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The Influence of Cognitive and Psychomotor Aspects on Students' Academic Achievement

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ABSTRACT

Background

Many students struggle to understand complex academic material, which negatively impacts their academic performance

Purpose

This study aims to examine the influence of psychomotor and cognitive aspects on the academic achievement of management students at Muhammadiyah University of East Kalimantan.

Design/method/approach

This study uses a quantitative research design. Data were collected through structured questionnaires distributed directly to the selected students, as well as documentation of their academic records. The sample of 180 students was determined using the Slovin formula and selected by random sampling from a total population of 328 students. The collected data were analyzed statistically using SPSS 27 software, employing classical assumption tests, multiple linear regression, and hypothesis testing to assess the relationship between cognitive factors and academic achievement.

Results

The analysis revealed that cognitive aspects have a significant positive influence on the academic achievement of eighth-semester management students at Universitas Muhammadiyah Kalimantan Timur. Students who demonstrated stronger cognitive skills—such as critical thinking, understanding, and the ability to analyze material—tended to achieve higher academic performance, as reflected in their GPA and other academic indicators. The statistical results from multiple linear regression showed that the cognitive variable contributed meaningfully to variations in students' academic success. These findings suggest that efforts to enhance cognitive abilities among students can lead to improved academic outcomes in higher education settings.

Contribution/value

This study provides valuable insight into the specific role of cognitive aspects in shaping academic achievement among eighth-semester management students at Universitas Muhammadiyah Kalimantan Timur. The findings offer practical recommendations for educators to design learning strategies that better support students' cognitive growth.

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INTRODUCTION

Academic achievement is a key indicator for measuring student success during their higher education journey. Typically, academic achievement is measured by cumulative grade point average (GPA), which reflects performance across all courses taken. However, academic success is not solely determined by students' intellectual abilities; it is also influenced by a variety of internal and external factors. Internal factors include academic motivation, learning skills, interests, and abilities, while external factors involve the learning environment, social surroundings, and educational facilities. The optimal interplay of these factors enables students to better internalize and apply what they have learned in each subject.

Achieving optimal academic results is not only determined by the above factors and the quality of teaching and academic environment, but also by internal student aspects such as cognitive and psychomotor abilities. According to Muhammad & Sulastri (2021), academic achievement serves as an indicator for evaluating the success of students' learning process. Their research shows that learning motivation, self-esteem, and social support have a positive influence on students' academic achievement. National data reveals that the average GPA for Indonesian graduates in 2022 was 3.33, with fields such as economics and arts averaging 3.37, health and social sciences at 3.36, and humanities at 3.35, while agriculture averaged 3.25. This confirms that GPA remains a national standard for assessing student academic achievement.

The cognitive aspect refers to students' mental and intellectual abilities to remember and apply information gained during the learning process. Cognitive abilities include critical thinking, understanding and analyzing material, and effectively solving problems. In higher education, this aspect significantly supports academic achievement and plays a crucial role as it enables students to understand, retain, and use knowledge in various assignments and exams. Research shows that high cognitive abilities have a positive correlation with better academic performance (Barry J. Zimmerman, 2018), indicating that cognitive skills form the foundation for strong academic achievement.

According to Nurokhim et al. (2023), student learning assessment covers three aspects: knowledge, attitude, and skills. Psychomotor indicators include perception, preparation, guided response, mechanism, adaptation, and organization. Bloom (as cited in H. Rahman, 2020) states that process skills (psychomotor) lead to the development of basic mental, physical, and social skills, which are essential for personal expertise. During skills training, necessary attitudes such as creativity, cooperation, responsibility, and discipline are developed in line with relevant study fields. The quality of learning outcomes and processes are inseparable; if both learning management and its features run well, the process will be effective, and the output will be of high quality (Nasser, 2021; Ulfah, Opan Arifudin, Volume 2, Issue 1, January 2021).

Similarly, the Management Undergraduate Program at Universitas Muhammadiyah Kalimantan Timur aims to produce graduates who are competent in management, grounded in Islamic values, and equipped with strong analytical, decision-making, and leadership skills. With 328 active eighth-semester students, the program continuously strives to create a

conducive learning environment. However, observations indicate an imbalance between students' cognitive and psychomotor aspects. Some students with high GPAs only master one or two subjects, while those with lower GPAs may have broader knowledge. In addition, many students lack practical skills such as presentation and real-world application of knowledge. This situation highlights the need for greater attention to the development of both aspects to optimize students' academic achievement.

Several key issues exist regarding the close relationship between cognitive and psychomotor aspects, which are interrelated and mutually influential. Strong cognitive skills can support the development of psychomotor skills, and a good understanding of concepts (cognitive) helps students perform practical tasks more effectively. Both cognitive and psychomotor aspects play important roles in academic achievement. By understanding the relationship between these two aspects and other factors affecting academic performance, educational institutions and students can identify necessary steps to improve the quality of education.

In terms of psychomotor skills, students' academic achievement can be assessed through various motor and physical activities. Many students struggle to understand complex academic material, which negatively impacts their academic performance. Research on the impact of cognitive, affective, and psychomotor aspects on learning outcomes (Ulfah, Opan Arifudin Vol. 2, No. 1, January 2021) found that factors such as intellectual and spiritual intelligence do not have a significant influence on students' academic achievement. This suggests that research should focus on other variables that may have a greater impact, such as learning motivation, knowledge, and student skills. Additionally, there are inconsistencies in research findings regarding the influence of specific cognitive abilities on academic achievement. For example, some studies find a significant correlation between logical reasoning skills and academic grades, while others do not. These differences indicate that the role of cognitive and psychomotor abilities in academic achievement is complex and may depend on specific contexts or subjects.

LITERATURE REVIEW

Academic achievement among university students is shaped by a complex interplay of internal and external factors. Internally, cognitive aspects are widely recognized as key determinants of academic success. Cognitive abilities refer to mental processes that enable individuals to learn, understand, and process information. According to Bloom's Taxonomy (2020), the cognitive domain includes six hierarchical levels: remembering, understanding, applying, analyzing, evaluating, and creating. These abilities are essential for students to master course material, complete complex assignments, and develop critical thinking skills necessary for problem-solving in academic settings.

Several studies have highlighted the importance of cognitive strategies in learning. For example, students who actively engage in cognitive learning approaches—such as note-taking, reorganizing material, and participating in discussions—tend to achieve better academic results compared to those who do not use such strategies. Sahir (2022) emphasizes that the development of cognitive aspects in higher education plays a crucial

role in supporting optimal academic achievement. Furthermore, research by Hidayat et al. (2019) found that learning models that strengthen cognitive skills, such as contextual teaching and learning, have a positive impact on student performance. Similarly, Islam et al. (2019) demonstrated that cognitive abilities directly affect academic achievement, especially in courses requiring logical and analytical thinking.

However, not all studies agree on the extent of this influence. Azis (2021) discovered that intellectual intelligence did not significantly affect the academic performance of accounting students, suggesting that cognitive ability is not always the primary determinant of achievement. Sulastri (2022) also noted that academic engagement did not significantly impact student performance, highlighting the potential role of other factors such as motivation and learning environment.

External factors are also significant. Nurjanah (2021) points out that the application of cognitive theories in teaching can enhance students' understanding and help them develop more systematic learning strategies. Moreover, the quality of teaching methods, learning materials, and the overall learning environment can either support or hinder the development of students' cognitive skills.

Despite the general consensus on the importance of cognitive aspects, gaps remain in the literature. Specifically, there is limited research on which teaching methods most effectively enhance students' cognitive abilities and how these relate to academic performance, particularly in the context of management education. Additionally, the ideal quality of learning materials and the most influential aspects of the learning environment from the students' perspective are yet to be fully explored.

In summary, while cognitive aspects are widely acknowledged as important for academic achievement, their impact can vary depending on other contributing factors. Further research is needed to identify the most effective strategies for fostering cognitive development and to clarify the interplay between cognitive abilities and other influences on student success.

METHOD

This study uses a quantitative approach. The study population included 328 8th semester Management students at the Muhammadiyah University of East Kalimantan. The sample selection was carried out by purposive sampling with the criteria of active students who had taken a minimum of 120 credits. Using the Slovin formula (10% error rate), 180 respondents were obtained as a representative sample.

Data collection was carried out through two methods: (1) Closed questionnaire to measure cognitive aspects (analytical skills, problem solving) and psychomotor (presentation skills, case simulation) using a Likert scale of 1-5. This instrument was adapted from the research of Ulfah & Arifudin (2021) with item-total correlation validity> 0.3 and Cronbach's Alpha reliability> 0.7; (2) Documentation of GPA values as an indicator of academic achievement, verified through campus academic archives.

Data analysis involved three stages:

1. Classical Assumption Test:

a. Normality test with Kolmogorov-Smirnov
b. Multicollinearity test (VIF <10)
c. Heteroscedasticity test through scatterplot
2. Multiple Linear Regression to determine the contribution of independent variables to GPA, with the equation:
Y=a+b1X1+b2X2+eY=a+b1X1+b2X2+e
3. Hypothesis Test:
a. Partial t-test (α=0.05) confirms the individual influence of each variable
b. Simultaneous F-test (α=0.05) measures the combined effect
c. Determination Coefficient (R^2) to determine the percentage of effective contribution.
d. The analysis process uses SPSS 27 software, ensuring that all stages meet the principles of research ethics through informed consent and confidentiality of respondent data.

RESULTS

Classical Assumption Test

Normality Test

The normality test is carried out with a normal probability plot with the help of the IBM SPSS version 27 program. This study uses the One Sample Kolmogorov-Smirnov test with a significant value of 0.05 with the following decision making:
1. If the sig value> 0.05 then the data is normally distributed.
2. If the sig value <0.05 then the data is not normally distributed.

Table 1 Normality Test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		185
Normal Parameters[a,b]	Mean	172628184.7
	Std. Deviation	1537580480
Most Extreme Differences	Absolute	.051
	Positive	.051
	Negative	-.045
Test Statistic		.051
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

(Source: Researcher Processed Data, 2025)

Based on the table above, the results of the normality test show that the Asymp Sig. (2-tailed) value is .200c.d, this value is greater than 0.05. Thus, it can be interpreted that in this analysis the data is normally distributed.

Multicollinearity Test

Based on the results of the multicollinearity test below, for the cognitive aspect variable (X1), the Tolerance value is 0.216 and the VIF value is 4.623. While for the psychomotor aspect variable (X2), the Tolerance value is also 0.216 and the VIF value is 4.623. Based on the criteria that have been set in the research method section, a model is

considered free from multicollinearity if the Tolerance value is greater than 0.10 and the VIF value is less than 10.

Table 2. Multicollinearity Test

Variabel	Item	Tolerance	VIF	Description
Aspek Kognitif	X1	0.216	4.623	No multicollinearity
Aspek Psikomotorik	X2	0.216	4.623	No multicollinearity

(Source: Researcher Processed Data, 2025)

The test results in this study indicate that the Tolerance and VIF values for both independent variables meet the criteria for no Multicollinearity if the tolerance value of the multicollinearity test findings is higher than <0.01. If the VIF number is less than or greater than 10, there is no multicollinearity (Sahir, 2022:70). Thus, it can be concluded that there is no multicollinearity between the independent variables in this model. The Cognitive Aspect (X1) and Psychomotor Aspect (X2) variables each do not have a strong linear relationship with each other which can affect the stability and interpretation of the regression results. This shows that the regression analysis carried out in this study can provide a more accurate estimate and a more valid interpretation of the influence of cognitive and psychomotor aspects on the academic achievement of students at the Muhammadiyah University of East Kalimantan.

Heteroscedasticity Test

Heteroscedasticity test is a test that assesses whether there is inequality of residual variance for all observations in a linear regression model. Heteroscedasticity is a condition where there is inequality of error variance for all observations of each independent variable in the regression model. The purpose of the heteroscedasticity test is to see whether in the regression model there is inequality of residual variance between several observations. The heteroscedasticity test in this study uses the Glejser test. The test results can be seen in the following table:

Tabel 3. Heteroscedasticity Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.037	.888		.042	.966
	Kognitif	.001	.037	.006	.039	.969
	psikomtorik	.002	.036	.007	.044	.965

a. Dependent Variable: ABS_RES

(Source: Researcher Processed Data, 2025)

Based on the table above, the results of the heteroscedasticity test with the Glejser test show that the sig. value of variable X, namely the cognitive aspect and psychomotor aspect, is 0.966 and 0.969. The value obtained is greater than 0.05. So it can be said that this analysis shows that there is no heteroscedasticity in the regression model. Therefore, it can

be concluded that the regression model used to analyze the influence of cognitive aspects and psychomotor aspects of competence on academic achievement of students at the Muhammadiyah University of East *Kalimantan is valid and reliable.*

Multiple Linear Regression Analysis

The multiple linear regression analysis applied in this study aims to determine whether or not there is an influence of the independent variable on the dependent variable. The results of data processing in this study using SPSS 27 are shown in the table, namely

Table 4. Multiple Linear Regression Analysis

Model	Unstandardized Coefficients	
	B	Std. Error
(Constant)	18.364	2.008
KOGNITIF	.122	.084
PSIKOMOTORIK	.540	.082

(Source: Researcher Processed Data, 2025)

According to the table, an equation can be drawn to determine the influence of cognitive and psychomotor aspects on the academic achievement of students at the Muhammadiyah University of East Kalimantan.

$Y= 18.364+0.122\ X_1 0.082X_2$

Interpretation of Coefficients

1. Konstanta (Intersep) b0 = 18.364, This value indicates that if the cognitive aspect X1 and psychomotor aspect X2 are equal to 0, the predicted value of student Y's academic achievement is 18,364.
2. Cognitive Aspect Coefficient = 0.122 , This coefficient indicates that for every one increase in the cognitive aspect X1, the academic achievement value of student Y will decrease by 0.122, assuming other variables are constant.
3. Psychomotor Aspect Coefficient = 0.540, This coefficient indicates that for every one level increase in the psychomotor aspect X2, the academic achievement value of student Y will increase by 0.540, assuming other variables are constant.

Hypothesis Testing

In this study, hypothesis testing was conducted using three main methods: t-test (partial), F-test (simultaneous), and Coefficient of Determination (R-Square) test.

t-test (partial)

Tabel 5. t-Test Results (Partial)

Model	*t*	*Sig.*	*Description*
Aspek Kognitif (X1)	1.452	.148	No Significant Impact
Aspek Psikomotorik (X2)	6.607	.001	Significantly Influential

(Source: Researcher Processed Data, 2025)

Based on the results of the partial t-test contained in the Table, an in-depth interpretation of the results can be carried out. For the cognitive aspect variable (X1), the significance value of 0.148 is greater than 0.05, so it does not have a significant effect on

students' academic achievement. On the other hand, for the psychomotor aspect variable (X2), the significance value of 0.001, this value is smaller than 0.05, this indicates that H_o is rejected and H_1 is accepted so that it means that the psychomotor aspect has a significant effect on the academic achievement of students at the Muhammadiyah University of East Kalimantan Province.

F-test (simultaneous)

Tabel 6. F-Test Results (Simultaneous)

Model	*F*	*Sig.*	*Description*
Regression Residul TOTAL	145.037	0.001[b]	Significantly Influential

(Source: Researcher Processed Data, 2025)

Based on the results of the F-test above, it shows a significance value of 0.001 with a significance value smaller than 0.05. This table shows that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. This means that the independent variables, cognitive aspects and psychomotor aspects simultaneously have a significant influence on the academic achievement of students at the Muhammadiyah University of East Kalimantan Province. When the cognitive and psychomotor aspects are collectively/simultaneously, these two variables contribute significantly to improving academic achievement. This finding indicates that both improvements in students' cognitive aspects and psychomotor aspects are considered important to encourage better student achievement at the Muhammadiyah University of East Kalimantan Province.

Coefficient of Determination test

Tabel 7. Results of Determination Coefficient Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.784[a]	.614	.610	3.578

(Source: Researcher Processed Data, 2025)

The results of the determination coefficient test listed in the Table show an Adjusted R Square value of 0.614 indicating that the regression model is quite good at predicting student achievement, considering that the closer it is to 1, the better the model's ability to explain variations in the data. These results confirm that the cognitive and psychomotor aspects have a significant contribution in explaining variations in student academic achievement at the Muhammadiyah University of East Kalimantan Province in the regression model used.

DISCUSSION

The discussion of results of this study indicate that, simultaneously, both cognitive and psychomotor aspects make a significant contribution to students' academic achievement. However, when analyzed separately, only the psychomotor aspect is proven to have a statistically significant influence.

These findings align with real-world observations, where students who are actively involved in laboratory activities, presentations, and case simulations tend to have better adaptability and application skills. This is reflected in more stable GPAs and their ability to complete assignments that require real-world application. Meanwhile, mastery of cognitive aspects such as memorizing theories and understanding concepts, while important, does not directly guarantee high academic achievement if not balanced with psychomotor skills.

In this study, multiple linear regression analysis was used to determine the extent of the influence of cognitive and psychomotor aspects on students' academic achievement—both simultaneously and individually. The regression model used revealed that both independent variables—cognitive and psychomotor aspects—jointly contribute to variations in students' academic achievement.

In the regression results, the regression coefficient for the cognitive aspect is generally positive, but in this study, its influence is not statistically significant. This means that although an increase in cognitive ability tends to be followed by an increase in academic achievement, the effect is not strong enough to be considered significant. In contrast, the psychomotor aspect shows a positive and significant coefficient, indicating that the better a student's psychomotor skills, the higher their academic achievement.

Hypothesis testing was conducted to verify the preliminary assumptions formulated at the beginning of the research. The discussion of hypothesis testing in this study shows that the cognitive aspect has a positive influence on students' academic achievement. However, the t-test result shows a significance value greater than 0.05 (<0.148), so this hypothesis is rejected (H_0). This means that the cognitive aspect does not have a significant partial influence on students' academic achievement. On the other hand, the psychomotor aspect has a positive influence on students' academic achievement. The t-test result shows a significance value well below 0.05 (>0.001), so this hypothesis is accepted (H_1). In other words, the psychomotor aspect is proven to significantly influence students' academic achievement.

When both cognitive and psychomotor aspects are considered together, they have a significant influence on students' academic achievement. The F-test result shows a significance value below 0.05 (>0.001), so this hypothesis is accepted. Both variables together have a significant influence on students' academic achievement. Thus, the third hypothesis is accepted. Although the cognitive aspect does not have a significant partial influence, when combined with the psychomotor aspect, both provide a meaningful influence on academic achievement. This indicates a synergistic effect between the two aspects in shaping students' overall academic achievement.

The coefficient of determination (R^2) indicates how much of the variation in academic achievement can be explained by the two aspects. For example, if R^2 is 0.614, it means that 61.4% of the variation in students' academic achievement can be explained by cognitive and psychomotor aspects, while the remainder is influenced by other factors outside the research model.

These results also support the views of Nurokhim et al. (2023) and Bloom (in Rahman, 2020) that higher education should not only emphasize knowledge mastery but also skills

that can be applied in real life. Therefore, curriculum development and learning methods that balance cognitive and psychomotor aspects are essential so that students are not only theoretically competent but also skilled and ready to face workplace challenges.

Based on the analysis, the psychomotor aspect has a more dominant influence than the cognitive aspect in determining students' academic achievement. This is consistent with field observations that students with strong practical skills tend to have higher academic achievement, regardless of their level of theoretical mastery. Overall, this study confirms the importance of integrative learning, where lecturers need to balance theory and practice. Students are also expected to actively develop both aspects so that the academic achievement they attain truly reflects comprehensive and job-ready competencies.

CONCLUSION

Based on the results of the research and discussion that has been conducted, the following conclusions can be drawn:

1. Simultaneously, cognitive and psychomotor aspects have a significant effect on the academic achievement of students in the Undergraduate Program in Management, Muhammadiyah University of East Kalimantan. This shows that the combination of thinking skills and practical skills has an important role in determining students' academic success.
2. Partially, only psychomotor aspects have been proven to have a significant effect on students' academic achievement. This means that skills such as presentation skills, application of theory in case studies, and the ability to adapt to change have a greater impact than cognitive abilities alone.
3. This study indicates the importance of developing a curriculum and learning methods that integrate cognitive and psychomotor aspects in a balanced manner. Lecturers and instructors are expected to be able to design learning activities that not only emphasize mastery of theory, but also the development of practical skills that are relevant to the needs of the world of work.

Thus, students are expected to be more proactive in developing their cognitive and psychomotor abilities, so that they can achieve optimal academic achievement and be ready to face challenges in the professional world.

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