Vol. 10, No. 3, 2024, pp. 163-174
DOI: https://doi.org/10.29210/020244097

Contents lists available at Journal IICET

JPPI (Jurnal Penelitian Pendidikan Indonesia)
ISSN: 2502-8103 (Print) ISSN: 2477-8524 (Electronic)

Journal homepage: https://jurnal.iicet.org/index.php/jppi

Educational management strategies: linking infrastructure, student activities, and academic performance

Paul Arjanto*), Rivaldo Paul Telussa
[1]Universitas Pattimura, Indonesia
[2]Universitas Satya Wiyata Mandala, Indonesia

Article Info

Article history:

Received Jun 01st, 2024
Revised Jul 09th, 2024
Accepted Aug 01st, 2024

Keyword:

Educational facilities,
School participation,
Student activities,
Educational outcomes,
Structural equation modeling

ABSTRACT

This research examines how educational facilities impact school participation, student activities, and educational outcomes in Indonesia, highlighting the urgent need for improved infrastructure. Using 2023 data from the Central Statistics Agency, this study analyzes various indicators such as the number of schools, classroom conditions, sanitation, teacher numbers, and educational outcomes across different regions. Structural Equation Modeling (SEM) is employed to test the relationships among these variables. The findings show that while educational facilities are reliable and valid, enhancing them alone does not guarantee better educational outcomes or increased school enrollment. Other factors like teaching quality and socioeconomic support are crucial. Improved facilities do, however, boost student engagement in extracurricular activities, which is essential for skill development and motivation. The study reveals a positive correlation between school participation and educational outcomes, emphasizing the need for strategies to improve attendance and engagement. It highlights the importance of a holistic educational approach that integrates both academic and extracurricular activities. Policymakers and educators should adopt comprehensive strategies, including improving facilities, teaching quality, and providing socioeconomic support, to maximize educational outcomes and ensure long-term success.

Corresponding Author:

Paul Arjanto,
Universitas Pattimura
Email: paul.arjanto@fkip.unpatti.ac.id

Introduction

Improving the quality of education is one of the top priorities in national development in Indonesia. The urgency of this study lies in addressing the critical need for enhancing educational outcomes in Indonesia through the improvement of educational facilities and infrastructure. The context of this research is set within Indonesian educational settings, where inadequate facilities remain a significant barrier to achieving high-quality education, particularly in remote and underprivileged areas. Recent studies have underscored the direct correlation between the quality of educational infrastructure and student performance, engagement, and retention rates. For instance, research highlights that well-maintained facilities contribute to better academic outcomes and overall student well-being (Barrett et al., 2019; Oluyemi Toyinbo, 2017). Furthermore, conducive learning environments positively impact both student and teacher performance (Jaya et al., 2023; Villarreal Arroyo et al., 2023). Addressing these challenges is essential for leveraging education as a cornerstone for national development.

Education is a crucial foundation for the development of a country. Through education, individuals acquire the knowledge, skills, and values necessary to contribute productively to society (Darling-Hammond et al., 2020; Gillies, 2015; Laurie et al., 2016). In Indonesia, education plays a central role in improving the quality of life and driving economic growth. However, achieving these goals requires supportive conditions, including adequate educational facilities and infrastructure. Educational facilities encompass physical structures such as classrooms, laboratories, libraries, and other supporting infrastructure like sanitation and access to information technology (Barrett et al., 2019; Murillo & Román, 2011; Ozcan, 2021). The quality of school facilities is also linked to higher teacher retention rates in urban school districts.

Educational facilities play a crucial role in creating a conducive learning environment. Research shows that the quality of school facilities is directly related to students' academic performance. A good indoor environment can enhance overall productivity and health, which ultimately has a positive impact on students' learning outcomes (Oluyemi Toyinbo, 2017; Villarreal Arroyo et al., 2023; Yangambi, 2023). Additionally, good school facilities are associated with improved academic achievement among students (Mkwama, 2023; Tiara Octavia et al., 2020). Adequate and uncrowded classrooms also contribute to increased student engagement. Acoustic, thermal, and lighting comfort in classrooms significantly impact academic performance (Jaya et al., 2023; Krüger & Zannin, 2004). The quality of school facilities is also linked to higher teacher retention rates in urban school districts.

School participation is a vital indicator of the success of the educational system. Adequate facilities can enhance student participation in schools. The quality of physical school facilities can affect student attendance, with poor facilities often leading to higher absenteeism (Maxwell, 2016; Simons et al., 2010). Furthermore, a healthy and safe school environment boosts student participation (Pulimeno et al., 2020). In Indonesia, data from the 2023 Education Statistics indicate that school participation remains a challenge, especially in remote areas. Efforts to improve the availability and quality of educational facilities in these areas are expected to increase school participation rates.

Extracurricular activities are essential in supporting the holistic development of students. Access to information and communication technology (ICT) is one aspect that supports students' learning activities outside the classroom. A school environment that supports the use of technology can improve students' learning outcomes (Fikriyah et al., 2022; Rufaidah et al., 2021). Additionally, classrooms that can be reconfigured for various teaching and learning methods support greater student engagement in interactive learning activities (Fukuzawa & Boyd, 2016; Gualano & Campbell, 2024; Jia et al., 2023). Extracurricular activities, such as student clubs and organizations, also play a critical role in developing students' character and social skills. School designs that support extracurricular activities contribute to students' personal and academic development.

Educational outcomes include various indicators such as retention rates, continuation rates, repetition rates, and dropout rates. The condition of educational facilities significantly impacts these indicators. For example, good classroom lighting is associated with better physical development and academic performance (Mogas-Recalde & Palau, 2021; Norazman et al., 2018). Additionally, good classroom ventilation positively correlates with students' academic achievement (Haverinen-Shaughnessy et al., 2011; Haverinen-Shaughnessy & Shaughnessy, 2015). In Indonesia, challenges in achieving optimal educational outcomes persist, particularly in areas with inadequate facilities. Data from the 2023 Education Statistics show that dropout rates remain high in some provinces, often linked to inadequate school facilities.

To understand the complex relationships between educational facilities, school participation, student activities, and educational outcomes, SEM is used. SEM allows for the analysis of direct and indirect relationships between various variables, providing a more comprehensive picture of the factors influencing educational outcomes. This approach can be applied in the context of education in Indonesia to identify the pathways of influence between school facility conditions, school participation, student activities, and educational outcomes. Previous research has used path analysis to identify factors influencing various aspects within educational and social contexts (Englund et al., 2018; Jama et al., 2009; Wang & Hofkens, 2020). Despite the extensive research on the impact of educational facilities on student outcomes, there is a notable gap in the literature concerning the specific mechanisms through which these facilities influence educational outcomes in the Indonesian context.

This study aims to address this gap by using Structural Equation Modeling (SEM) to explore the direct and indirect relationships between educational facilities, school participation, student activities, and educational outcomes in Indonesia. The novelty of this research lies in its comprehensive approach to analyzing these variables simultaneously, providing a holistic understanding of how improvements in educational infrastructure can lead to enhanced educational performance and participation. By focusing on the unique challenges and

conditions of Indonesian schools, this study offers valuable insights and actionable recommendations for policymakers to improve the quality of education nationwide.

Method

This study employs a quantitative research design using SEM to analyze the relationships between educational facilities, school participation, student activities, and educational outcomes in Indonesia. SEM allows for the examination of both direct and indirect effects among multiple variables, providing a comprehensive understanding of the complex interactions within the educational context (Hoyle, 2023; Kline, 2023). The data for this study is drawn from the 2023 Education Statistics published by the Central Bureau of Statistics (Badan Pusat Statistik). This dataset includes detailed information on the number of schools, classroom conditions, sanitation facilities, teacher numbers, and various indicators of school participation and educational outcomes across different regions of Indonesia, accessible via the link https://www.bps.go.id/id/statistics-table?subject=521. The study focuses on 4 variables. The SEM for this study was designed to analyze the relationships between: 1) educational facilities (EF): number of schools (EF1), classroom conditions (EF2), sanitation facilities (EF3), number of teachers (EF4); 2) school participation (SP): school participation rates (SP1), gross enrollment rates (SP2), net enrollment rates (SP3), number of out-of-school children (SP4); 3) student activities (SA): access to information and communication technology (SA1), participation in extracurricular activities (SA2); 4) educational outcomes (EO): retention rates (EO1), continuation rates (EO2), repetition rates (EO3), dropout rates (EO4) in Indonesia. The specified model included the following latent variables and their respective indicators.

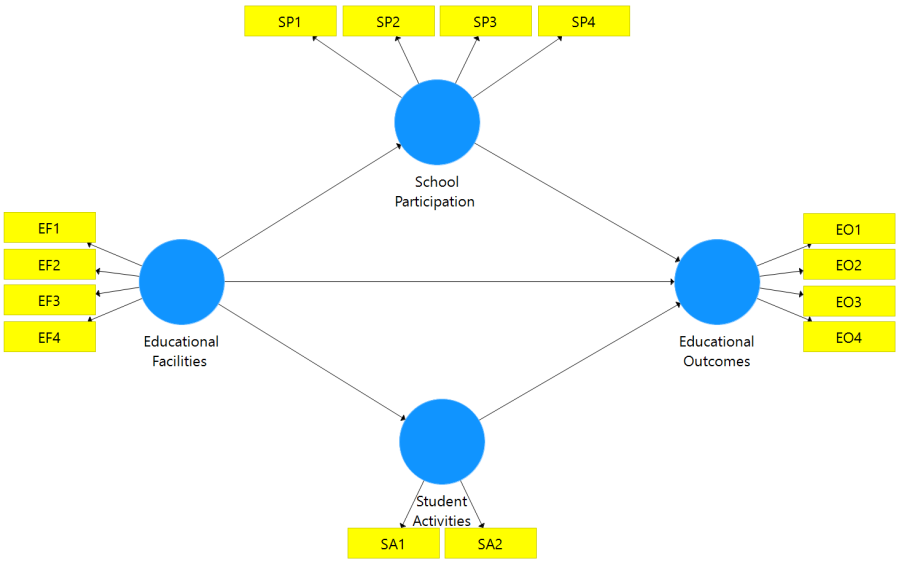

Figure 1. Structural Equation Model for Educational Facilities, School Participation, Student Activities, and Educational Outcomes

The data analysis for this study involves several critical steps to comprehensively understand the relationships between educational facilities, school participation, student activities, and educational outcomes. First, the measurement model evaluation assesses the reliability and validity of the constructs used in the study. Reliability is tested using Cronbach's Alpha and Composite Reliability, indicating the consistency of the measurements, while validity is assessed through the Average Variance Extracted (AVE) and rho_A, determining the extent to which the constructs capture the variance of their indicators. High reliability and validity metrics confirm that the constructs are measured reliably and validly. Second, the overall fit of the Structural Equation Model (SEM) is evaluated using several fit indices, including the Standardized Root Mean Square Residual (SRMR), Squared Euclidean Distance (d_ULS), Geodesic Distance (d_G), Chi-Square, and Normed Fit Index (NFI). These indices help determine how well the proposed model represents the observed data, with a good model fit indicating that the hypothesized relationships between the constructs are consistent with the empirical data. Third, path coefficients are analyzed to understand the direct relationships between educational facilities, school participation, student activities, and educational outcomes.

These coefficients indicate the strength and direction of the relationships, with positive coefficients suggesting a direct positive relationship and negative coefficients indicating a negative relationship. This step provides insight into the direct effects of educational facilities on the other variables. Fourth, the indirect effects of

educational facilities on educational outcomes are examined through intermediary variables such as school participation and student activities. Indirect effects are calculated to understand how educational facilities influence outcomes not just directly but also through their impact on other variables, helping to identify the pathways through which educational facilities can affect educational outcomes. Finally, the total effects combine both direct and indirect effects to provide a holistic view of the impact of educational facilities on educational outcomes. By summing the direct and indirect effects, the total effects reveal the overall influence of educational facilities on the dependent variables. This comprehensive analysis helps to understand the broader implications of improving educational facilities on school participation, student activities, and ultimately, educational outcomes. These steps ensure a thorough examination of the data, providing a detailed understanding of the complex interactions within the educational context and guiding effective educational management strategies.

Results and Discussions

Measurement Model Evaluation

We conducted reliability and validity tests for four latent constructs: Educational Facilities, Educational Outcomes, School Participation, and Student Activities using Cronbach's Alpha, rho_A, Composite Reliability, and Average Variance Extracted (AVE).

Table 1. Reliability and Validity Metrics for Latent Constructs

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Educational Facilities	0.974	0.975	0.982	0.930
Educational Outcomes	0.730	0.929	0.831	0.636
School Participation	0.554	0.802	0.750	0.542
Student Activities	0.953	0.953	0.977	0.955

For Educational Facilities, the reliability and validity metrics indicate a very high level of internal consistency and convergent validity. The Cronbach's Alpha value of 0.974 is well above the commonly accepted threshold of 0.70, suggesting that the indicators for this construct are highly reliable (Nunnally & Bernstein, 1994). The rho_A value of 0.975 confirms the high reliability of the construct, as values above 0.70 are considered acceptable (Dijkstra & Henseler, 2015). The Composite Reliability value of 0.982 indicates excellent reliability, suggesting that the construct consistently measures what it is intended to measure (Hair et al., 2019). An AVE of 0.930 is significantly above the threshold of 0.50, indicating that the construct has a high level of convergent validity, meaning that a large portion of the variance is captured by the indicators rather than error (Fornell & Larcker, 1981). The metrics for Educational Outcomes show acceptable levels of reliability and validity. The Cronbach's Alpha value of 0.730 meets the minimum threshold of 0.70, indicating acceptable reliability (Nunnally & Bernstein, 1994). The rho_A value of 0.929 is high, further supporting the reliability of the construct (Dijkstra & Henseler, 2015).

With a Composite Reliability value of 0.831, the construct shows good reliability, meaning it is a consistent measure (Hair et al., 2019). The AVE of 0.636 exceeds the recommended threshold of 0.50, demonstrating good convergent validity (Fornell & Larcker, 1981). The metrics for School Participation indicate some concerns with reliability but acceptable validity. The Cronbach's Alpha value of 0.554 is below the commonly accepted threshold of 0.70, suggesting potential issues with internal consistency (Nunnally & Bernstein, 1994). This might indicate that the indicators for this construct are not highly correlated. However, the rho_A value of 0.802 is acceptable and suggests that the construct is reliable despite the low Cronbach's Alpha (Dijkstra & Henseler, 2015). A Composite Reliability value of 0.750 indicates acceptable reliability, suggesting that the construct is consistently measured (Hair et al., 2019). An AVE of 0.542 is above the threshold of 0.50, indicating that the construct has adequate convergent validity (Fornell & Larcker, 1981). The metrics for Student Activities indicate excellent reliability and validity. The Cronbach's Alpha value of 0.953 is very high, indicating excellent internal consistency (Nunnally & Bernstein, 1994). With a rho_A value of 0.953, this confirms the high reliability of the construct (Dijkstra & Henseler, 2015). The Composite Reliability value of 0.977 suggests outstanding reliability, meaning the construct is measured consistently (Hair et al., 2019). An AVE of 0.955 is significantly above the threshold of 0.50, indicating that the construct has very high convergent validity (Fornell & Larcker, 1981).

Model Evaluation

We identified model fit indices for Structural Equation Model (SEM) analysis, including Saturated and Estimated models.

Table 2. Model Fit Summary

Index	Saturated Model	Estimated Model	Interpretation
SRMR	0.073	0.073	Good Fit
d_ULS	3.131	3.132	Good Fit
d_G	3.939	4.130	Good Fit
Chi-Square	3.651	2.716	Good Fit
NFI	0.851	0.855	Marginal Fit
rms Theta	0.278	0.278	Marginal Fit

The table provides a comprehensive overview of the model fit indices for the Structural Equation Model (SEM) analysis, comparing both the Saturated and Estimated models. These indices are essential for evaluating how well the proposed model represents the observed data. Below is a detailed interpretation of each fit index, highlighting the implications for the model's validity and reliability. For the Standardized Root Mean Square Residual (SRMR), both the Saturated and Estimated models have an SRMR of 0.073. SRMR measures the average discrepancy between observed and predicted correlations. Values below 0.08 are generally indicative of a good fit (Hu & Bentler, 1999). An SRMR of 0.073 suggests that the model's predictions closely match the observed data, indicating a good fit for both the Saturated and Estimated models. This high level of fit implies that the model is well-specified and that the residuals are minimal. The Squared Euclidean Distance (d_ULS) values are 3.131 for the Saturated Model and 3.132 for the Estimated Model. d_ULS assesses the discrepancy between the observed and model-implied correlation matrices. Lower values indicate a better fit, typically with values below 5 considered acceptable.

The low values for both models suggest that the estimated correlations are close to the observed correlations, signifying a good fit. The minimal difference between the Saturated and Estimated models further indicates that the model specification is robust and that it effectively captures the underlying data structure. For the Geodesic Distance (d_G), the values are 3.939 for the Saturated Model and 4.130 for the Estimated Model. Similar to d_ULS, d_G measures the fit of the model. Values within an acceptable range (typically below 5) indicate a good fit. The values for both models, while slightly higher than d_ULS, still fall within the acceptable range, indicating that the model captures the data's underlying structure well. The slight increase in the Estimated Model's value may suggest minor deviations but still supports a good fit overall. The Chi-Square values are 3.651 for the Saturated Model and 2.716 for the Estimated Model. The Chi-Square statistic tests the null hypothesis that the model fits the data perfectly. Lower values indicate a better fit. The Chi-Square value for the Estimated Model (2.716) is lower than that for the Saturated Model (3.651), suggesting an improved fit.

This improvement implies that the model adjustments made in the Estimated Model better capture the nuances of the data, reducing discrepancies between observed and expected values. For the Normed Fit Index (NFI), the values are 0.851 for the Saturated Model and 0.855 for the Estimated Model. NFI values range from 0 to 1, with values closer to 1 indicating a better fit (Bentler & Bonett, 1980). Values above 0.90 are typically considered indicative of a good fit. The NFI values for both models are in the marginal fit range, suggesting that while the model is reasonably good, there is room for improvement. This marginal fit indicates that the model explains a substantial portion of the variance but may still miss some aspects of the data's complexity. The Root Mean Square Theta (rms Theta) value is 0.278 for both models. rms Theta measures the degree of misspecification in reflective measurement models. Values closer to 0 indicate better model specification, with values below 0.20 considered good and those below 0.30 considered marginal (Henseler et al., 2015). An rms Theta of 0.278 indicates a marginal fit, suggesting that while the model captures much of the data's structure, there are areas where it could be improved. This level of misspecification implies that some relationships within the model may need refinement.

Path Coefficients

Path coefficients for the relationship between educational facilities, educational outcomes, school participation, and student activities. These coefficients reflect the strength and direction of these relationships, providing insight into dynamics in educational contexts.

Table 3. Path Coefficients for Relationships between Educational Facilities, Outcomes, Participation, and Activities

Path Coefficients	Educational Outcomes	School Participation	Student Activities
Educational Facilities	-0.322	-0.219	0.960
School Participation	0.900		
Student Activities	0.493		

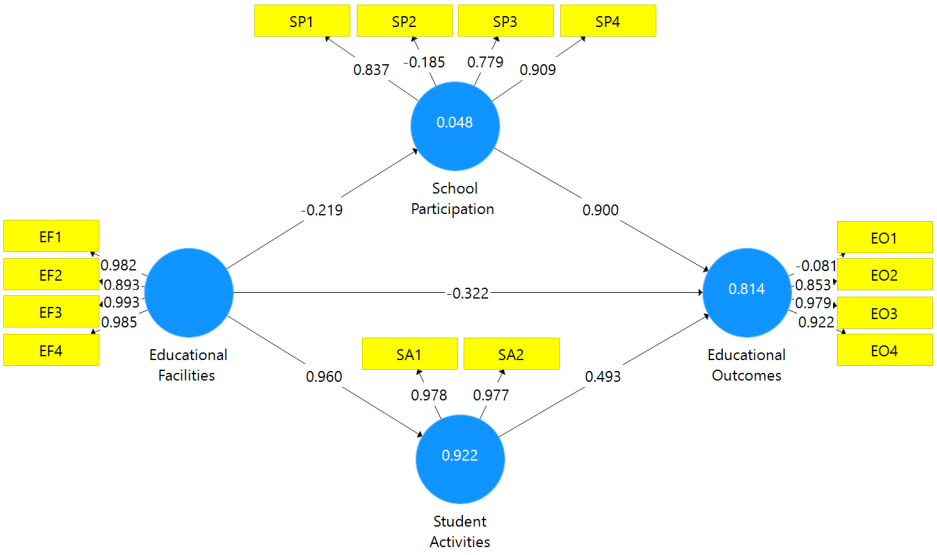

Figure 2. Results of the Structural Equation Model for Educational Facilities, School Participation, Student Activities, and Educational Outcomes

The negative path coefficient of -0.322 between educational facilities and educational outcomes indicates that an increase in educational facilities is associated with a decrease in educational outcomes. This counterintuitive result could be influenced by various underlying factors. For instance, it might suggest that simply providing better facilities does not automatically translate into improved educational performance. Other factors, such as the quality of instruction, student demographics, and socioeconomic conditions, could be more influential in determining educational outcomes. Studies have shown that while physical infrastructure is important, it must be complemented with effective teaching practices and supportive learning environments to have a positive impact on student performance (Arjanto, 2022; Hanushek & Woessmann, 2012). Similarly, the negative path coefficient of -0.219 between educational facilities and school participation indicates that better educational facilities are correlated with lower school participation rates.

This finding could reflect issues such as inadequate utilization of the facilities or external socioeconomic barriers that prevent students from attending school despite the availability of good facilities. For example, in some contexts, improved school facilities might attract students from higher socioeconomic backgrounds, inadvertently marginalizing lower-income students who face other barriers to attendance (Arjanto et al., 2023; Glewwe & Kremer, 2006). In contrast, the strong positive path coefficient of 0.960 between educational facilities and student activities suggests that improved educational facilities significantly boost student participation in extracurricular activities. Enhanced facilities likely provide better infrastructure and resources for various student activities, such as sports, arts, and clubs, which in turn encourage greater student engagement. This aligns with research indicating that well-equipped facilities enhance the overall school experience and foster a conducive environment for student participation in a broad range of activities (Flutter, 2006).

The positive path coefficient of 0.900 between school participation and educational outcomes indicates a strong positive relationship. Higher rates of school participation are closely linked to improved educational outcomes, suggesting that when students regularly attend and engage in school, their academic performance tends to improve. This supports the idea that consistent school attendance and participation are critical for academic success, as they provide students with continuous learning opportunities and reduce the risk of falling behind academically (Ancheta et al., 2021; Sekiwu, 2020). Similarly, the positive path coefficient of 0.493 between student activities and educational outcomes indicates that increased involvement in student activities positively affects educational outcomes. Participation in extracurricular activities helps develop a range of skills, including teamwork, leadership, and time management, which are beneficial for academic success. Moreover, such activities can enhance students' engagement and motivation, contributing to better academic performance. This finding is consistent with research that highlights the positive impact of holistic educational experiences on student outcomes (Barrett et al., 2013; Nedungadi et al., 2024).

Indirect Effects

The total indirect impact provides an overall measure of how educational facilities influence educational outcomes through intermediary variables. Specific indirect impacts detail each pathway, illustrating how educational facilities impact educational outcomes through school participation and student activities.

Table 4. Total Indirect Effects of Educational Facilities

Total Indirect Effects	Educational Outcomes
Educational Facilities	0.276

The total indirect effect of educational facilities on educational outcomes is 0.276. This positive value indicates that when considering the pathways through intermediate variables such as school participation and student activities, the overall effect of educational facilities on educational outcomes is positive. This implies that while the direct effect of educational facilities on outcomes might be negative, the indirect pathways contribute positively to the outcomes. This highlights the importance of considering the entire system of relationships within the educational environment to understand the true impact of educational facilities.

Table 5. Specific Indirect Effects of Educational Facilities

Specific Indirect Effects	Specific Indirect Effects
Educational Facilities -> School Participation -> Educational Outcomes	-0.197
Educational Facilities -> Student Activities -> Educational Outcomes	0.473

The specific indirect effect of -0.197 through the pathway of school participation indicates a negative relationship. This suggests that, despite having better educational facilities, there might be factors within the school participation process that negatively impact educational outcomes. For instance, if improved facilities are not coupled with efforts to enhance student engagement and reduce absenteeism, the benefits of the facilities might not be realized. This underscores the need for comprehensive strategies that not only improve physical infrastructure but also address engagement and participation issues (Barrett et al., 2019; Flutter, 2006; Glewwe & Kremer, 2006). In contrast, the specific indirect effect of 0.473 through the pathway of student activities indicates a strong positive relationship. This suggests that better educational facilities significantly enhance student activities, which in turn positively influence educational outcomes. This finding aligns with the idea that a supportive physical environment encourages student participation in extracurricular activities, which helps develop various skills and improves academic performance (Anjum, 2021; Buckley & Lee, 2021; Hunt, 2005). This pathway highlights the importance of creating an environment that fosters student engagement beyond the classroom, contributing to better overall educational outcomes.

Total Effects

These total effects encapsulate both direct and indirect influences, providing a holistic view of the relationships between these variables.

Table 6. Total Effects of Educational Facilities on Outcomes, Participation, and Activities

Total Effects	Educational Outcomes	School Participation	Student Activities
Educational Facilities	-0.046	-0.219	0.960
School Participation	0.900		
Student Activities	0.493		

The total effect of -0.046 indicates a slight negative relationship between educational facilities and educational outcomes. This suggests that, overall, better educational facilities do not significantly improve educational outcomes and may even have a small negative impact. This counterintuitive result highlights the complexity of the educational environment, where the presence of improved facilities alone is insufficient to guarantee better educational performance. Factors such as the quality of teaching, student engagement, and socioeconomic conditions likely play a more pivotal role in influencing educational outcomes (An et al., 2007; Javornik & Klemenčič Mirazchiyski, 2023; Li & Xue, 2023; Mazenod et al., 2019). The negative total effect of -0.219 suggests that better educational facilities are associated with lower school participation rates. This could be due to a variety of reasons, including the possibility that improved facilities are not effectively utilized or that there are external barriers such as socioeconomic challenges that prevent students from attending school regularly. This finding emphasizes the need for policies that address broader social issues and ensure that improved facilities are accessible and beneficial to all students, particularly those from disadvantaged backgrounds (Barrett et al., 2019).

The strong positive total effect of 0.960 indicates that better educational facilities significantly enhance student participation in extracurricular activities. This suggests that improved facilities provide the necessary infrastructure and resources to support a wide range of student activities, thereby encouraging greater student engagement. This finding is consistent with the idea that a well-equipped physical environment is crucial for fostering an active and vibrant student life, which can contribute positively to students' overall development and well-being (Baafi, 2020; Hawkins et al., 2023; Maxwell, 2018; Zhang et al., 2023). The total effect of 0.900

demonstrates a strong positive relationship between school participation and educational outcomes. This indicates that higher rates of school participation are closely linked to improved educational outcomes. When students attend school regularly and participate actively, they are more likely to achieve better academic performance.

This finding supports the importance of policies and interventions aimed at increasing school attendance and reducing absenteeism to enhance educational outcomes (Ancheta et al., 2021; Appiah, 2024). The total effect of 0.493 indicates a positive relationship between student activities and educational outcomes. This suggests that increased involvement in extracurricular activities positively influences academic performance. Participation in such activities helps develop essential skills, enhances student engagement, and fosters a sense of belonging, all of which contribute to better educational outcomes. This aligns with research that highlights the benefits of a holistic educational approach that includes both academic and extracurricular dimensions (Anjum, 2021; Hunt, 2005; Rahayu & Dong, 2023).

Implications in Educational Management Strategies

Educational management strategies play a crucial role in enhancing the overall effectiveness of educational institutions. These strategies encompass various aspects such as curriculum management, student management, educator and staff management, facilities and infrastructure management, financial management, special services management, school-community relations, and information system management. Research highlights the significance of integrating extracurricular activities into the formal curriculum to foster student engagement and motivation. Additionally, equitable admission programs and active participation in school activities are essential for improving educational outcomes. Continuous professional development for educators, along with the optimal utilization of facilities, ensures high-quality education. Effective financial management, encompassing transparency and accountability, further supports the enhancement of school activities. Special services such as counseling and psychological support address students' personal and social issues, thereby boosting participation. Strong collaboration between schools and the community fosters external support, and robust information systems enable data-driven decision-making, ensuring the continuous improvement of educational programs.

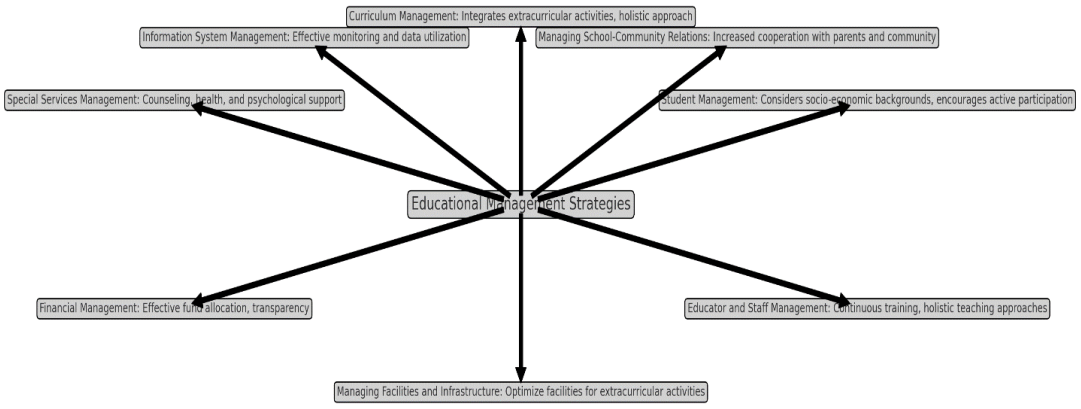

Figure 3. Key Areas of Educational Management Strategies and Their Implications

This analysis reveals important implications across several key areas of education management, including: 1) Curriculum management, research findings indicate the importance of integrating extracurricular activities that have been proven to enhance educational outcomes into the formal curriculum. Curriculum adjustments should be made based on the needs of the students to ensure relevance and sustainability. A holistic approach that focuses not only on academic achievement but also on skill development through additional activities should be adopted. The implication of this strategy is increased student engagement and motivation, which can be translated into a more dynamic and inclusive curriculum. 2) Student management should strengthen admission programs that consider socio-economic backgrounds to reduce inequities in school participation. Programs that encourage active participation in school and extracurricular activities should be implemented. The implication of this strategy is increased attendance and involvement of students, which contributes to better educational outcomes. 3) Educator and staff management, continuous training for educators to manage and effectively utilize educational facilities is necessary. Professional development that supports holistic teaching approaches should also be encouraged. The implication of this strategy is the improvement of educational quality and student participation through the competency of educators in using facilities and managing extracurricular activities. 4) Managing facilities and infrastructure, it is important to ensure that educational facilities are not

only adequate but also optimized for extracurricular activities. Evaluation and improvement of facility utilization should be conducted to support school participation and student activities maximally. The implication of this strategy is increased student participation in activities that support educational outcomes, although facilities alone are not enough to improve academic results without support from other programs. 5) Financial management should allocate funds effectively to support extracurricular activities that have been proven to enhance educational outcomes. Transparency and accountability in the management of educational budgets must be ensured. The implication of this strategy is the improvement of school activities' quality and student participation, positively impacting educational outcomes. 6) Special services management needs to develop counseling and guidance services that support student involvement in school activities. Additional services such as health and psychological support should be provided to overcome participation barriers. The implication of this strategy is that effective special services can help address students' personal and social issues, enhancing participation and overall educational outcomes. 7) Managing school-community relations, cooperation with parents and the community should be increased to support student participation in school activities. Programs involving the community in school activities should be held to boost external support. The implication of this strategy is that a good relationship between the school and the community can enhance support for students and school programs, contributing to better educational outcomes. 8) Information system management, effective information systems should be implemented to monitor student participation and school activities. Data should be used to make informed decisions in managing facilities, extracurricular activities, and educational interventions. The implication of this strategy is accurate data management, which helps in planning and evaluating programs that support educational outcomes.

Conclusions

The research findings highlight several critical implications for educational management. The high reliability and validity of educational facilities underscore the importance of investing in physical infrastructure, which supports various educational activities and enhances the overall learning experience. However, the negative path coefficients between educational facilities and educational outcomes and school participation indicate that simply improving facilities is not enough; other factors such as teaching quality and socio-economic support play a crucial role in achieving better educational outcomes. Conversely, the positive relationship between educational facilities and student activities suggests that better facilities can significantly boost student engagement in extracurricular activities, which are vital for skill development and motivation. Furthermore, the strong positive correlation between school participation and educational outcomes emphasizes the need for strategies that increase student attendance and engagement. Similarly, involvement in extracurricular activities positively impacts educational outcomes, reinforcing the importance of a holistic educational approach that includes both academic and extracurricular dimensions. Indirect effects reveal that while the direct impact of educational facilities on outcomes may be negative, the overall positive influence through school participation and student activities underscores the necessity of a comprehensive strategy that addresses multiple facets of the educational environment to achieve better results.

References

An, X., Hannum, E., & Sargent, T. (2007). Teaching Quality and Student Outcomes: Academic Achievement and Educational Engagement in Rural Northwest China. China: An International Journal, 05(02), 309–334. https://doi.org/10.1142/S0219747207000179

Ancheta, R. F., Daniel, D., & Ahmad, R. (2021). Effect Of Class Attendance On Academic Performance. European Journal of Education Studies, 8(9). https://doi.org/10.46827/ejes.v8i9.3887

Anjum, S. (2021). Impact of Extracurricular Activities on Academic Performance of Students at Secondary Level. International Journal of Applied Guidance and Counseling, 2(2), 7–14. https://doi.org/10.26486/ijagc.v2i2.1869

Appiah, K. (2024). Impact of School Feeding Programs on Student Attendance and Performance in Ghana. African Journal of Education and Practice, 9(2), 23–34. https://doi.org/10.47604/ajep.2522

Arjanto, P. (2022). How Is Principal Leadership Related To Effective School? International Research-Based Education Journal, Vol 4, No 2 (2022), 163–174.

Arjanto, P., Bafadal, I., Atmoko, A., & Sunandar, A. (2023). Bibliometric analysis of school improvement research: A century of scholarly contributions. Jurnal Akuntabilitas Manajemen Pendidikan, 11(1), 34–48. https://doi.org/10.21831/jamp.v11i1.59380

Baafi, R. K. A. (2020). School Physical Environment and Student Academic Performance. Advances in Physical Education, 10(02), 121–137. https://doi.org/10.4236/ape.2020.102012

Barrett, P., Treves, A., Shmis, T., Ambasz, D., & Ustinova, M. (2019). The Impact of School Infrastructure on Learning: A Synthesis of the Evidence. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-1378-8

Barrett, P., Zhang, Y., Moffat, J., & Kobbacy, K. (2013). A holistic, multi-level analysis identifying the impact of classroom design on pupils' learning. Building and Environment, 59, 678–689. https://doi.org/10.1016/j.buildenv.2012.09.016

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. Psychological Bulletin, 88(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Buckley, P., & Lee, P. (2021). The impact of extra-curricular activity on the student experience. Active Learning in Higher Education, 22(1), 37–48. https://doi.org/10.1177/1469787418808988

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. Applied Developmental Science, 24(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

Dijkstra, T. K., & Henseler, J. (2015). Consistent Partial Least Squares Path Modeling. MIS Quarterly, 39(2), 297–316. https://doi.org/10.25300/MISQ/2015/39.2.02

Englund, C., Olofsson, A. D., & Price, L. (2018). The influence of sociocultural and structural contexts in academic change and development in higher education. Higher Education, 76(6), 1051–1069. https://doi.org/10.1007/s10734-018-0254-1

Fikriyah, A., Kassymova, G. K., Nurbaiti, N., & Retnawati, H. (2022). Use of technology in high school: A systematic review. Materials of International Practical Internet Conference "Challenges of Science," 109–114. https://doi.org/10.31643/2022.14

Flutter, J. (2006). This place could help you learn': Student participation in creating better school environments. Educational Review, 58(2), 183–193. https://doi.org/10.1080/00131910600584116

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.2307/3151312

Fukuzawa, S., & Boyd, C. (2016). Student Engagement in a Large Classroom: Using Technology to Generate a Hybridized Problem-based Learning Experience in a Large First Year Undergraduate Class. The Canadian Journal for the Scholarship of Teaching and Learning, 7(1). https://doi.org/10.5206/cjsotl-rcacea.2016.1.7

Gillies, D. (2015). Human Capital Theory in Education. In M. Peters (Ed.), Encyclopedia of Educational Philosophy and Theory (pp. 1–5). Springer Singapore. https://doi.org/10.1007/978-981-287-532-7_254-1

Glewwe, P., & Kremer, M. (2006). Schools, Teachers, and Education Outcomes in Developing Countries. In Handbook of the Economics of Education (Vol. 2, pp. 945–1017). Elsevier. https://doi.org/10.1016/S1574-0692(06)02016-2

Gualano, R. J., & Campbell, S. W. (2024). Classrooms in the metaverse: Educational applications and levels of learner interaction in virtual reality. Communication Education, 73(2), 212–225. https://doi.org/10.1080/03634523.2024.2312873

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis. In Cengage (Eighth). Cengage.

Hanushek, E. A., & Woessmann, L. (2012). Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation. Journal of Economic Growth, 17(4), 267–321. https://doi.org/10.1007/s10887-012-9081-x

Haverinen-Shaughnessy, U., Moschandreas, D. J., & Shaughnessy, R. J. (2011). Association between substandard classroom ventilation rates and students' academic achievement: Substandard classroom ventilation rates and students' academic achievement. Indoor Air, 21(2), 121–131. https://doi.org/10.1111/j.1600-0668.2010.00686.x

Haverinen-Shaughnessy, U., & Shaughnessy, R. J. (2015). Effects of Classroom Ventilation Rate and Temperature on Students' Test Scores. PLOS ONE, 10(8), e0136165. https://doi.org/10.1371/journal.pone.0136165

Hawkins, G. T., Chung, C. S., Hertz, M. F., & Antolin, N. (2023). The School Environment and Physical and Social-Emotional Well-Being: Implications for Students and School Employees. Journal of School Health, 93(9), 799–812. https://doi.org/10.1111/josh.13375

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hoyle, R. H. (Ed.). (2023). Handbook of structural equation modeling (Second edition). The Guilford Press.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6(1), 1–55. https://doi.org/10.1080/10705519909540118

Hunt, H. D. (2005). The Effect Of Extracurricular Activities In The Educational Process: Influence On Academic Outcomes? Sociological Spectrum, 25(4), 417–445. https://doi.org/10.1080/027321790947171

Jama, M., Mapesela, M., & Beylefeld, A. (2009). Theoretical perspectives on factors affecting the academic performance of students. South African Journal of Higher Education, 22(5). https://doi.org/10.4314/sajhe.v22i5.42919

Javornik, Š., & Klemenčič Mirazchiyski, E. (2023). Factors Contributing to School Effectiveness: A Systematic Literature Review. European Journal of Investigation in Health, Psychology and Education, 13(10), 2095–2111. https://doi.org/10.3390/ejihpe13100148

Jaya, A. K., Fithratullah, R., Kurniawati, K., & Utha, M. A. (2023). The Influence of Environmental Quality in Classrooms on Internal Response and Academic Performance in Conventional and Energy-Efficient Buildings. Journal of Social Research, 2(11), 4006–4019. https://doi.org/10.55324/josr.v2i11.1516

Jia, C., Hew, K. F., Jiahui, D., & Liuyufeng, L. (2023). Towards a fully online flipped classroom model to support student learning outcomes and engagement: A 2-year design-based study. The Internet and Higher Education, 56, 100878. https://doi.org/10.1016/j.iheduc.2022.100878

Kline, R. B. (2023). Principles and practice of structural equation modeling (Fifth edition). The Guilford Press.

Krüger, E. L., & Zannin, P. H. T. (2004). Acoustic, thermal and luminous comfort in classrooms. Building and Environment, 39(9), 1055–1063. https://doi.org/10.1016/j.buildenv.2004.01.030

Laurie, R., Nonoyama-Tarumi, Y., Mckeown, R., & Hopkins, C. (2016). Contributions of Education for Sustainable Development (ESD) to Quality Education: A Synthesis of Research. Journal of Education for Sustainable Development, 10(2), 226–242. https://doi.org/10.1177/0973408216661442

Li, J., & Xue, E. (2023). Dynamic Interaction between Student Learning Behaviour and Learning Environment: Meta-Analysis of Student Engagement and Its Influencing Factors. Behavioral Sciences, 13(1), 59. https://doi.org/10.3390/bs13010059

Maxwell, L. E. (2016). School building condition, social climate, student attendance and academic achievement: A mediation model. Journal of Environmental Psychology, 46, 206–216. https://doi.org/10.1016/j.jenvp.2016.04.009

Maxwell, L. E. (2018). The Role of the Physical Environment in Education. In Environmental Psychology and Human Well-Being (pp. 135–166). Elsevier. https://doi.org/10.1016/B978-0-12-811481-0.00006-8

Mazenod, A., Francis, B., Archer, L., Hodgen, J., Taylor, B., Tereshchenko, A., & Pepper, D. (2019). Nurturing learning or encouraging dependency? Teacher constructions of students in lower attainment groups in English secondary schools. Cambridge Journal of Education, 49(1), 53–68. https://doi.org/10.1080/0305764X.2018.1441372

Mkwama, V. (2023). The Influence Of School Facilities On Student's Academic Achievement In Tanzania. International Journal Of Research In Education Humanities And Commerce, 04(05), 213–223. https://doi.org/10.37602/IJREHC.2023.4518

Mogas-Recalde, J., & Palau, R. (2021). Classroom Lighting and Its Effect on Student Learning and Performance: Towards Smarter Conditions. In Ó. Mealha, M. Rehm, & T. Rebedea (Eds.), Ludic, Co-design and Tools Supporting Smart Learning Ecosystems and Smart Education (Vol. 197, pp. 3–12). Springer Singapore. https://doi.org/10.1007/978-981-15-7383-5_1

Murillo, F. J., & Román, M. (2011). School infrastructure and resources do matter: Analysis of the incidence of school resources on the performance of Latin American students. School Effectiveness and School Improvement, 22(1), 29–50. https://doi.org/10.1080/09243453.2010.543538

Nedungadi, P., Menon, R., Gutjahr, G., & Raman, R. (2024). Evaluating Holistic Education and Digital Learning model for advancing SDG4: A longitudinal mixed-effects modeling approach. Cogent Social Sciences, 10(1), 2299134. https://doi.org/10.1080/23311886.2023.2299134

Norazman, N., Che Ani, A. I., Ja'afar, N. H., & Khoiry, M. A. (2018). Indoor Lighting in Classroom Environment Influences on Students' Learning Performance. The Journal of Social Sciences Research, SPI6, 986–990. https://doi.org/10.32861/jssr.spi6.986.990

Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory (3. ed., [Nachdr.]). McGraw-Hill.

Oluyemi Toyinbo. (2017). Indoor Environmental Quality, Pupil's Health and Academic Performance. https://doi.org/10.13140/RG.2.2.32940.56962

Ozcan, M. (2021). Factors Affecting Students' Academic Achievement according to the Teachers' Opinion. Education Reform Journal, 6(1), 1–18. https://doi.org/10.22596/erj2021.06.01.1.18

Pulimeno, M., Piscitelli, P., Colazzo, S., Colao, A., & Miani, A. (2020). School as ideal setting to promote health and wellbeing among young people. Health Promotion Perspectives, 10(4), 316–324. https://doi.org/10.34172/hpp.2020.50

Rahayu, A. P., & Dong, Y. (2023). The Relationship of Extracurricular Activities with Students' Character Education and Influencing Factors: A Systematic Literature Review. AL-ISHLAH: Jurnal Pendidikan, 15(1), 459–474. https://doi.org/10.35445/alishlah.v15i1.2968

Rufaidah, L. N., Umamah, N., Sumardi, Marjono, & Surya, R. A. (2021). Learning environment technology-based in improving students' independent learning. IOP Conference Series: Earth and Environmental Science, 747(1), 012056. https://doi.org/10.1088/1755-1315/747/1/012056

Sekiwu, D. (2020). Investigating the relationship between school attendance and academic performance in universal primary education: The case of Uganda. African Educational Research Journal, 8(2), 152–160. https://doi.org/10.30918/AERJ.82.20.017

Simons, E., Hwang, S.-A., Fitzgerald, E. F., Kielb, C., & Lin, S. (2010). The Impact of School Building Conditions on Student Absenteeism in Upstate New York. American Journal of Public Health, 100(9), 1679–1686. https://doi.org/10.2105/AJPH.2009.165324

Tiara Octavia, E., . I., & Sholikah, M. (2020). How Do School Facilities Affect School Quality? Case Study in Vocational High School at Pati, Indonesia. KnE Social Sciences. https://doi.org/10.18502/kss.v4i6.6648

Villarreal Arroyo, Y. P., Peñabaena-Niebles, R., & Berdugo Correa, C. (2023). Influence of environmental conditions on students' learning processes: A systematic review. Building and Environment, 231, 110051–110051. https://doi.org/10.1016/j.buildenv.2023.110051

Wang, M.-T., & Hofkens, T. L. (2020). Beyond Classroom Academics: A School-Wide and Multi-Contextual Perspective on Student Engagement in School. Adolescent Research Review, 5(4), 419–433. https://doi.org/10.1007/s40894-019-00115-z

Yangambi, M. (2023). Impact of School Infrastructures on Students Learning and Performance: Case of Three Public Schools in a Developing Country. Creative Education, 14(04), 788–809. https://doi.org/10.4236/ce.2023.144052

Zhang, J., Yang, Y., Ge, J., Liang, X., & An, Z. (2023). Stimulating creativity in the classroom: Examining the impact of sense of place on students' creativity and the mediating effect of classmate relationships. BMC Psychology, 11(1), 432. https://doi.org/10.1186/s40359-023-01479-7