The Influence of Campus Physical Facilities and Academic Community Interaction on Learning Motivation and Student Learning Outcomes at the Faculty of Economics and Business, State University of Jakarta

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Abstract. This study examines the influence of campus physical facilities and academic community interaction on student learning outcomes with learning motivation as a mediating variable among 110 students at the Faculty of Economics and Business, State University of Jakarta. Using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0, data were collected through online questionnaires using convenience sampling. Results reveal that campus physical facilities significantly influence both learning motivation ($\beta = 0.382$; $p = 0.001$) and learning outcomes ($\beta = 0.652$; $p < 0.001$). Academic community interaction significantly affects learning motivation ($\beta = 0.318$; $p = 0.001$) but not learning outcomes directly ($\beta = 0.086$; $p = 0.544$). Notably, learning motivation does not mediate the relationship between environmental factors and learning outcomes, challenging conventional motivational theories. The model explains 70.8% of learning motivation variance and 62.4% of learning outcomes variance. These findings suggest that physical infrastructure serves as a foundational prerequisite for academic achievement through direct mechanisms rather than motivational pathways, while social interactions enhance motivation but require additional mechanisms to translate into concrete outcomes. The study provides empirical evidence for prioritizing infrastructure development alongside structured academic community programs in higher education.

Keywords: campus physical facilities, academic community interaction, learning motivation, learning outcomes, higher education

Introduction

Higher education institutions worldwide face increasing pressure to optimize student learning outcomes while addressing the United Nations Sustainable Development Goal 4, which emphasizes ensuring inclusive and equitable quality education. The post-pandemic era has fundamentally transformed educational landscapes, requiring universities to reimagine their physical infrastructure and social interactions to support effective learning environments (Subagio et al., 2021). In Indonesia, Article 31 of the 1945 Constitution guarantees every citizen's right to education, making the quality of higher education facilities and academic interactions crucial for national development.

Recent research has increasingly focused on environmental factors that influence student academic achievement. Campus physical facilities, including classrooms, laboratories, libraries, and technological infrastructure, have been identified as critical determinants of learning effectiveness (Victor & Selvia, 2022). Simultaneously, the quality of interactions within academic communities—encompassing student-faculty relationships, peer collaboration, and engagement with administrative staff—has emerged as a significant predictor of educational success (Sadewa & Prasetya, 2024; Uno et al., 2019).

Learning motivation serves as a crucial psychological mechanism that potentially mediates the relationship between environmental factors and academic outcomes. According to Self-Determination Theory, environmental support can enhance intrinsic motivation, leading to improved learning performance (Deci &

Ryan, 2020). However, existing literature presents mixed findings regarding the mediating role of motivation in the relationship between campus environment and academic achievement (Andini & Septikasari, 2022; Caniago, 2023).

The Faculty of Economics and Business at State University of Jakarta, as one of the largest faculties in the university, provides an ideal context for examining these relationships. Despite substantial investments in campus infrastructure and emphasis on academic community building, comprehensive research examining the interconnected effects of physical facilities and social interactions on student outcomes remains limited. This study addresses this gap by investigating how campus physical facilities and academic community interactions influence student learning outcomes through learning motivation mediation.

The objective of this research is to analyze the direct and indirect effects of campus physical facilities and academic community interactions on learning outcomes among students at the Faculty of Economics and Business, State University of Jakarta, with learning motivation as a mediating variable.

Literature Review

This study integrates three complementary theoretical frameworks to understand how environmental and social factors influence student motivation and learning outcomes in higher education. Maslow's Hierarchy of Needs Theory provides the primary foundation, suggesting that adequate campus facilities fulfill basic physiological and safety needs, while positive academic interactions address social and esteem needs, fostering motivation toward self-actualization through academic achievement (Uno, 2019). Self-Determination Theory (SDT) by Deci and Ryan emphasizes three psychological needs: autonomy, competence, and relatedness, where campus facilities enhance competence while academic interactions fulfill relatedness needs and support academic autonomy (Deci & Ryan, 2020). Social Learning Theory by Bandura (1977) explains how academic environment interactions influence motivation through observation, imitation, and social reinforcement processes. Research findings reveal complex relationships between campus physical facilities, academic community interaction, learning motivation, and learning outcomes. Campus physical facilities encompass all physical resources supporting academic activities, including buildings, classrooms, laboratories, and libraries (Aziz, 2019; Damanik, 2019), with standards regulated by Minister of National Education Regulation No. 49 of 2014 in Indonesia. (Subagio et al., 2021) classify facilities into primary infrastructure (lecture buildings, classrooms, laboratories) and learning facilities (libraries, computer centers, multimedia rooms), while Victor & Selvia (2022) add quality dimensions encompassing safety, comfort, and accessibility.

Academic community interaction involves reciprocal relationships among faculty, students, and educational staff in formal and informal contexts (Sadewa & Prasetya, 2024; Sarwono, 2019), encompassing verbal and non-verbal communication, idea exchange, collaboration, and interpersonal relationships forming academic culture (Uno et al., 2019). Research identifies three main components: student-faculty interaction, peer interaction, and student-staff interaction (Kurniawan, 2023; Sadewa & Prasetya, 2024). Strong empirical support demonstrates positive effects on learning outcomes, with Lee & Park (2020) finding 42% improvement through supportive academic climates, Miller & Jones (2019) showing higher GPAs for actively interacting students (3.2 vs 2.7), and Rahman & Sari (2021) finding strong positive correlation (r=0.68, p<0.01) between communication quality and learning outcomes. Learning motivation, defined as the driving force generating, maintaining, and directing learning activities (Damanik, 2019; Sardiman, 2016), demonstrates strong relationships with learning outcomes through intrinsic motivation (internal drive for skills and knowledge) and extrinsic motivation (external factors like rewards and recognition) (Djamarah, 2015; Masni, 2017). Research shows motivation contributes 56% to learning outcome variance Deci & Ryan (2020), with (Bandura & Locke (2003) showing strong correlation (r=0.78, p<0.001) and Zimmerman & Schunk (2021) finding 1-unit motivation increase produces 0.3-point GPA improvement. Learning outcomes have evolved from simple academic grades to multidimensional constructs encompassing cognitive, affective, and psychomotor domains (Bloom et al., 1956; Sudjana, 2017), with Anderson & Krathwohl (2001) revising Bloom's taxonomy into six hierarchical cognitive levels: Remember, Understand, Apply, Analyze, Evaluate, and Create, emphasizing that higher education outcomes must reflect abilities in application, analysis, synthesis, and critical evaluation (Krathwohl, 2002).
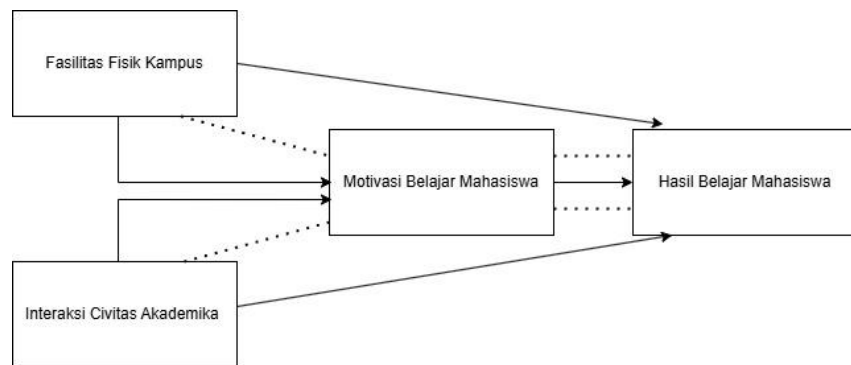
Figure 1 : Conceptual Framework

Methods

This study employed a quantitative research design using a descriptive-correlational approach to examine the relationships between campus physical facilities, academic community interaction, learning motivation, and learning outcomes. The research utilized primary data collected through an online survey method, which was selected for its efficiency, broader reach, and cost-effectiveness in gathering data from geographically dispersed respondents.

The population consisted of all active students enrolled at the Faculty of Economics and Business, State University of Jakarta. This population was chosen because these students directly experience and utilize campus facilities while actively engaging with the academic community in their daily learning processes. A convenience sampling technique was employed due to accessibility considerations and time constraints inherent in academic research. The study utilized a sample of 110 respondents who completed the online questionnaire.

Data collection was conducted using a structured online questionnaire distributed through Google Forms platform. The questionnaire employed a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to measure respondents' perceptions across four main constructs. Campus Physical Facilities were measured through six dimensions: classroom quality, technology facilities, library resources, laboratory facilities, supporting facilities, and general infrastructure. Academic Community Interaction was assessed via six dimensions: student-faculty interaction, peer interaction, interaction with administrative staff, academic participation, digital communication, and academic climate. Learning Motivation was evaluated through six dimensions: intrinsic motivation, extrinsic motivation, persistence, effort, engagement, and goal orientation. Learning outcomes were measured through four dimensions: quantitative academic achievement, cognitive competence, applied competence, and additional academic achievements.

The research instrument underwent validity and reliability testing to ensure measurement quality. Content validity was established through expert review, while construct validity was assessed using factor analysis. Reliability was evaluated using Cronbach's alpha and composite reliability measures. Prior to main data collection, a pilot study was conducted with 30 respondents to test instrument effectiveness and identify potential issues.

Data analysis was performed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0 software. This analytical approach was selected due to its capability to handle complex models with multiple variables simultaneously and its robustness with smaller sample sizes and non-normal data distributions. The analysis consisted of two main phases: outer model evaluation to assess measurement model validity and reliability, and inner model evaluation to examine structural relationships between constructs. Specific statistical tests included convergent validity assessment through factor loadings and Average Variance Extracted (AVE), discriminant validity evaluation using Fornell-Larcker criterion, reliability testing through Cronbach's alpha and composite reliability, multicollinearity assessment via Variance Inflation Factor (VIF), and hypothesis testing through path coefficient analysis with bootstrap resampling for significance testing.

Result and Discussion

The measurement model evaluation demonstrates strong psychometric properties across all constructs. Convergent validity assessment through outer loadings reveals that all indicators exceed the minimum threshold of 0.7, ranging from 0.711 to 0.875. Physical Campus Facilities shows the strongest individual indicator with x1.1 achieving a loading of 0.839, while Academic Community Interaction displays consistent loadings across dimensions (0.723-0.777). Learning Motivation demonstrates the highest single indicator performance with y5 at 0.875, and Learning Outcomes shows balanced contributions across all measured aspects (0.711-0.754).

The reliability analysis confirms excellent internal consistency across all constructs. Cronbach's Alpha values range from 0.701 to 0.794, with Physical Campus Facilities demonstrating the highest reliability (α = 0.794). Composite reliability (rho_c) values exceed 0.8 for all constructs, indicating very good reliability, with Physical Campus Facilities achieving the highest value (0.866). Average Variance Extracted (AVE) values meet the minimum threshold of 0.5, with Learning Motivation showing the strongest convergent validity (0.662), confirming that each construct adequately explains the variance in its respective indicators.

Discriminant validity assessment through the Fornell-Larcker criterion

Table 1: The Fornell-Larcker criterion

	x1.1	x2.1	y1	z1
x1.1	0.787			
x2.1	0.760	0.749		
y1	0.792	0.743	0.814	
z1	0.729	0.752	0.756	0.726

The Fornell-Larcker criterion assessment reveals generally acceptable discriminant validity, though some constructs show strong intercorrelations. While most diagonal values (square root of AVE) exceed their corresponding off-diagonal correlations, the high correlation between Physical Campus Facilities and Learning Motivation (0.792) slightly exceeds the square root of AVE for Physical Campus Facilities (0.787). This suggests these constructs, while distinct, are closely related conceptually, which aligns with theoretical expectations about the relationship between learning environment and motivation.

Multicollinearity assessment through Variance Inflation Factor (VIF) analysis confirms no problematic collinearity issues, with all values well below the conservative threshold of 3.0. The highest VIF value of 1.849 for x1.1 indicates minimal redundancy among indicators, ensuring that each contributes unique information to the model.

Table 2: Variance Inflation Factor

	VIF
x1.1	1.849
x1.2	1.511
x1.4	1.541
x1.5	1.567
x2.1	1.456
x2.2	1.504
x2.4	1.497

x2.5	1.569
y1	1.528
y3	1.374
y5	1.748
z1	1.288
z2	1.362
z3	1.294
z5	1.395

The structural model demonstrates substantial explanatory power for both endogenous variables. Learning Motivation achieves an R^2 of 0.708 (adjusted R^2 = 0.699), indicating that Physical Campus Facilities and Academic Community Interaction collectively explain 70.8% of the variance in students' learning motivation. This substantial explanatory power suggests that environmental and social factors are primary drivers of student motivation in higher education contexts.

Learning Outcomes achieves an R^2 of 0.624 (adjusted R^2 = 0.617), meaning 62.4% of variance in learning outcomes is explained by the model's predictor variables. This moderate-to-substantial explanatory power indicates that while the model captures significant factors influencing academic performance, additional variables beyond the scope of this study may contribute to learning outcomes variability.

Path coefficient analysis reveals distinct patterns of influence among study variables. Physical Campus Facilities emerges as the most influential predictor, showing strong significant effects on both Learning Outcomes (β = 0.652, t = 4.608, p < 0.001) and Learning Motivation (β = 0.382, t = 3.389, p = 0.001). This finding underscores the critical role of adequate physical infrastructure in supporting both student motivation and academic achievement, consistent with environmental psychology theories that emphasize the impact of physical environment on cognitive and motivational processes.

Table 3: Path coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
x1.1 -> y1	0.382	0.376	0.113	3.389	0.001
x1.1 -> z1	0.652	0.623	0.141	4.608	0.000
x2.1 -> y1	0.318	0.321	0.097	3.269	0.001
x2.1 -> z1	0.086	0.112	0.142	0.606	0.544
z1 -> y1	0.193	0.189	0.094	2.051	0.040

Academic Community Interaction demonstrates a significant positive effect on Learning Motivation (β = 0.318, t = 3.269, p = 0.001), confirming that positive social interactions within the academic community enhance students' drive to learn. However, the direct effect of Academic Community Interaction on Learning Outcomes proves non-significant (β = 0.086, t = 0.606, p = 0.544), suggesting that social interactions may influence academic performance through indirect pathways rather than direct mechanisms.

Learning Motivation shows a significant but modest direct effect on Learning Outcomes (β = 0.193, t = 2.051, p = 0.040), indicating that while motivated students tend to achieve better academic results, the

relationship strength is moderate, possibly due to other mediating factors not captured in this model.

Effect size analysis through f-square provides insights into the practical significance of observed relationships. Physical Campus Facilities demonstrates medium effect sizes for both Learning Motivation (f^2 = 0.227) and Learning Outcomes (f^2 = 0.155), confirming its substantial practical importance. Academic Community Interaction shows a medium effect size for Learning Outcomes (f^2 = 0.248) but only a small effect for Learning Motivation (f^2 = 0.044), suggesting differential impacts across outcome variables.

Mediation analysis through indirect effects reveals that Learning Motivation does not serve as a significant mediator in this model. The indirect effect of Physical Campus Facilities on Learning Outcomes through Learning Motivation approaches but does not reach significance (β = 0.126, t = 1.860, p = 0.063), while the indirect effect of Academic Community Interaction through Learning Motivation is clearly non-significant (β = 0.017, t = 0.553, p = 0.580).

These findings suggest that the influence of environmental and social factors on learning outcomes operates primarily through direct mechanisms rather than through motivational mediation. This challenges traditional assumptions about motivation as a primary mediating pathway and suggests more complex relationships between environmental factors and academic outcomes.

Table 4: Specific Indirect Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
x1.1 -> z1 -> y1	0.126	0.119	0.068	1.860	0.063
x2.1 -> z1 -> y1	0.017	0.021	0.030	0.553	0.580

The study's most striking finding is the dominant role of physical campus facilities in predicting both student motivation and learning outcomes. This aligns with extensive research in environmental psychology demonstrating that physical environments significantly influence cognitive performance, emotional well-being, and behavioral outcomes. In the higher education context, adequate facilities appear to serve multiple functions: they signal institutional quality and commitment to student success, provide necessary tools and resources for effective learning, and create psychological comfort that enables focus and engagement.

The direct effect of physical facilities on learning outcomes, independent of motivational pathways, suggests that environmental quality may influence academic performance through multiple channels including reducing cognitive load, minimizing distractions, enabling effective study behaviors, and supporting diverse learning modalities.

Interestingly, the finding that academic community interaction significantly influences motivation but not learning outcomes directly presents an intriguing paradox. This pattern suggests that while positive social interactions enhance students' desire and enthusiasm for learning, translating this motivation into concrete academic achievements may require additional supportive mechanisms.

This finding may reflect the complexity of academic performance, which depends not only on motivation but also on factors such as prior knowledge, study skills, time management, and assessment methods. Social interactions may create positive emotional states and general engagement with academic life without necessarily providing the specific skills or knowledge required for academic success.

Notably, the absence of significant mediation effects challenges common assumptions about motivation as a primary pathway through which environmental and social factors influence learning outcomes. This finding suggests that motivation, while important, may not be the primary mechanism through which campus facilities and social interactions affect academic performance.

Alternative explanations might include direct cognitive benefits of better facilities (e.g., improved concentration in comfortable environments), skill development through social interactions that doesn't necessarily increase motivation, or the influence of unmeasured variables that confound the motivation-outcome relationship.

These findings contribute to several theoretical frameworks and have important practical implications

for higher education institutions. From an environmental psychology perspective, the results support theories emphasizing direct environmental influences on cognitive performance beyond motivational pathways. The social cognitive theory perspective is partially supported through the demonstrated importance of social interactions for motivation, though the limited translation to outcomes suggests additional complexity in self-regulatory processes.

The results also inform educational effectiveness theories by highlighting that environmental quality may be a more fundamental prerequisite for learning success than previously recognized, potentially operating at a more basic level than motivational processes.

From a practical standpoint, for higher education institutions, these findings suggest that investment in physical infrastructure should be a high priority, as facilities appear to influence both student motivation and academic outcomes directly. The study recommends focusing on classroom comfort, technology adequacy, library resources, and general campus infrastructure as primary strategies for improving student success.

Regarding social interactions, institutions should recognize that while positive academic community relationships enhance motivation, additional mechanisms are needed to translate this motivation into academic achievement. This might include structured peer learning programs, mentoring systems that provide both social support and academic guidance, and collaborative learning opportunities that directly contribute to skill development.

While these results provide valuable insights, several limitations should be considered when interpreting the findings. The convenience sampling method may limit generalizability, and the cross-sectional design prevents causal inferences. The focus on a single faculty within one university may not represent broader higher education contexts.

Future research should explore longitudinal relationships to establish causality, investigate additional mediating variables beyond motivation, examine the specific mechanisms through which physical facilities influence learning outcomes, and test the model across diverse institutional and cultural contexts. Additionally, qualitative research could provide deeper insights into student experiences with campus facilities and social interactions, potentially revealing unmeasured pathways influencing academic success.

Conclusion

This study examined the relationships between campus physical facilities, academic community interaction, learning motivation, and student learning outcomes among 110 students at the Faculty of Economics and Business, State University of Jakarta, using PLS-SEM analysis. The findings reveal that campus physical facilities serve as the most critical factor for academic success, demonstrating the strongest direct effect on learning outcomes ($\beta = 0.652$, $p < 0.001$), while academic community interaction significantly enhances learning motivation ($\beta = 0.318$, $p = 0.001$) but lacks direct impact on outcomes ($\beta = 0.086$, $p = 0.544$). Learning motivation shows moderate influence on academic performance ($\beta = 0.193$, $p = 0.040$) but does not mediate between environmental factors and outcomes, challenging conventional motivational theories. The model explains 70.8% of learning motivation variance and 62.4% of learning outcomes variance, indicating that physical infrastructure operates as a foundational prerequisite for academic achievement through direct cognitive and environmental mechanisms rather than purely motivational pathways.

These findings contribute theoretically by providing empirical support for environmental psychology theories, demonstrating that physical learning environments influence academic performance beyond motivational mediation, and revealing the complexity of social influence processes in academic settings where interactions enhance motivation but require additional mechanisms to translate into concrete outcomes. Practically, the results suggest that higher education institutions should prioritize infrastructure development as a primary strategy for improving student success, focusing on classroom modernization, technology integration, library resources, and laboratory facilities, while simultaneously implementing structured peer learning programs and comprehensive mentoring systems that combine social support with academic guidance to bridge the motivation-outcome gap.

Several limitations warrant consideration, including the cross-sectional design that prevents causal inferences, convenience sampling that may limit generalizability, reliance on self-report measures introducing potential bias, and focus on a single faculty within one Indonesian university. Future research should employ longitudinal designs to establish causality, multi-institutional studies to test generalizability, mixed-methods

approaches to understand underlying mechanisms, and cross-cultural investigations to examine contextual moderators. For the Faculty of Economics and Business at State University of Jakarta, these results recommend continued investment in physical infrastructure combined with thoughtful academic community building, contributing to growing recognition that learning environments are active contributors to educational outcomes deserving strategic attention and investment in higher education policy and practice.

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