The Influence of Internal and External Factors on Learning Achievement

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Abstract. This study presents an analysis of several factors related to Indonesian student achievement. The sample consists of one hundred and eleven students in the second semester at the State Islamic University of Malang in Indonesia. The sample represents 74% of the student population for the even semester of 2021. Data were collected through instruments consisting of internal and external factors consisting of seventy-six statements. The age of the students ranged between 19 and 20 years. Internal factors which were analyzed included health, intelligence, talents, interests, motivations, and student learning methods. External factors analyzed include lecturers, other students, facilities, courses, extracurricular activities, and achievements. Then, internal and external factors were analyzed using multiple linear regression. These two factors simultaneously affect student achievement. Partially, the internal factors that influence learning achievement are the variables of intelligence and talent. Meanwhile, partially external factors that dominate the influence of learning achievement are lecturers and curriculum variables.

Keywords: Internal factor · External factor · Multiple linear regression · Learning achievement

1 Introduction

Measuring student academic achievement is a challenge because student achievement results from various factors both within the student and the surrounding environment. Measurement of student academic achievement is essential in education because student status can help improve higher education performance and student academic achievement (Hussain, et al., 2019). Measurement of student learning achievement is one of the business processes carried out within the scope of university business process management. This measurement is also a form of evaluating the implementation of higher education business processes. Student learning achievement affects the performance of the study program (Gustems-Carnicer, Calderon, & Calderon-Garrido, 2019). Therefore, the measurement of student learning achievement is an important thing.

Measurement of student learning achievement cannot be done quickly because the existing information system is not yet integrated. If the information system is not integrated, student achievement progress cannot be predicted accurately. Therefore, it is

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necessary to predict student learning achievement as early as possible to develop learning strategies in a study program (Neroni, Meijs, Gijselaers, Kirschner, & de Groot, 2019).

The learning process involves several entities, one of which is a student. Student achievement is measured as one of the variables to measure the performance of the study program. Various sources of information, such as demographics, academic background, and behavioral features, are used by educational institutions to determine things that affect learning achievement (Alyahyan & Dustegor, 2020; Larrabee Sonderlund, Hughes, & Smith, 2019). The elements that affect the learning process can be used to determine the factors that affect academic achievement (Lei, Cui, & Zhou, 2018). Students who have high and low academic achievement or fail as a result of these learning-related factors.

Several problems that hinder student achievement in the learning process are grouped into two categories: internal and external factors. The factors that influence the achievement of academic achievement are in the form of factors within students (internal) and factors from outside students (external) (Papanastasiou, 2000; Aspelin, 2012; Fitrianti & Nur, 2018). Internal factors include intelligence, self-concept, and so on, while external factors include: family, social status, academic environment, and so on (Hellas, et al., 2018).

2 Method

2.1 Data Collection

This study uses primary data sources in the form of questionnaires. Questionnaires were distributed to students who took digital electronics courses at the Department of Informatics Engineering, Maulana Malik Ibrahim State Islamic University, Malang. The questionnaire contains seventy-six statements that students must fill out as respondents. The aspects measured in the questionnaire used as independent variables are presented in Fig. 1. The coefficient of Cronbach's alpha test is 0.955. Furthermore, instruments can be used for data collection. In addition, learning outcomes data in the form of final semester scores are used as the dependent variable.

2.2 Research Design

The population in this study were second-semester students majoring in Informatics Engineering UIN Maulana Malik Ibrahim, as many as 111 from a population of 151 students consisting of 62 male students and 49 female students. The sampling technique used is purposive sampling. The research method used is a survey method. This method is used because the research aims to describe the results of the analysis of internal and external factors that dominate the learning outcomes of digital electronics courses. The instrument used is a questionnaire. The questionnaire was prepared to refer to the variables that affect students' digital electronics learning outcomes which were distributed to participants.

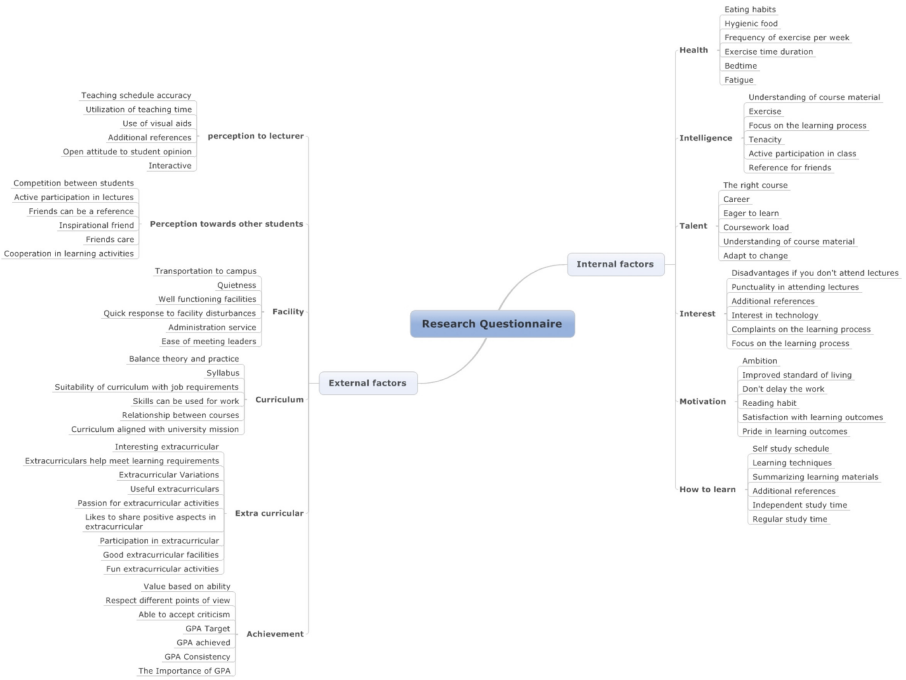

Fig. 1. Aspects in the Questionnaire

2.3 Data Analysis

The data were tested using multiple linear regression to determine the effect of internal and external factors on learning achievement. Data were analyzed using SPSS 26. Testing the statistical value at a significance of 5%.

3 Result

3.1 Classic Assumption Test

3.1.1 Normality Test

The normality test was used to test whether the data used in the study had a normal distribution, both multivariate and univariate. Data normality requirements must be met before Multiple Linear Regression analysis is performed. Table 1 shows the results of the normality test using the Kolmogorov-Smirnov.

The normality test using Kolmogorov-Smirnov yielded a significance of 0.085. The normality test results, as presented in Table 1, show a significance value of more than 0.05, so the research data is normally distributed. Next are the multicollinearity test and the heteroscedasticity test. Multiple Regression analysis can be performed if there are no symptoms of Multicollinearity and heteroscedasticity.

Table 1. Normality Test Using Kolmogorov-Smirnov

N		56
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.00000000
Most Extreme Differences	Absolute	.111
	Positive	.111
	Negative	−.070
Test Statistic		.111
Asymp. Sig. (2-tailed)		.085[c]

[a] Test distribution is Normal.
[b] Calculated from data.
[c] Lilliefors Significance Correction.

Table 2. Internal Factor Multicollinearity Test

Model	Collinearity Statistics	
	Tolerance	VIF
Health (x1)	0.675	1.482
Intelligence (X2)	0.435	2.299
Talent (X3)	0.547	1.828
Interest (X4)	0.435	2.299
Motivation (X5)	0.494	2.022
LearningMethod (X6)	0.454	2.203

[a] Dependent Variable: Score

3.1.2 Multicollinearity Test

A multicollinearity test is conducted to ensure that there is intercorrelation or collinearity between independent variables in a regression model. Intercorrelation is a linear relationship or a strong relationship between one independent variable or predictor variable with other predictor variables in a regression model. Table 2 shows the results of the collinearity test for internal factors, and Table 3 shows the results for external factors.

Symptoms of multicollinearity do not occur in the multicollinearity test if the Tolerance value is less than 0.100 (VIF $<$ 0.100) and the VIF value is less than 10 (VIF $<$ 10) (Ghozali, 2018). Table 2 shows that the internal factors consisting of variables of health, intelligence, talent, interest, motivation, and learning methods have a tolerance value of less than 0.100 and a VIF value of less than 10. Based on the tolerance value and VIF, it can be concluded that the internal factors data do not occur multicollinearity symptoms in the multicollinearity test.

Table 3. Multicollinearity Test of External Factors

Model	Collinearity Statistics	
	Tolerance	VIF
Lecturer (X7)	0.546	1.830
OtherStudent (X8)	0.536	1.865
Facility (X9)	0.462	2.165
Curriculum (X10)	0.429	2.329
Extracurricular (X11)	0.671	1.490
Achievement (X12)	0.702	1.425

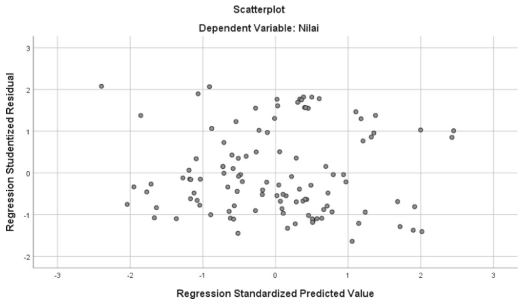

Fig. 2. Internal factor heteroscedasticity test scatterplot

Table 3 shows that external factors consisting of lecturers, other students, facilities, curriculum, extracurricular and achievement variables have a tolerance value of less than 0.100 and a VIF value of less than 10. Tolerance values of less than 0.100 and VIF of less than 10 can be concluded that the external factor data did not show multicollinearity symptoms in the multicollinearity test.

3.1.3 Heteroscedasticity Test

The heteroscedasticity test was carried out to test the inequality of variance and residuals from one observation to another. Residual is the value of the difference between the observed value and the predicted value. The requirement that must be met in a regression model is the absence of heteroscedasticity problems. Heteroscedasticity does not occur if there is no clear pattern (wavy or widened then narrowed) in the scatterplot image and the points spread above and below the number 0 on the Y axis (Ghozali, 2018). Figure 2 is a scatterplot of the internal factor heteroscedasticity test, and Fig. 3 is a scatterplot of the external factor heteroscedasticity test.

Figure 2 shows scatterplots of internal factors consisting of variables of health, intelligence, talent, interest, motivation, and learning methods. In the figure, it can be concluded that in the heteroscedasticity test for internal factor data, there are no symptoms of heteroscedasticity because there is no clear pattern in the scatterplot image.

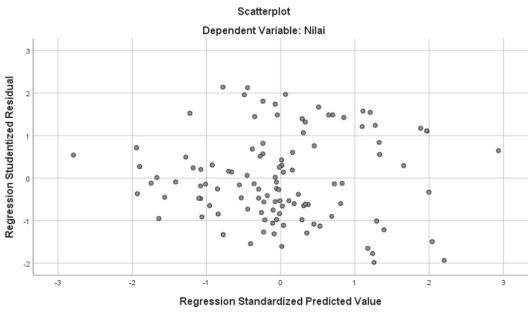

Fig. 3. Scatterplot of External Factor heteroscedasticity test

Table 4. Partial t-test of Internal Factors

Model	Sig.
Health (x1)	0.147
Intelligence (X2)	0.003
Talent (X3)	0.150
Interest (X4)	0.672
Motivation (X5)	0.398
LearningMethod (X6)	0.235

[a] Dependent Variable: Score

Figure 3 shows scatterplots of external factors consisting of lecturers, other students, facilities, curriculum, extracurricular and achievement variables. Based on the figure, it can be concluded that the heteroscedasticity test for external factor data has no symptoms of heteroscedasticity because there is no clear pattern in the scatterplot image.

3.2 Partial t-test

The t-test tests the regression coefficient of each independent variable on the dependent variable to determine the effect of the independent variable on the dependent variable. The purpose of the partial t-test is to test the influence of each independent variable on the dependent variable. Table 4 shows the results of the partial t-test for internal factors, and Table 5 shows the results of the partial t-test for external factors.

Multiple linear regression using partial t-test based on the significance value. If the significance value is less than 0.05 (<0.05), the independent variable partially influences the dependent variable. Table 4 shows that the health variable does not affect learning achievement, the intelligence variable affects learning achievement, and the talent variable affects learning achievement, interest, achievement, and learning style variables do not affect learning achievement.

Table 5 shows that the lecturer variable affects learning achievement. Other student variables, facilities, curriculum, extracurricular, and achievement, do not affect learning achievement.

Table 5. Partial t-test of External Factors

Model	Sig.
Lecturer (X7)	0.001
OtherStudent (X8)	0.391
Facility (X9)	0.144
Curriculum (X10)	0.313
ExtraCurricular (X11)	0.772
Achievement (X12)	0.996

[a] Dependent Variable: Score

Table 6. Simultaneous F Test of Internal Factors

	Sig.
Regression	.033[b]

Table 7. Simultaneous F Test of External Factors

	Sig.
Regression	.017[b]

4 F-test

The F test is a simultaneous regression relationship test that aims to determine whether all independent variables significantly affect the dependent variable. Table 6 shows the results of the simultaneous F test for internal factors, and Table 7 shows the results for external factors.

The basis for decision-making is the simultaneous F test; if Sig. < 0.05 means that the independent variable simultaneously affects the dependent variable (Ghozali, 2018). In Table 6, the significance has a value of 0.033, less than 0.05. This value means that internal factors of health, intelligence, talent, interest, motivation, and learning methods simultaneously affect learning achievement.

Table 7 shows that the significance value is 0.017, less than 0.05. The significance value means that external factors of lecturers, other students, facilities, curriculum, extracurriculars, and achievement simultaneously affect learning achievement.

5 Coefficient of Determination (R^2)

The coefficient of determination shows that the contribution of the independent variables in the regression model can explain the variation of the dependent variable. The coefficient of determination test is carried out to determine and predict the level of importance

of the contribution given by the independent variables jointly to the dependent variable. The result of the coefficient of determination test for internal factors is 0.121, while for the test results, the coefficient of determination for external factors is 0.135. The coefficient of determination value means that the effect of student achievement variable on student learning outcomes originating from internal factors is 12.1% and from external factors is 13.5%.

6 Effective Contribution and Relative Contribution

Effective contribution (EC) is a measure of the contribution of a predictor variable or independent variable to the dependent variable in regression analysis. The sum of the effective contributions for all independent variables equals the sum of the values in the coefficient of determination. The purpose of calculating EC is to determine the contribution of each independent variable to the dependent variable so that the contribution given by each independent variable can be seen clearly in percentage units. To calculate EC as shown in Eq. (1) (Hadi, 2004).

$$EC(x)\% = Beta_x \cdot CorrelationCoefficient \cdot 100\% \tag{1}$$

Meanwhile, relative contribution (RC) is a measure that shows the contribution of an independent variable or predictor to the number of regression squares. The RC sum of all independent variables is 100% or equal to one. RC is used to determine the contribution of each independent variable or predictor to the dependent variable as a whole (Hadi, 2004). The RC calculation is the calculation of the contribution of each independent variable without regard to other variables not examined in this study so that the contribution of each independent variable can be predicted. RC equation (Hadi, 2004) as shown in Eq. (2).

$$SR(X)\% = \frac{\text{Effective Contribution(X)}\%}{coefficient\ of\ determination} \tag{2}$$

Based on Table 8, it can be concluded that the EC for the most dominant internal factors is the intelligence variable at 10.04% and the talent variable at 3.15% to the learning achievement variable by taking into account other independent variables not examined in this study. Next is the EC for the most dominant external factor, namely the lecturer variable of 12.80% and the curriculum variable of 2.66% of the learning achievement variable, considering the variables not examined in this study.

Furthermore, the RC for the most dominant internal factor is the intelligence variable of 83% and the talent variable of 26.03% of the learning achievement variable without regard to other variables not examined in this study. In contrast, the RC for the most dominant external factor is the lecturer variable at 94.83% and the Curriculum at 19.74% for the learning achievement variable without paying attention to other variables not examined in this study.

A multiple linear regression equation model was developed to determine the value of the increase or decrease in student achievement due to internal and external influences on students. Multiple linear regression equations were obtained from the t-test results.

Table 8. Calculation of EC and RC

Variable	Regression coefficient (BETA)	Correlation coefficient	Coefficient of determination	SE	SR
Health (x1)	−0,106	0	0.121	0.00	0
Intelligence (x2)	0.422	0.238		10.04	83.00
Talent (x3)	0.18	0.175		3.15	26.03
Interest (x4)	−0.059	0.058		−0.34	−2.83
Motivation (x5)	−0.111	0.031		−0,34	−2.84
Learning method (x60	−0.163	0.024		−0.39	−3.23
Lecturer (x7)	0.409	0.313	0.135	12.80	94.83
Other Student (x8)	−0.107	0.075		−0.80	−5.94
Facility (x9)	−0.198	0.054		−1.07	−7.92
Curriculum (x10)	0.141	0.189		2.66	19.74
Extracurricular (x11)	−0.032	0.026		−0.08	−0.62
Achievement (x12)	−0.001	0.094		−0.01	−0.07

Equation (4) shows a multiple linear regression equation in the presence of an external component.

$$Y = 37,746 - 0,902X_7 + 3,431X_8 + 1,203X_9 - 0,527X_{10} - 0,838X_{11} - 1,159X_{12} \tag{3}$$

$$Y = 26,954 + 2,828X_1 - 0,830X_2 - 1,440X_3 + 1,111X_4 - 0,147X_5 - 0,004X_6 \tag{4}$$

7 Discussion

This study found that internal and external factors affect student achievement. The dominant internal factor that most influences student achievement is student intelligence. There is a positive influence between intelligence on learning achievement, which means that the higher the intellectual intelligence, the learning achievement will increase (Lumbantobing, 2020; Widiani & Istiqomah, 2021; Purwitasari, Mardi, & Musyaffi, 2022). In addition, talent also affects learning achievement. This conclusion is similar to that stated by Dilvina, Witono, and Safruddin, who stated that those who got low learning scores were caused by a lack of interest and talent (Dilvina, Witono, & Safruddin, 2021).

Another dominant factor from the analysis results is the lecturer variable on external factors. The immediate implication of these findings is that more can be done to improve

learning achievement by increasing lecturer effectiveness. This study is in line with the research by George, Zalmon, and Okafor, which stated that the lecturer factor also had a significant positive relationship with student performance (George, Zalmon, & Okafor, 2020). Lecturers seem to have more to do with students' academic progress than the methods used for student assignments. High academic achievement is more likely to result in highly homogeneous classrooms not supported in this study. Wonu and Zalmon also corroborated the results of this study. They stated that the constraints on the effectiveness of learning and student achievement were also caused by the lecturer variable (Wonu & Zalmon, 2019). Apart from lecturers, another influencing variable is the curriculum.

8 Conclusion

Based on the formulation of the problem, it can be concluded that: There is a relationship between internal factor variables and learning achievement variables (sig. = 0.033), and there is a relationship between external factors and learning achievement variables (sig. = 0.017).

The coefficient of determination for internal factors is 0.121, while the coefficient for external factors is 0.135. The coefficient of determination means that the contribution of the variable influence of student achievement learning outcomes originating from internal factors is 12.1% and from external factors is 13.5%. The coefficient of determination shows that the simultaneous contribution of internal factors to the learning achievement variable is 12.1%, while the simultaneous contribution of internal factors to learning achievement is 13.5%.

The Dominating Effective Contribution (EC) is the intelligence variable at 10.04%, talent at 3.15%, lecturers at 12.8%, and the curriculum at 2.66% by itself affects the learning achievement variable while taking into account other independent variables that are not investigated in this study. The relative contribution (RC) is the intelligence variable at 83%, talent at 26.03%, lecturers at 94.83%, and the curriculum at 19.74%, individually affecting the learning achievement variable by not paying attention to other independent variables not examined in this study.

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