The influence of mathematics academic potential and learning motivation of Papuan college students in Jember on academic achievement

Y Wangguway and A U Albab
Department of Mathematics Education Post Graduage, University of Jember, Indonesia

Email: yustinuswangguway@gmail.com

Abstract. This research aims to find out the influence of mathematics academic potential and learning motivation of Papuan college students in Jember on academic achievement. The population in this research is Papuan college students who study in Jember. Data collection is by using the questionnaire method, test method, and documentation method. The questionnaire method is for collecting data of learning motivation, the test method is for collecting data of mathematics academic potential. Analysis prerequisites in this research are the test of normality, the test of multicollinearity, the test of heteroscedasticity, and the test of autocorrelation by SPSS of 17 versions for Windows. The analysis method used in this research is the t-test of hypothesis testing with a significant level of 2-tails or \( \alpha \geq 0.05 \). The research result shows that mathematics academic potential and learning motivation has a significant effect on the academic achievement of Papuan college students in Jember Regency, East Java.

1. Introduction
At higher education, the student is required to be active in the teaching and learning process, so as Papuan college students who study in Jember Regency, East Java Province. In higher education, the Papuan college student is not only following lectures, but also other provisions are the percentage of attendance in the lecture, completion of the assignment, and actively involved in other academic activities that must be done by Papuan college students. The success of Papuan college students in the academic field is marked by academic achievement as they achieved, shown by Grade Point (IP) as well as Grade-Point Average (IPK) and accuracy in completing the study in high education college [1,2].

Academic achievement is the term to show the achievement or someone's success level in the academic field as the result of optimal learning which has been done by a college student [2,3]. According to Slameto in [3], academic achievement is an important output and is a measurement tool of student cognitive ability.

Academic achievement in this research can be interpreted as a picture of learning outcomes of Papuan college students in doing their duty as a student at college and this kind of research has been researched by [1,2,4, 5, 6]. The achievement of the academic achievement of Papuan college students is affected by several factors, it is both in Papuan students themselves (internal factor) and out of Papuan students (external factor). One of the determinant factors of college student's academic achievement is academic potential belongs to college students and learning motivation.
Academic potential is interpreted as individual academic ability which has a probability to develop. Potential is innate from birth that needs to be developed to reach the achievement. Academic potency belonged to each individual is different in the academic field. There is a college student who has academic potential in the mathematics field, biology, technology, and others. The research is focused on mathematics academic potential that belonged to Papuan college students and expected to be able to push the academic achievement of Papuan students in higher education.

Learning motivation is one factor that has a role in the determination of college student’s academic achievement. Motivation is one of the movers in the human self in doing something [7]. Motivation has a strong role in determining the action realization that has been planned. Motivation occurs as soul awareness balanced by the expectation of something that wants to be achieved. Motivation can come from out of or in Papuan college student themselves, the motivation which comes from Papuan student themselves is in the form of desire to reach the goal or to reach what is needed by Papuan students [8].

According to [9], motivation is an encouragement or a reason that triggers someone to make a decision or action and motivation is also a process where the activity directed to the goal is achieved or maintained. Keller [10] said that learning motivation is conceptual learning that is dynamic in someone in the learning activity. Keller in [11], said that four factors that affect someone's learning motivation, (1) Attention, that is learning strategy chosen. (2) Relevance, learning strategy that supports participant's needs, interests, and motives. Goal-oriented is an important aspect of learning relevance. (3) Confidence, that is supported by the clarity of the learning that is achieved by college students, and (4) Satisfaction, college students are pushed to find a way that can push them to study intrinsically through interesting feedback.

Based on the research result of [2,11,13,12] and [14] shows that student’s learning motivation greatly affects the student's academic achievement.

**Conceptual framework**

![Conceptual framework](image)

Figure 1. Conceptual framework

Based on Figure 1, it can be seen that academic potency in mathematics as independent variable $X_1$ and learning motivation as the second independent variable $X_2$ that affects academic achievement as a dependent variable $Y$.

**2. Research method**

This research is quantitative research that aims to find out whether or not mathematics academic potential and learning motivation of Papuan college students in Jember affect academic achievement, both simultaneously and partially. The research instrument used in this research is a questionnaire, Test of Mathematics Academic Potential, and documentation.

The subject in this research is college students coming from Papua amounting to 68 college students who study in Jember regency, province of East Java. The research sample is focused on Papuan college students who take the Scientech department. Data collection is done by spreading a research questionnaire to Papuan student respondents after that continued by Academic Potential Test and documentation of Papuan college student's IPK. Data is analyzed by using SPSS of 17 versions for Windows. Analysis prerequisites in this research use test of normality, test multicollinearity, the test of
heteroscedasticity, and test of autocorrelation. While the analysis uses the test of multiple linear regression, T-test, F-test, and test of determination.

3. Research finding

3.1 Test of normality

The test of normality is intended to find out whether data distribute normally or not. If the variable is distributed normally, then we can use parametric statistics based on this assumption. In this research, the test of normality is based on the Kolmogorov-Smirnov test with the assist of the SPSS program of 17 versions for Windows so that it can be used as a test of goodness of fit after regression analysis. Kolmogorov-Smirnov test is done by comparing probability value with the level of significance of 0.05. If the probability value is bigger than 0.05 then data is distributed normally. The output result of SPSS can be seen in Table 1.

| Tests of Normality | Kolmogorov-Smirnov Statistic | df | Sig. | Shapiro-Wilk Statistic | df | Sig. |
|--------------------|-----------------------------|-----|------|------------------------|-----|------|
| Mathematics Academic Potential | .123 | 68 | .051 | .956 | 68 | .017 |
| Learning Motivations | .086 | 68 | .200 | .977 | 68 | .240 |
| Academic Achievement | .090 | 68 | .200 | .982 | 68 | .442 |

Based on Table 1, the value of Kolmogorov-Smirnov for mathematics academic potential is 0.051 > 0.05 so that can be concluded that mathematics academic potential data is distributed normally. The value of Kolmogorov-Smirnov for learning motivation is 0.200 > 0.05 so that can be concluded that learning motivation data is distributed normally. Moreover, the value of Kolmogorov-Smirnov for academic achievement can be concluded that data is distributed normally.

3.2 Test of multicollinearity

The test of multicollinearity is intended to find out whether there is a significant correlation between independent variables. Test of multicollinearity with SPSS is done by regression rest, with the reference value of VIF (variance inflation factor) and the correlation coefficient between independent variables. The criteria used in the research is if VIF value is around number 1 or has a tolerance approaching, then it can be said there is no problem with multicollinearity in the regression model. The test results of multicollinearity can be seen in Table 2.

| Coefficientsa | Unstandardized Coefficients | Standardized Coefficients | Collinearity Statistics |
|---------------|-----------------------------|----------------------------|-------------------------|
| Model         | B   | Std. Error | Beta | t  | Sig. | Tolerance | VIF |
| 1             | (Constant) | 20,275 | 16,304 | 1,244 | .218 | | |
| Mathematics Academic Potential | .341 | .121 | .323 | 2,809 | .007 | .987 | 1,013 |
| Learning Motivations | .344 | .210 | .188 | 1,636 | .107 | .987 | 1,013 |

a. Dependent Variable: Academic Achievement
Based on Table 2, VIF value approaches 1 for all values of the independent variable. As well as tolerance value approaches to 1 for all values of the independent variable. Therefore, it can be concluded that in the regression between independent variables does not occur multicollinearity.

3.3 Test of heteroscedasticity
Test of heteroscedasticity is intended to find out whether there is a deviation from assumption terms on linear regression, wherein model regression has to be fulfilled the term of no heteroscedasticity. The test result of heteroscedasticity using by SPSS of 17 versions for Windows can be seen in Figure 2.

![Figure 2. Diagram of regression distribution](image)

Based on Figure 2, it can be analyzed that the distribution point above and under the Y axis, and it does not occur certain pattern so that can be concluded that there is no heteroscedasticity.

3.4 Test of autocorrelation
The test of autocorrelation is intended to find out whether there is a variable correlation in the prediction model with time or not. The test of autocorrelation with SPSS is done by the regression test, with the reference value of the Durbin-Watson value such as in Table 3.

| Model | R     | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------|----------|-------------------|----------------------------|---------------|
| 1     | .392  | .153     | .127              | 11,276                     | 1.827         |

a. Predictors: (Constant), Learning Motivations, Mathematics Academic Potential
b. Dependent Variable: Academic Achievement

Based on Table 3, the Coefficient of Durbin-Watson is = 1.827 (approaches to 2) so that it can be concluded that regression between the independent variable of \(X_1\) and \(X_2\) on \(Y\) does not occur autocorrelation.
3.5 Test of linear regression
Regression analysis is done by finding the regression line equation of the independent variable of X and the dependent variable of Y. The result of regression analysis using SPSS of 17 versions for Windows can be seen in Table 2. Based on Table 2, the regression equation is

\[ Y = 20.275 + 0.341X_1 + 0.344X_2 \]

3.6 T-test
The T-test is used to determine whether the independent variable affects significantly dependent variable.0 Tested by using SPSS of 17 versions for Windows by using a t-test with the level of significance of 0.05. As for the hypothesis in this research is as follows:

\[ H_0; \beta = 0, \text{there is no positive effect and significant mathematics academic potential and learning motivation on the academic achievement of the Papuan college student in Jember.} \]

\[ H_1; \beta \neq 0, \text{there is a positive effect and significant mathematics academic potential and learning motivation on the academic achievement of the Papuan college student in Jember.} \]

Based on the t-test result of SPSS in Table 2, it is obtained that the probability value of mathematics academic potential is 0.007 < 0.05, therefore, it can be concluded that hypothesis zero \((H_0)\) is rejected and hypothesis one \((H_1)\) is accepted. Meaning there are positive effect and significant mathematics academic potential on academic achievement of the Papuan college student in Jember.

For the learning motivation variable, the probability is 0.107 < 0.05, therefore, it can be concluded that hypothesis zero \((H_0)\) is accepted and hypothesis one \((H_1)\) is rejected. Meaning there is no positive effect and significant learning motivation on the academic achievement of the Papuan college student in Jember.

3.7 Coefficient of determination
The coefficient of determination is used to explain the contribution of influence given to the independent variable on the dependent variable. Based on the output of SPSS in Table 3, mathematics academic potential variable and learning motivation has a significant effect on academic achievement. The coefficient of determination \((R^2)\) is 0.153 (15.3%), meaning the influence of academic potential and learning motivation gives a contribution of 15.3% on the academic achievement of Papuan college students.

4. Discussion
4.1 The influence of mathematics academic potential on academic achievement
Based on t-partial test result, the coefficient of variable regression of mathematics academic \((X_1)\) is 0.341 positive value (+) and t-count obtained is 2.809 > 1.99714 (t table) and the probability of mathematics academic potential is 0.007 < 0.05, therefore, it can be concluded that hypothesis zero \((H_0)\) is rejected and the hypothesis one \((H_1)\) is accepted. Meaning there are positive effect and significant mathematics academic potential on academic achievement of the Papuan college student in Jember.

| Table 4. Coefficient of determination of \(X_1\) and to \(Y\) variable |
|-------------------------|------------------|------------------|------------------|
| Model Summarya          | R                | R Square         | Adjusted R Square | Std. Error of the Estimate |
| 1                       | .344a            | .118             | .105              | 11,418                        |

a. Predictors: (Constant), Mathematics Academic Potential
b. Dependent Variable: Academic Achievement

Based on Table 4 above, coefficient of determination of \(X_1\) to \(Y\) variable is 0.118 meaning that the contribution of influence of mathematics academic potential on academic achievement of Papuan college students in Jember is 11.8% while the rest of 88.2% is influenced by other factors outside regression model which is analyzed.
Academic potential is one factor that influences Papuan college students in achieving their achievement. In this research, the researcher focuses on numerical ability. This is proportional to the result obtained that mathematics academic potential of Papuan college students in Jember is very high and affects academic achievement. This shows that Papuan college students in Jember have a talent or numerical ability or mathematics ability which is necessary to be increased so that can support their academic achievement.

The research that was done by [13] said that one of the strategies to increase academic success is through clear orientation and develop the academic potential belonged to the students. The research that was done by [14] pressed that academic potential if developed well will help and build a good cognitive. Therefore, Papuan college students have to develop their mathematics academic potential or numerical ability so that can support their lecture and influence on academic achievement of Papuan college students.

4.2 The Influence of learning motivation on academic achievement

Based on t-partial test result, the coefficient of variable regression of learning motivation ($X_2$) is 0.341 positive value (+) and t-count obtained is 1.636 $>$ 1.99714 (t table) and the probability of learning motivation is 0.107 $<$ 0.05, therefore, it can be concluded that the hypothesis zero ($H_0$) is accepted and the hypothesis one ($H_1$) is rejected. Meaning there is no positive effect and significant learning motivation on the academic achievement of the Papuan college student in Jember.

Table 5. Coefficient of determination of $X_2$ and to $Y$ variable

| Model Summary$^a$ | Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|--------------------|-------|----|----------|-------------------|---------------------------|
| 1                  | .225$^a$ | .051 | .036 | 11,850 |

a. Predictors: (Constant), Learning Motivations
b. Dependent Variable: Academic Achievement

Based on Table 5 above, the coefficient of determination of $X_2$ to $Y$ variable is 0.051 meaning that the contribution of influence of learning motivation on academic achievement of Papuan college students in Jember is 5.1% while the rest of 94.9% is influenced by other factors outside regression model which is analyzed. The lows of learning motivation of Papuan college students in Jember are based on several factors including the low curiosity, the low of need under the learning, the low of expectation of Papuan college students to be a success, and the low of motivation from the students so that they do not influence in their academic achievement.

Besides the above factors, other factors that influence the lows of learning motivation of Papuan college students are friends, language, and environment. Having friends is of course very helpful in reaching a good academic achievement, but Papuan college students in their friendship environment less diffuse with the students coming from other regions and tend to make friends with college students coming from Papua only. This, of course, makes Papuan college student's thinking patterns less developed because of a lack of communication to the outside so that the motivation to reach a good achievement is less enough. The language also influences the learning motivation of Papuan college students in reaching academic achievement. The language used in Papua daily of Papuan college students is local language and when they study in Jember, there will be language change that has to be mastered fast by Papuan college students to adjust themselves. The use of Java or Madura language in explaining material at campus also influences the low motivation of Papuan college students in learning.

Factors and habits of Papuan college students that influence the low of learning motivation in reaching a good academic achievement need to be changed. Papuan college student’s habit that is not confidence under their ability has to be changed into believing their ability, not realizing the advantage of learning has to be changed into realizing the advantage of learning, not having high curiosity has to
be changed into having high curiosity, not understanding learning material at campus has to be changed into understanding learning material by asking to their classmates, senior or lecturer, false style of learning has to be changed into good style of learning, living environment influencing bad style of learning has to be changed into living environment that gives support and motivation so that the academic achievement gets better, not having learning target has to be changed into having target in learning and not having achieved ideals has to be changed into having achieved ideals.

4.3 The influence of mathematics academic potential and learning motivation on academic achievement

Simultaneous test (F-test) aims to find out simultaneously the influence of mathematics academic potential and learning motivation on the academic achievement of Papuan college students in Jember. The simultaneous test (F-test) is summarized in Table 6 as follows:

| Model       | Sum of Squares | df | Mean Square | F      | Sig.  |
|-------------|----------------|----|-------------|--------|-------|
| Regression  | 1496.295       | 2  | 748,147     | 5.884  | .004* |
| Residual    | 8264.646       | 65 | 127,148     |        |       |
| Total       | 9760.941       | 67 |             |        |       |

a. Predictors: (Constant), Learning Motivations, Mathematics Academic Potential
b. Dependent Variable: Academic Achievement

Based on Table 6 above that F-count obtained is 5.884 > 3.14 (F-table) with Sig. < 0.051 meaning H0 is rejected and H1 is accepted. The independent variable has a simultaneous influence on the dependent variable. This result shows that mathematics academic potential and learning motivation have a simultaneous influence on the academic achievement of Papuan college students in Jember.

Based on the output of SPSS in Table 3, mathematics academic potential variable and learning motivation has a significant effect on academic achievement. The coefficient of determination ($R^2$) is 0.153 (15.3%), meaning the influence of academic potential and learning motivation gives a contribution of 15.35 on the academic achievement of Papuan college students.

Based on the description above, then Papuan college students in Jember are necessary to pay attention to the second independent variable that is learning motivation and mathematics academic potential. The second variable can support the increase of the student’s academic achievement in Jember. Learning motivation is an important thing that has to be owned by Papuan college students in Jember. By the existence of strong motivation in learning will show a good result. By diligent effort and especially based on the existence of high motivation, then a college student will be able to reach a good academic achievement. Mathematics academic potential is the academic ability of Papuan college students in the mathematics field that has a probability to be developed. If this academic ability is developed and continuously sharpened then it will be very supporting academic achievement that will be achieved by Papuan college students in Jember.

5. Conclusion

This research aims to find out the influence of mathematics academic potential variable and learning motivation of Papuan college students in Jember on academic achievement. According to the F-test hypothesis, it can be concluded that mathematics academic potential variable and learning motivation has a significant influence on academic achievement of Papuan college students who study in Jember.

Based on the coefficient of determination $R^2$ obtained, mathematics academic potential and learning motivation has influenced 15.3% for the academic achievement of Papuan college students.
This means that 84.7% are influenced by other predictor factors that are still open that can influence the academic achievement of Papuan college students in Jember regency, East Java.

Acknowledgment
Thank you-note I give to Papuan college students who study at higher education in Jember who still spend their time as the research informant.

References
[1] Saleh M 2014 The Influence of motivation, factors of family , campus environment and active organization on academic achievement Jurnal Phenomenon. 4(2) pp 109–141
[2] Sinaga H D E 2018 Influence of Studying While Working and Learning Motivation to Academic Achievement of College Students Majoring Information System at Stmk Royal Kisarans J. Phys. Conf. Ser. 1114
[3] Safi I, Sutriyono, and Handoko F 2015 The Service Quality Judged From Academic Achievement of Case Study Students at University of Kediri Jurnal Teknologi dan Manajemen Industri 1(2) pp 22–27
[4] Sarwa I N 2010 The Determination of Academic Potential, Kinesthetic Aptitude, and Achievement Motivation Toward Learning Achievement of The Students of The Karawitan Art Departemen at The Performance Art Faculty of Indonesian Art Institute Denpasar Jurnal Ilmu Pendidikan dan Pembelajaran Ganesha 7(1) pp 1–15
[5] Hazrati-viari A, Rad A T, and Torabi S S 2012 The effect of personality traits on academic performance : The mediating role of academic motivation Procedia - Soc. Behav. Sci. 32 pp 367–371
[6] Costa C, Paula A, Pedroso M, and Ferreira M 2015 Pedagogical interaction and learning performance as determinants of academic achievement Procedia - Soc. Behav. Sci. 171 pp 874–881
[7] Pramesti G 2017 The analysis of student motivation Correspondence in lectures JNPM (Jurnal Nasional Pendidikan Matematika 1(1) pp 88–96
[8] Dityawati M S and Wuryadi 2019 The Influence of Learning Motivation , Ability of Teachers to Teach , Parental Attention and Learning Facilities in Understanding Material of Regulatory System in Senior High School J. Phys. Conf. Ser. 1233
[9] Blašková M 2014 Influencing Academic Motivation , Responsibility and Creativity Procedia - Soc. Behav. Sci. 159 pp 415–425
[10] Keller J M 2010 Motivational Design for Learning and Performance (USA: Springer)
[11] Rusmono R, Sulardi S, and Suyitno S 2018 Influence of learning model and learning motivation to learning outcome of micro hydro power plant Influence of learning model and learning motivation to learning outcome of micro hydro power plant IOP Conf. Ser. Mater. Sci. Eng. 434
[12] Nugroho C and Pramukantoro J 2014 The Influence of Student Learning Motivation Based on School Background on Basic Practices in Electricity and Mathematics Engineering 1 on Student Achievement of Students of PTE UNESA in the class of 2012 Jurnal Pendidikan Teknik Elektro 3(1)
[13] Suprayogi M N, Ratriana L, and Wulandari A P J 2019 The interplay of academic efficacy and goal orientation toward academic achievement J. Phys. Conf. Ser. 1175
[14] Thayer A, Lee C P, Hwang L H, Sales H, Sen P, and Dalal N 2011 The Imposition and Superimposition of Digital Reading Technology : The Academic Potential of E-readers Proc. SIGCHI Conf. Hum. Factors Comput. Syst. ACM pp 2917–2926