interest influences learning achievement (Djamarah, 2002). Some of the characteristics can be investigated if students have an interest in learning mathematics, namely preferring and enjoying learning mathematics rather than other subjects, being active in either classroom or out-of-class activities, more interested in solving math problems than other subjects, having great attention in mathematics.

To increase students' interest in learning, there are some things that teachers can do, that is to convey the purpose of learning in accordance with the intellectual level of the students, because the students' understanding of the learning objectives can generate interest in learning (Sanjaya, 2008), to explain the benefits of learning the subject matter, students' interest will increase if they know the benefits of mathematics (Marchis, 2011). Explaining the subject matter of mathematics needs to be done with a good approach, because many less successful lessons due to the less good learning process (Al-Agili, 2012; Sa'ad, Adamu, & Sadiq, 2014), teachers design better learning, because the design of learning has effects on the progress of student's achievement (Ariani & Mirdadz, 2016). Another important thing for students' interest in learning math is that teachers must make students enjoy learning it since pleasure is important in learning (Schukajlow, 2015), and there is a relationship of learning pleasure with learning achievement (Jalali & Heidari, 2016). There is a significant influence between the feeling of pleasure with interest in learning and affecting the achievement of learning mathematics (Laksono, 2016).

Learning motivation is an important part of learning. Bugge and Wikan (2013) stated that motivation greatly influences the improvement of students' learning outcomes. The result of this study shows that there is a significant relationship between motivation and learning achievement (Sumantri & Whardani, 2017). Uno (2012) stated that motivation and learning are two inseparable things. How much the definition of motivation can be expressed as an intrinsic factor that drives the desire for success in learning (Slavin, 1997), a desire and encouragement arising from a person acts actively to achieve the goal (Huitt, 2001; Asrori, 2007), a directed activities towards achievement of goals (Schunk et al., 2008), and encouragement of learning (Suprijono, 2009). Motivation indicators are consisted of determined, loving, happy, diligent, and eager in learning (Sardiman, 2011). Some characteristics can be measured when students have motivation to learn math, that is diligently follow the lesson, diligent to study either alone or in group discussions, learning maximally to achieve his goals, trying to get a high score, eager to learn in class or at home, realizing the need of mathematics on other subjects, and attending school at every math lesson.

Several things that should be performed by the math teacher to improve students' learning motivation, they are to make the competition in the class because the competition influences intrinsic motivation (Song, Kim, Tenzek, & Lee, 2009), and to raise awareness is needed in the learning process so that students have their own willingness to learn. It can be interpreted as perceived by someone (Hasan, 2005). To carry out a reexamination to improve the score, and informing the exam results by returning the examined answer sheet is an effort to improve students' learning motivation. Giving feedback, knowing the results and giving the score can accumulate student learning motivation (Sardiman, 2011). Giving appreciation in various forms, such as praise or reward is also important to improve motivation. Hamid (2006) states that reward is a tool in education that can encourage students to do better. Awarding is a stimulus to students in order to strengthen a response (Arifin, 2011), significantly appreciation effects on student learning motivation and mathematics achievement (Syahrul, 2017; Ariyuza & Kusrini, 2014)

## 3. Method

The study is conducted in eighth grade of senior high school with 209 students, consisted of five state schools and two private schools from seven regencies in North Sumatera. Data collection technique is performed by giving questionnaires to the respondent which contains about student's interest and motivation toward mathematics, and

student's opinion about the role that has been implemented by the teacher as a motivator, and numerical data is a mathematics achievement of students obtained from school documents. The Data are analyzed by path analysis, finding the best path of teacher's factor as motivator that influence students' interest and motivation in mathematics achievement. For the purposes of data analysis, the teacher as an interest motivator is expressed as a variable X1 which has a variable component X1j, j = 1,..., 4, and for motivation is variable X2 with component variable X2j, j = 1,..., 5. Students' interest is expressed as variable Y1 which has component variable Y1j, j = 1,..., 8, and learning motivation is variable Y2 with component of variable Y2j, j = 1.., 6, while the students' mathematics achievement is expressed by the variable Z. So the path analysis is to find the best path of the variables X1 and X2 to variable Z through variables Y1 and Y2. Description of path analysis is shown below.
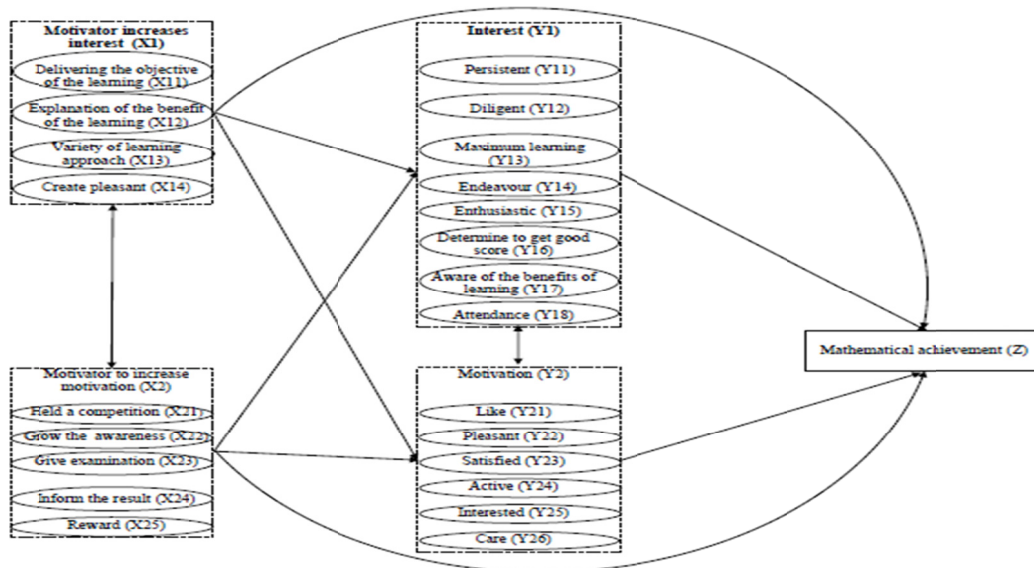


Figure 1. Description of path analysis

## 4. Result and Discussion

Data analysis with the help of SPSS Version 19 software is used to know correlation between two variables with r test, regression significance with t test and $\alpha = 0.05$, and beta value is to find out the coefficient of path between two variables. The process is done repeatedly with several stages to obtain the best path. The test process is briefly described as follows. Firstly, to test the correlation of each two main variables, namely X1, X2, Y1, Y2, and Z, and to test regression significance of the main variables X1, X2, Y1 and Y2 to variable Z. Summary of the calculation results as in the following table.

Table 1. Correlation of the main variables

|  |  | X1 | X2 | Y1 | Y2 | Z |
|---|---|---|---|---|---|---|
| | Pearson Correlation | 1 | .428** | .387** | .265** | .163* |
| X1 | Sig.(2-tailed)/ | | .000 | .000 | .000 | .018 |
| | N | 209 | 209 | 209 | 209 | 209 |
| | Pearson Correlation | 428** | 1 | .246* | .304** | .164* |
| X2 | Sig.(2-tailed)/ | .000 | | .000 | .000 | .018 |
| | N | 209 | 209 | 209 | 209 | 209 |
| | Pearson Correlation | .387** | .246** | 1 | .465** | .164* |
| Y1 | Sig.(2-tailed)/ | .000 | .000 | | .000 | .018 |
| | N | 209 | 209 | 209 | 209 | 209 |
| | Pearson Correlation | .265** | .304** | .465** | 1 | .234** |
| Y2 | Sig.(2-tailed)/ | .000 | .000 | .000 | | .001 |
| | N | 209 | 209 | 209 | 209 | 209 |

|  |  | | | | | |
|---|---|---|---|---|---|---|
|  | Pearson Correlation | .163* | .164* | .164* | .234** | 1 |
| Z | Sig.(2-tailed)/ | .018 | .018 | .018 | .001 |  |
|  | N | 209 | 209 | 209 | 209 | 209 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2. Regression coefficient of main variables

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig |
|---|---|---|---|---|---|
|  | B | Std. Error | Beta |  |  |
| (Constant) | 55.943 | 4.667 |  | 11.986 | .000 |
| X1 | .053 | .059 | .072 | .907 | .365 |
| X2 | .055 | .060 | .071 | .922 | .358 |
| Y1 | .028 | .061 | .037 | .458 | .647 |
| Y2 | .120 | .053 | .177 | 2.257 | .025 |

Dependent variable: Z.

The result of the calculations in Table 1 shows that all the main variables are significantly correlated. Table 2 shows that only variable Y2 has contribution to variable Z, because the value of $t = 2.257 \geq t_{(0.05)} = 1.657$. Thus, only the variable Y2 has a direct influence to the variable Z, while other variables do not have a direct influence to variable Z. Then, it is tested significance of regression variable X1 and X2 to variable Y2. Based on result of calculation that regression of variable X1 to Y2 have coefficient value, and regression of variable X2 to Y2 has coefficient $t = 2.283 \geq t_{(0.05)} = 1.657$. It means that the variables X1 and X2 contribute significantly to the variable Y2.

Based on correlation test and regression significance of each component variable X1 and X2 to variable Y2, The calculation result shows that component of variable X1 contributes to variable component Y2, that is to variable Y22 and Y26. Furthermore, significance test of regression of Y22 and Y26 variable to variable Z is obtained result, that is variable Y22 contributes significantly to variable Z, it is indicated by value $t = 2.174$, while the variable Y26 does not contribute directly to the variable Z, it is shown by the value $t = 0.954 \leq t (0.05) = 1.657$. Thus, the variable Y26 is ignored for the next analysis. After being tested the regression coefficient of variable component X1 that is X1j, j = 1,..., 4 to variable Y22 obtained result that some component of variable X1 contribute significantly to variable Y22. The results of the calculation as in the following table.

Table 3. The regression coefficient of variable component X1 to variable Y22

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig |
|---|---|---|---|---|---|
|  | B | Std. Error | Beta |  |  |
| (Constant) | .985 | .289 |  | 3.415 | .001 |
| X11 | .163 | .073 | .159 | 2.237 | .026 |
| X12 | .133 | .080 | .119 | 1.653 | .100 |
| X13 | .156 | .074 | .152 | 2.106 | .036 |
| X14 | .128 | .070 | .123 | 1.833 | .068 |

Dependent Variable: Y22.

Based on Table 3, it can be stated that the variable X11 contributes significantly to variable Y22 ($t = 2.237 \geq t_{(0.05)} = 1.657$) with the path coefficient $\rho_1 = 0.119$. Variable X13 contribute significantly to variable Y22 ($t = 2.106 \geq t_{(0.05)} = 1.657$) with the path coefficient $\rho_2 = 0.152$. Variable X14 contribute significantly to variable Y22 ($t = 1.833 \geq t_{(0.05)} = 1.657$) with the path coefficient $\rho_3 = 0.123$, while variable X12 does not contribute significantly to Y22 ($t = 1.653 \leq t_{(0.05)} = 1.657$), so that the last path diagram is variable X11, X13 and X14 through variable Y22 to variable Z, and the path can be described as follows
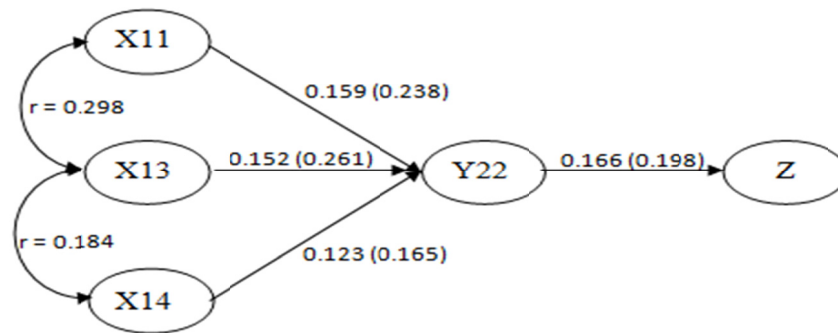
Figure 2. Path diagram of variable component through Y22 to Z

Then, it is calculated the best contribution of the variables X11, X13 and X14 through Y22 to Z by calculating the amount of effect proportionally by structural equation model (SEM) as follows.

1) Direct influence

a)    The effect of X11 to Z, namely   $P_1 = \rho_{Y22X11} x\ \rho_{Y22X11} + \rho_{ZY22} x\ \rho_{ZY22}$

b)    The effect of X13 to Z, namely $P_2 = \rho_{Y22X13} x\ \rho_{Y22X13} + \rho_{ZY22} x\ \rho_{ZY22}$

c)    The effect of X14 to Z, namely $P_3 = \rho_{Y22X14} x\ \rho_{Y22X14} + \rho_{ZY22} x\ \rho_{ZY22}$

2) Correlation Influence

a)    The effect of X11 to Z, namely $P_4 = \rho_{Y22X11} x\ \rho_{Y22X11} + \rho_{Y22X11} x\ r_{X11X13} x\ \rho_{Y22X13} + \rho_{ZY22} x\ \rho_{ZY22}$

b)    The effect of X13 to Z, namely

   $P_5 = \rho_{Y22X13} x\ \rho_{Y22X13} + \rho_{Y22X13} x\ r_{X13X11} x\ \rho_{Y22X11} + \rho_{Y22X14} x\ r_{X13X14} x\ \rho_{Y22X14} + \rho_{ZY22} x \rho_{ZY22}$

c)    The effect of X14 to Z, namely $P_6 = \rho_{Y22X14} x\ \rho_{Y22X14} + \rho_{Y22X14} x\ r_{X14X13} x\ \rho_{Y22X14} + \rho_{ZY22} x\ \rho_{ZY22}$

After being substituted correlation value and path coefficient to structural equation model, then based on the calculation results obtained with a large percentage of contribution, namely $P_1$ = 5.17%, $P_4$= 6.00%, $P_2$ = 5.06%, $P_5$ = 6.10%, $P_3$ = 4.26%, dan $P_6$ =4.61%. It shows that the teacher's role as a motivator in increasing students' interest influences students' motivation in mathematical achievement. The dominant factor that influences it can be stated the beginning from the biggest contribution factor that is 6.10% caused by the delivery factor of the learning objectives and the teacher makes the students comfortable to learn. The second factor, at 6.00% is influenced by the delivery of learning objectives and a variety of learning approaches so that students enjoy learning. The third factor is the delivery of learning goals to give effect of 5.17% to make students happy to learn and influence student learning motivation. The fourth factor of 5.06% is attributed to the varied learning approach that makes students happy to learn. The fifth factor of 4.61% is influenced by the effort of the teacher to make the students happy to learn and the varied learning approach also makes students happy to learn mathematics, and the sixth factor of 4.26% influenced by the pleasant classroom atmosphere makes students happy to learn and influence the students' motivation in mathematical achievement.

## 5. Conclusion

The result of learning mathematics is one important thing in education. Up to this present, many developing countries show the result of mathematics education is not achieved good results yet. Many factors influence the outcomes of mathematics education, which are internal and external factors. Interest and motivation to excel in mathematics are internal factors that can be influenced by external factors such as teacher factor. One very important thing of teacher's role in education is as a motivator to increase students' interest and motivation to achievement. The results of this study indicate that the dominant factor of the teacher's role as a motivator with the indicator of the delivery of learning objectives, comfort learning and a variety of learning approaches make students happy to learn and influence the motivation of students to achievement in mathematics.

## Acknowledgements

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