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The Role of Motivation, Activeness, and Numeracy Skills on Grade X Vocational High School Students' Mathematics Learning Achievement

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ABSTRACT

This study aims to analyze and describe the contribution of learning motivation, learning activeness, and numeracy skills on vocational high school students' mathematics learning achievement. This quantitative research involves a population of grade X students at a private vocational high school in Surakarta, Central Java, Indonesia, Academic Year 2022/2023. With the quota sampling technique, 45 students were obtained as the research sample. The data-collecting method applied is questionnaires and tests. The data were analyzed using multiple linear regression tests with a significance level of 5% using SPSS software. The normality, linearity, multicollinearity, autocorrelation, and heteroscedasticity tests were performed as prerequisite analysis tests. Based on the results of data analysis, it can be concluded that: (1) There is a significant contribution of learning motivation to student learning outcomes with a partial determination coefficient of 14.77, (2) There is no significant contribution of active learning to student learning outcomes, with a partial determination coefficient of 3.21. (3) There is no significant contribution from numeracy skills to student learning outcomes, with a partial determination coefficient of 0.01, (4) there is a significant contribution of learning motivation, learning activeness, and numeracy skills on vocational high school students mathematics learning achievement with a simultaneous determination coefficient (R^2) of 0.18. It means that the percentage of contribution given by learning motivation, learning activeness, and numeracy skills on vocational high school students mathematics learning achievement is 18%. In comparison, other factors outside this study influence the remaining 82%.
Keywords: *learning motivation, learning activeness, numeracy skills, and mathematics learning achievement.*

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INTRODUCTION

Learning outcomes are one of the references to measure the success of the learning process in education. Learning outcomes are the successes that students have achieved in receiving learning experiences so that changes in mindset and behavior occur for the better than before. According to Zamzani et al. (2022), learning outcome indicators are shown by behavior changes, including cognitive, affective, and psychomotor domains, including learning mathematics.

Students' good perception of mathematics will make students interested and pursue learning. However, in reality, every student views mathematics differently. Some students consider mathematics an exciting and fun science. But not a few students also think that mathematics is a subject that is difficult to understand. According to Lestari (2017), each student has a different view of mathematics. Students considering mathematics a fun topic will grow motivated and optim istic in solving math problems. However, pessimism and disinterest in solving mathematical problems will increase in students who perceive mathematics as a complicated subject. The lack of interest in student learning contributes to student learning outcomes. Prastika's (2021) research states that an individual can participate in learning activities well when they are highly interested in learning and vice versa. An individual can only participate in learning activities properly if he has a high interest in education which can affect student learning outcomes. Thus the lack of interest in learning and students' negative perceptions of mathematics lead to expected learning outcomes.

Several factors influence mathematics learning outcomes that vary. According to Nabillah & Abadi (2019), student learning outcomes are influenced by internal and external factors. Factors originating from oneself greatly influence the progress of student studies, for example, interests, talents, health, study habits, and independence. Factors arising from outside the student's self affect the progress of the student's study of the environment, studies of the natural environment, the environment of the family, the community environment, and other factors, namely schools and school equipment. Factors originating from students include motivation, activeness, and numeracy skills. Student learning motivation has a significant influence on student learning outcomes. According to Monika & Adman (2017), learning motivation can be interpreted as a driving force for carrying out a learning activity that originates from within and outside the student's self, influencing students' enthusiasm for learning.

Motivation has its role for someone. According to Astriyanti & Rejeki (2022), learning motivation affects the learning outcomes of Grade X students in online learning during the COVID-19 pandemic. Based on the analysis results, students with high learning motivation have better learning outcomes than students with medium and low learning motivation. Meanwhile, students with moderate learning motivation had better learning outcomes than those with low motivation. Students who are motivated can contribute more optimally in carrying out learning so that they can provide good learning outcomes.

Saputra et al. (2018) state that learning motivation as an internal factor that influences student learning outcomes has a positive and significant influence, and the two have a solid relationship. So that by increasing student learning motivation can improve student achievement. Motivation is a condition in the individual as the driving force for carrying out an activity, managing the objectives of the activity, and maintaining sincerity in carrying out the activity. Motivation is one of the energies that move students to have an interest or desire to take learning seriously. According to

Kompri (2019), learning motivation can be interpreted as a psychological aspect that is experiencing development, meaning that it is affected by students' physiological conditions and psychological maturity.

Based on some of these opinions, motivation is a power or encouragement to carry out activities that can change certain behaviors or actions to become a better condition. Liu and Lin (2010) classify several indicators of learning motivation as follows: 1) Intrinsic goal orientation, 2) Extrinsic goal orientation, 3) Task value, 4) Belief control, 5) Self-efficacy, and 6) Task anxiety.

Active student learning is an effort made by students to carry out learning activities. According to Ramlah et al. (2014), active learning can be demonstrated by involving students in seeking or obtaining information from sources such as books, teachers, and other friends so that students are expected to be better able to recognize and develop their total learning capacity and potential. The activeness of student learning greatly influences their learning outcomes, as research conducted by Putri & Firmansyah (2020) states a reasonably strong correlation between student learning activity and student achievement or learning outcomes.

According to Sardiman (2018), activity is physical and mental, namely acting and thinking as a series that cannot be separated. According to Wibowo (2016), student activity in learning is all physical and non-physical activities of students in teaching and learning activities that are optimal to create a conducive classroom atmosphere. According to Sinar (2018), student activity can be seen from their sincerity in participating in learning. Students who are not active in learning can also be seen from their seriousness in participating in learning. According to Irmawanti et al. (2018), partially student activity directly influences mathematics learning outcomes by 0.182 and significantly indirectly influences learning outcomes through learning motivation by 0.226.

Indicators of liveliness in the form of student enthusiasm shown during learning can be seen through student responses during learning. Sudjana (2014) explains in his book that there are several indicators of student activity in the teaching and learning process, as follows: 1) participating in carrying out assignments, 2) involved in solving problems, 3) asking friends or teachers when they don't understand, 4) look for various information that is used to solve problems, 5) carry out group discussions according to teacher directions, 6) assess his abilities and the results that have been obtained, 7) train himself in solving problems or questions, 8) opportunity to use or apply what he has obtained in solving the task or problem at hand. sriyono (1992), in his book, explains that indicators of activity are: 1) sensory activity, 2) sensory activity, 3) intellectual activity, 4) memory activity, and 5) emotional activity.

Based on the opinions of the experts above, the indicators of activeness in this study are as follows: 1) sensory activity, 2) intellectual activity, 3) memory activity, 4) emotional activity, 5) participating in carrying out assignments, 6) involved in solving problems, 7) ask friends or teachers when they don't understand, 8) look for various information used to solve problems, 9) carry out group discussions according to teacher directions.

Students' difficulties in solving math problems, because they need help to read mathematical symbols or understand the questions correctly, are caused by a lack of students' numeracy literacy skills. Therefore the importance of developing students' numeracy literacy skills. According to Anderha et al. (2021), high numeracy skills will also result in high learning achievement, and vice versa; the lower the numeracy ability, the lower the student's achievement.

According to Miftah & Setyaningsih (2022), Minimum Competency

Assessment or *Asesmen Kompetensi Minimum* (AKM) is designed to measure students' cognitive abilities where the aspects that are measured are numeracy literacy and reading literacy. Numeracy literacy is part of the AKM. The Ministry of Education and Culture (2020) explained that AKM is a fundamental competency needed by all students to develop their capacity and participate positively in society. Two essential competencies are measured by AKM, namely reading and mathematical literacy (numeration). The Ministry of Education and Culture (2017) explained that numeracy literacy is the knowledge and skills to use various kinds of numbers and symbols related to basic mathematics to solve practical problems in everyday life and then analyze the information displayed in multiple forms and interpret the results of the analysis to predict and make decisions.

To ensure that AKM measures the competencies needed in life, it also follows the notion of numeracy literacy. AKM questions do not only measure specific topics or content but various content, various contexts, and at different cognitive levels. Wijaya & Dewayani (2021) explained that the mental status of numeracy literacy in the minimum competency assessment is divided into three classes: knowing, applying, and reasoning; 1. Knowing, questions at this cognitive level assess students' knowledge abilities about facts, processes, concepts, and procedures. Keywords commonly used at this level include remembering, identifying, classifying, calculating, taking/obtaining, and measuring; 2. Applying, questions at this cognitive level assesses mathematical abilities in applying knowledge and understanding of facts, relations, processes, concepts, procedures, and methods in real situations to solve problems or answer questions. Keywords commonly used at this level include selecting/determining, stating/modeling, and implementing/implementing; 3. Reasoning, questions at this cognitive level assess students' reasoning abilities in analyzing data and information, making conclusions, and expanding their understanding of new situations, including situations that were not known before or in more complex contexts. Questions may cover more than one approach or strategy. Keywords commonly used at this level include analyzing, integrating (synthesizing), evaluating, concluding, and making justifications.

Based on the description above, the researcher aims to analyze and describe the contribution of learning motivation, learning activeness, and numeracy skills on vocational high school students' mathematics learning achievement.

METHOD

This quantitative study involves calculations or quantity figures (Sugiyono, 2021). The research design is correlational, namely the relationship between the independent variables X_1, X_2 and $X_3$and the dependent variable Y. This relationship can be in the form of a correlational relationship, the contribution of a variable to other variables, or a causal relationship. This study focused on the contribution of three independent variables, learning motivation, learning activity, and numeracy skills, with one dependent variable, namely student learning outcomes, in the material of the Two-Variable Linear Equation System.

This research was conducted in Grade X of a private vocational high school in Surakarta Regency, Central Java, Indonesia. The population in this study were Grade X students for the 2022/2023 Academic Year. With the quota sampling technique, 45 students were obtained as the research sample. They collected data in this study using questionnaires, tests, and documentation.

Data analysis techniques in this study were carried out using multiple linear regression tests. As a prerequisite test for the multiple linear regression analysis, the normality, linearity,

multicollinearity, autocorrelation, and heteroscedasticity tests were first performed (Sufren & Nathael, 2014). All statistical analysis was performed using SPSS software.

RESULTS AND DISCUSSION

Data descriptions of learning motivation, learning activeness, numeracy skills and student learning outcomes are presented in Table 1.

Table 1. Descriptive Statistics

	X_1	X_2	X_3	Y
Mean	100,16	64,53	77,04	79,51
Median	101,00	62,00	79,00	78,50
Mode	94[a]	57[a]	80[a]	82,00
Std. Deviation	15,72	9,86	8,93	3,65
Minimum	66	47	60	75,00
Maximum	131	84	95	89,00

a. Multiple modes exist. The smallest value is shown

The data in Table 1 shows that the highest score on learning motivation is higher than the highest score on learning activity, numeracy skills, and learning outcomes. At the lowest score, student achievement results are higher than the value of learning motivation, learning activity, and numeracy skills. The mean indicates that the highest score on learning motivation is higher than the most elevated on learning activity, numeracy skills, and learning outcomes. The median shows that the highest score on learning motivation is higher than the highest score on learning activity, numeracy skills, and learning outcomes. The mode indicates that the highest score on learning motivation is higher than the highest score on learning activity, numeracy skills, and learning outcomes. And likewise, the standard deviation shows that the highest scores on learning motivation are higher than the highest scores on learning activeness, numeracy skills, and learning outcomes.

Based on the Kolmogorov-Smirnov normality test results, the residual variables contribute to normality and have met the normality assumptions. The linearity test shows that, too (learning motivation to student learning outcomes, learning activity to student learning outcomes, and numeric ability to student learning outcomes). Each of these variables has a significant linear relationship.

Furthermore, based on the tolerance value and Variance Inflation Factor (VIF) in the multicollinearity test, it shows no symptoms of multicollinearity. The heteroscedasticity test using the Glejser test indicates no signs of heteroscedasticity. This result is supported by the scatter graph, which displays the points on the chart spread and not patterned above and below zero on the axis. Dan pada uji autokorelasi menggunaka Durbin Wiston menunjukkan bahwa tidak terdapat gejala autokorelasi. And the autocorrelation test using Durbin Watson shows no signs of autocorrelation.

Table 2. Partial Homogenity Test

Model	zB	t	Sig.
(Constant)	93,114	14,373	,000
X1	-,092	-2,777	,008
X2	-,076	-1,416	,164
X3	,007	,116	,908

a. Dependent Variable: Y

Table 3. Simultaneous Homogenity Test

Model	df	F	Sig.
Regression	3	3,002	,041[b]
Residual	41		
Total	44		

a. Dependent Variable: Y

b. Predictors: (Constant), X3, X1, X2

Table 4. Determination Coefficient

Variabel	Koefisien Regresi (Beta)	Koefisien Korelasi	SE	R Square
X1	-0,396	-0,373	14,77	0,18
X2	-0,206	-0,156	3,21	0,18
X3	0,017	0,007	0,01	0,18

After the prerequisite test is fulfilled, the regression model can be used. Based on the data obtained, the regression model $Y = 93.114 - 0.092X_1 - 0.076X_2 +$

$0.007X_3$. is obtained. Then an analysis was carried out using the F test and t test to determine the contribution of the independent variables to the dependent variable.

a. The contribution of learning motivation to student learning outcomes.
   From table 2 it is known that the value of sig = 0.008 <0.05 and based on the calculation results of the t test or partial test with α = 5% the results are obtained with the value $t_{hiung} = 2.777 > t_{tabel} = 2.3267$, so H_0 is rejected, which means that there is a significant correlation of learning motivation on student learning outcomes. That is, learning motivation makes a significant contribution to student learning outcomes with a partial determination coefficient of 14.77.
b. The contribution of active learning to student learning outcomes
   From table 2 it is known that the sig value = 0.164 > 0.05 and based on the results of the calculation of the t test or partial test with α = 5% the results are obtained with the value $t_{hiung} = 1.416 < t_{tabel} = 2.3267$, so H_0 is accepted, which means that there is no significant correlation of active learning on student learning outcomes. That is, active learning does not make a significant contribution to student learning outcomes with a partial determination coefficient of 3.21.
c. Contribution of numeracy skills to student learning outcomes
   From table 2 it is known that sig = 0.908 > 0.05 and based on the calculation results of the t test or partial test with α = 5% the results are obtained with the value $t_{hiung} = 0{,}116 > t_{tabel} = 2.3267$. So that H_0 is accepted, which means that there is no significant correlation of numeracy skills to student learning outcomes. This means that numeracy skills do not make a significant contribution to student learning outcomes with a partial determination coefficient of 0.01.
d. The contribution of learning motivation, student learning activeness, and numeracy skills to student learning achievement
   From table 3 it is known that the value of sig = 0.41 <0.05 and based on the calculation results of the F test or simultaneous test with α = 5% the results obtained are $F_{hitung} = 3.002 > F_{tabel} = 2.8216$ so that H_0 is rejected, which means that there is a significant correlation of motivation learning, student learning activeness, and numeracy skills on student learning achievement. This means that learning motivation, student learning activeness, and numeracy skills make a significant contribution to student learning outcomes. The simultaneous determination coefficient (R^2) is 0.18, which means that the percentage of contribution made by learning motivation, student learning activeness, and numeracy skills to student learning outcomes is 18%, while the remaining 82% is influenced by other factors outside of this study.

The Contribution of Learning Motivation to Mathematics Learning Outcomes

This study shows a significant correlation of learning motivation on student learning outcomes with a partial determination coefficient of 14.77. That is, learning motivation makes a substantial contribution to student learning outcomes. According to Saptono (2016), high learning motivation in students will make them more active in learning; with persistence, they must have exemplary learning achievements. In contrast, the reverse is with students who need more motivation to learn. Therefore the importance of encouraging students either directly or indirectly.

This finding aligns with research

conducted by Saputra et al. (2018) stated that motivation as an internal factor that influences learning outcomes has a positive and significant influence on student learning outcomes. This opinion is also supported by the research results conducted by Jeffrey & Zein (2017). The results of the partial hypothesis test show that the achievement motivation variable has a significant effect on learning, the discipline variable has a significant impact on learning outcomes, and variable learning facilities significantly influence learning outcomes.

And simultaneously, the three independent variables of achievement motivation, learning discipline, and learning facilities significantly influence student learning outcomes. Meanwhile, Warti (2018) states that learning motivation and learning outcomes have a positive relationship in his research which shows that the higher student learning motivation, the higher mathematics learning outcomes will also be obtained. Thus, there is a significant positive correlation between learning motivation and learning outcomes; learning motivation is one factor that contributes to learning outcomes. If student learning motivation is high, high learning outcomes will be obtained, and vice versa. If learning motivation is low, student learning outcomes will be expected.

The Contribution of Learning Activeness to Mathematics Learning Outcomes

The results of the analysis of the active learning variable showed that there was no significant correlation between active learning and student learning outcomes with a partial determination coefficient of 3.21. This finding means that active learning does not contribute, or there is no positive and significant influence on, student learning outcomes. According to Sutama & Mayasri (2016), there is a significant effect with a significance level of 5% on the level of student activity on mathematics learning outcomes. That is, the different levels of student activity affect mathematics learning outcomes. The involvement or activeness of students in learning will influence learning outcomes; in this study, it was found that there was a lack of student activity in grade X Vocational High School, so there was no significant correlation between learning activeness variables on student learning outcomes.

This finding is in contrast to research conducted by Fadjrin (2017), which states that activeness has a positive and significant relationship with learning outcomes. The higher the students' learning activity, the higher learning outcomes will also be obtained. This research was conducted in class VIII junior high school, different from the sample in this study, namely class X vocational high school. This different level could be one of the factors causing the difference. This research is in line with Putri et al. (2019), in which study stated that active learning has a positive and significant relationship with student learning outcomes in mathematics. Likewise, the research conducted by Putri et al. shows that the research results are in contrast to this study because the sample background in this study is different, namely the rest of grade X Vocational High School.

The Contribution of Numeracy Skills to Mathematics Learning Outcomes

The results of the analysis of the numeracy ability variable in this study indicate that there is no significant correlation between numeracy ability on student learning outcomes with a partial determination coefficient of 0.01. This finding means that numeracy skills do not substantially contribute to student learning outcomes. According to Alfiah et al. (2020), students' numeracy skills affect student learning outcomes; students with low numeracy skills can get expected math learning outcomes, and students with high numeracy skills can also get high math

learning outcomes. This research was conducted in junior high schools with a sample of eighth-grade students, in contrast to this study which took samples from tenth-grade vocational high schools. This study found a low correlation between numeracy skills and learning outcomes.

This finding is inversely proportional to the research conducted by Anderha et al. (2021), which states that if the numeracy skills of Mathematics education students are high, then student mathematics achievement will be increased. According to Rosmalah et al. (2022), a significant relationship exists between numeracy literacy skills and the mathematics learning outcomes of high-grade students at SDN 70 Lamurukung, Tellusiattinge District, Bone Regency. Both studies indicated a positive correlation between numeracy skills and learning outcomes, but both were conducted on elementary and university students. So it also gives different results when carried out in Vocational High Schools.

The Contribution of Learning Motivation, Learning Activeness, and Numercy Skills to Mathematics Learning Outcomes

The results show that simultaneously learning motivation, active learning, and numeracy skills significantly contribute to student learning outcomes in vocational high schools. Thus increasing learning motivation, enthusiastic knowledge, and students' numeracy skills simultaneously improve learning outcomes in vocational high schools. The results of this study are consistent with the research of Tegeh et al. (2019). There is a significant relationship between learning motivation and learning outcomes of fifth-grade students at SD Cluster XII, Buleleng District. There is a positive and meaningful relationship between learning activities. In addition, there is a positive and significant relationship between learning motivation and active learning with the learning outcomes of fifth-grade students at SD Cluster XII, Buleleng District.

In line with research conducted by Indriyani & Rejeki (2017), student motivation significantly contributes to learning achievement. The student's learning motivation influences high or low student achievement. So that by increasing student learning motivation can improve student achievement. While the rest is controlled by the research results in line with a study conducted by Widyati (2022), that learning concentration and numeracy literacy influence students' mathematics learning outcomes with a contribution percentage of 16.1%, while other variables influence the rest. Thus simultaneously, learning motivation, learning activeness, and students' numeracy skills positively and significantly contribute to student learning outcomes.

CONCLUSION

Based on the research objectives and discussion of the analysis of the research results above, it can be concluded as follows: (1) There is a significant contribution of learning motivation to student learning outcomes with a partial determination coefficient of 14.77, (2) There is no significant contribution of active learning to student learning outcomes, with a partial determination coefficient of 3.21. (3) There is no significant contribution from numeracy skills to student learning outcomes, with a partial determination coefficient of 0.01, and (4) there is a significant contribution from learning motivation, learning activeness and numeracy skills to student learning outcomes with a simultaneous determination coefficient of 0.18 which means the percentage of contribution given by learning motivation, student learning activeness, and numeracy ability on student learning outcomes is 18%, while other factors outside of this study influence the remaining 82%.

The contribution of motivation to learning outcomes shows that student

motivation is high. So motivation and learning outcomes have high relatedness; if low motivation will get expected learning outcomes and vice versa. Keaktifan dan kemampuan numerasi pada siswa sekolah menengah kejuruan tidak memberikan kontribusi yang positif dan signifikan. Vocational high school students' activeness and numeracy skills do not make a positive and significant contribution. However, if the analysis is carried out simultaneously, learning motivation, active learning, and numeracy skills positively and significantly affect student learning outcomes. In addition to learning motivation, activeness, and numeracy skills, many factors influence student learning outcomes in vocational high schools.

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