P-ISSN 2708-6453	Pakistan Languages and Humanities Review	March-April 2026, Vol. 10, No. 2
O-ISSN 2708-6461	https://doi.org/10.47205/plhr.2026(10-II)04	[44-59]

Pakistan Languages and Humanities Review
www.plhr.org.pk

RESEARCH PAPER

Impact of Infrastructure on Student Learning Outcomes in SEF'S FAS Schools in Sindh

[1]Mukhtiar Ali Chandio, [2]Dr. Najmonnisa and [3]Zakia Mukhtiar

1. Deputy Director Programs, Sindh Education Foundation Govt. of Sindh. MS Education, Leadership and Management Shaheed Zulfikar Ali Bhutto Institute of Science and Technology (SZABIST) Karachi Campus, Sindh, Pakistan
2. Professor, Department of Education, SZABIST University, Karachi Campus, Sindh, Pakistan
3. Lecturer, College Education, Government of Sindh

***Corresponding Author** | mukhtiar.sef@gmail.com

ABSTRACT

The research examine the impact of infrastructure encompassing classroom environment, school facilities, learning resources, recreational facilities, and sanitation on academic performance in SEF's Foundation Assisted Schools (FAS) in Sindh, with a specific focus on the mediating role of student engagement. A total of 481 student participants were recruited using purposive sampling. The data was obtained through a closed -ended structured questionnaire with the use of 5 point Likert scale. Smart PLS was used for data analysis because of the complexity of the model and a survey method was utilized for data collection. The result indicated that classroom environment, school facilities, learning resources, recreational facilities, sanitation and hygiene all have a positive impact on student engagement and academic performance while student engagement has a positive effect on academic performance. Similarly, the impact of class environment, school facilities, learning resources, recreational facilities, and sanitation and hygiene facilities on academic performance is positively mediated by student engagement. Thereby, if students are more engaged and more likely to perform well in a well and clean school, academic outcomes also improve. The educational system needs to tackle issues of infrastructure and engagement in the classroom to help students do well and succeed educationally.

KEYWORDS Learning Outcomes, Students, Sindh Education Federation, Infrastructure, Sindh, PLS-SEM

Introduction

Quality education in a nation does not solely depend on teachers and curriculum but on a strong infrastructure promoting student involvement and achievement (Fisher, 2023). The well-built classroom, modern learning resources, and a safe, inclusive learning environment shape the students' cognitive development, literacy levels, and academic performance. Even the most dedicated teachers and best-designed curricula may struggle to deliver optimal learning outcomes without adequate infrastructure (Muslim et al., 2025). Well-equipped schools with good lighting, ventilation, and digital learning tools have been proven to continuously help to concentrate, motivate, and retain knowledge. On the other hand, deficit infrastructure, i.e., overcrowded classrooms, absence of sanitation, and lack of basic learning materials, negatively affects student engagement and performance. Countries that regularly provide resources for educational infrastructure are not only successful in terms of literacy rates but also in developing a competitive and innovative future workforce (Wang & Wang, 2023).

In Pakistan, the educational infrastructure situation continues to be a problem, particularly in rural and partially deprived regions of cities. Many schools still do not have basic facilities like properly constructed classrooms, electricity, clean drinking water, or functional sanitation. Students are deprived of this, and as a result, it hampers them from concentrating and discourages regular attendance, which leads to poor academic performance. Rind (2024), stated that poor infrastructure in schools in Pakistan has been a persistent barrier to quality education, especially in economically deprived regions. In order to remedy these problems, the policymakers and NGOs have been trying to develop classrooms and other learning paraphernalia among them sanitation facilities. Research reveals that top-performing schools register higher attendance rates, increased student involvement, improved academic performance (Shah et al., 2024). Education infrastructure and student achievement are related; therefore, government expenditure on constructing and sustaining schools is very crucial, particularly, to guarantee reasonable and adequate education in Pakistan (Siddique et al., 2023). SEF's FAS schools in Sindh confront a number of obstacles when it comes to the impact of facilities on educational results. Firstly, one of the prime challenges this infrastructure give rise to, is its unavailability and poor maintenance. It has also been observed that most schools do not have significant funds to build and maintain schools and, hence, do not have even the most basic facilities like classrooms, libraries, sanitation units, etc. Due to a lack of regular maintenance, they lose their status as achieving their function in support of student learning (Katbar et al., 2025). Moreover, the unavailability of proper infrastructure in schools, is also seems to be an issue. Such differences later create less opportunity for learning and bring about different academic performances in the students (School Education & Literacy Department, 2017). Even when classrooms and learning resources improve, the evidence of enhanced outcomes depend on how teachers and students utilize them. Without training teachers to bring modern facilities into teaching, the outcome of the student in terms of engagement and learning is often quite underwhelming (Ali et al., 2024).

Literature Review

Classroom Environment

The classroom environment drives students' academic performance, motivation, and overall learning experience (Ramzan et al., 2023). The course mentions physical, psychological and social aspects that determine the students' engagement, behavior, and cognitive development. A well-organized classroom and environment enhances safety and inclusiveness and collaboration that will help students to excel academically (Bonna, 2023). Physical aspects of a class or classroom environment like seating arrangement, lighting, temperature and technological resources affect students focus for learning severely (Orun, 2024). Studies also reveal that well-lit and ergonomically designed classroom improves concentration on students' learning, reduces fatigue hence improved academic performance (Abdul Latip et al., 2024). And also, the use of digital tools and interactive learning opens the way for active participation and critical thinking skills development (Rafiq et al., 2024).

H1: Classroom environment has a significant effect on (a) student engagement and (b) academic performance.

School Facilities

School facilities shape the learning environment and influence learner behaviors, eventually affecting learning outcomes (Jabeen et al., 2023). Several studies suggest that good school facilities, well maintained, are associated with students' performance and

engagement (Umar et al., 2023). They include physical infrastructure (classrooms, libraries, computer labs, etc.) and intangible facets (safety, accessibility). It is known and has been shown that the condition and availability of school facilities affect students' learning ability (Hussain et al., 2012). School facilities in good condition contribute to a positive learning environment and improve student engagement, according to a study by Ullah et al. (2023). Distractions from inadequate facilities, such as overcrowded classrooms or poor sanitation, may impede student focus and academic performance (Zaman et al., 2023). For example, schools with the latest infrastructure and accessibility to technological devices are enabling their students to have better interactive learning opportunities in their educational context (Awais, 2024).

H2: School facilities have a significant effect on (a) student engagement and (b) academic performance.

H3: Student engagement significantly mediates the effect of school facilities on academic performance.

Learning Resources

Students' academic success fundamentally depends on learning resources that offer user and academic work-related materials and tools to make learning more accessible and enriching (Fatima & Mehmood, 2024). These resources include textbooks, digital content, teaching aids, libraries, online databases, and educational software. Students' academic performance and engagement can be enhanced by the availability and quality of the learning resources (Ahmed et al., 2024). Better student outcomes are consistently attributed to having access to high-quality learning resources. In classrooms stocked with multimedia tools and interactive materials, the lecture is observed to be an engaging and effective mechanism for learning. These resources allow teachers to utilize a wider spectrum of teaching methods as more diverse methods are applied according to different learning styles and needs (Majeed & Ahmad, 2025).

H4: Learning resources have a significant effect on (a) student engagement and (b) academic performance.

H5: Student engagement significantly mediates the effect of learning resources on academic performance.

Recreational Facilities

School recreational facilities are extremely important for comprehensive students ' development, as it promotes physical and mental and social well-being (Khan et al., 2023). These facilities include playgrounds, sports fields, gyms, and any other space that will provide chances for healthy and complete school experiences for students because they can always participate in physical exertion, relaxation, and socialization within their school walls. School recreational facilities have been written about in detail. Scientific works exist where the connections between recreational facilities and better health and learning results of students are established. Physical activity on a daily basis increases concentration, memory and whole cognitive functioning, which makes the performance improve according to Sabri et al. (2024). More so, recreational spaces are sources of stress relief to students, which is essential for good mental health and emotional well-being (Kirran et al., 2025). Physical activities will help students cope with stress and become in a better mood; The upshot is that their concentrating abilities on academic matters is also enhanced in the process (Jabeen et al., 2023).

H6: Recreational facilities significantly affect (a) student engagement and (b) academic performance.

H7: Student engagement significantly mediates the effect of recreational facilities on academic performance.

Sanitation and Hygiene Facilities

Improving schools' sanitation and hygiene facilities is necessary to create a conducive learning environment (Pradhan et al., 2023). These facilities, which include clean and accessible restrooms, safe drinking water, waste disposal systems, and proper hygiene education, contribute immensely to improving student health, well-being, and academic performance (Hussain et al., 2024). The lack of adequate sanitation and hygiene facilities can negatively impact students' health and may result in absenteeism, poor concentration ability, and spoiled academic performance. Research stresses sanitation and hygiene in schools. Fatima et al. (2024) state that poor sanitation in schools is correlated with increased waterborne disease incidences resulting in frequent absenteeism. The illness usually means students cannot be at school, negatively impacting their learning ability. A challenge for female students is the lack of adequate sanitation facilities; the lack of private, clean restrooms can make them uncomfortable attending school (Nasiry, 2024).

H8: Sanitation and hygiene facilities significantly affect (a) student engagement and (b) academic performance.

H9: Student engagement significantly mediates the effect of sanitation and hygiene facilities on academic performance.

Student Engagement and Academic Performance of Students

Even though SEF funds are disbursed, student engagement continue to be critical for improving the learners' academic performance in the schools funded by SEF (Umar et al., 2023). The more students are engaged in classroom activities, the more motivated and enthusiastic they are to learn, and the more they show higher degrees of understanding and retention of the knowledge. SEF understands the importance of fostering learning environments in which students are excited about learning and tries to stimulate students' engagement. Engaged students tend to perform better academically, are more creative, and are better at critical thinking (Syed & Gul, 2023). The goals of the SEF are to promote interactive and student-centered learning models such that students are keen and motivated towards their education experience (Sarwat et al., 2024). In the coming years, SEF introduce various innovative, technology-driven learning tools to engage students further. Thus the study hypothesize the following relationships.

H10: Student engagement has a significant effect on academic performance.

H11: Student engagement significantly mediates the effect of the classroom environment on academic performance.

Material and Methods

Research Design

A quantitative explanatory research design was used. This present study was quantitative since it involves the collection and analysis of data in numerical form. Creswell et al. (2007) assert that it is suitable for studies that seek to discover patterns, test

hypotheses, and draw conclusions from statistical evidence. The nature of the study was explanatory in that it attempted to explain and explore the causal relation between variables. Explanatory research aims to understand cause and effect relationships between variables so the researcher knows or can explain why or how a certain phenomenon occurs (Saunders et al., 2009).

Sample Design

This study's population consists of students enrolled in foundation-assisted schools (FAS) under the Sindh Education Foundation (SEF) across districts of Sindh, Pakistan. These are public-private partnership schools for vulnerable communities offering education of better quality. This was a deliberate focus on secondary-level students. The study encompassed students of grades 9 to 12 in some FAS institutions. This population segment was suitable because they spend the majority of their day within the physical school environment, where they interact with schools' classrooms, sanitation facilities, libraries, etc. As such, these students were in a position to shed light on how infrastructure affects their academic motivation, concentration, and general school experience (Taguma et al., 2023). A purposive sampling method was used, a type of non-probability sampling most common in educational and social science studies when the sample must have particular characteristics associated with the study's goals (Etikan et al., 2016).

This study used the N15 formula to determine the sample size because it is a standard method used in quantitative research with a latent construct. This rule calculates the sample size with several observed indicators multiplied by 15 (Rouse, 1997). This approach correlates with Hair et al. (2023) suggestions to study sufficient sample size for stable parameter estimates, reliable models and sufficient statistical power for multivariate analyses. A structured questionnaire was administered to 481 students across grades 6-10 in SEF's FAS schools.

Variables

- Independent Variables: Classroom Environment, School Facilities, Learning Resources, Recreational Facilities, Sanitation and Hygiene Facilities
- Mediator: Student Engagement
- Dependent Variable: Academic Performance

Instrument

Table 1
Instrumentation

Variables	N Items	Likert Scale	Sources
Classroom Environment	5	5-Point	(Hanaysha et al., 2023)
School Facilities	5	5-Point	(Alsauidi, 2015)
Learning Resources	4	5-Point	(Thuo et al., 2024)
Recreational Facilities	4	5-Point	(James, 2024)
Sanitation and Hygiene Facilities	4	5-Point	(Kuranga et al., 2020)
Student Engagement	4	5-Point	(Hanaysha et al., 2023)
Academic Performance	4	5-Point	(Hanaysha et al., 2023)

Data Analysis Technique

The main statistical technique for this work was a structural equation model (SEM) with partial least squares (PLS). It is chosen since it is suitable for explanatory research and

can analyze the complex model comprising several constructs and indicators. However, Hair et al. (2023) stated that PLS-SEM is especially suitable when target constructs are to be predicted and data does not necessarily comply with a normal distribution. This study considered PLS-SEM advantageous mainly because it can simultaneously assess the measurement and structural models. Estimating path coefficients, factor loadings, and variances helped evaluate latent variables and the relations between them.

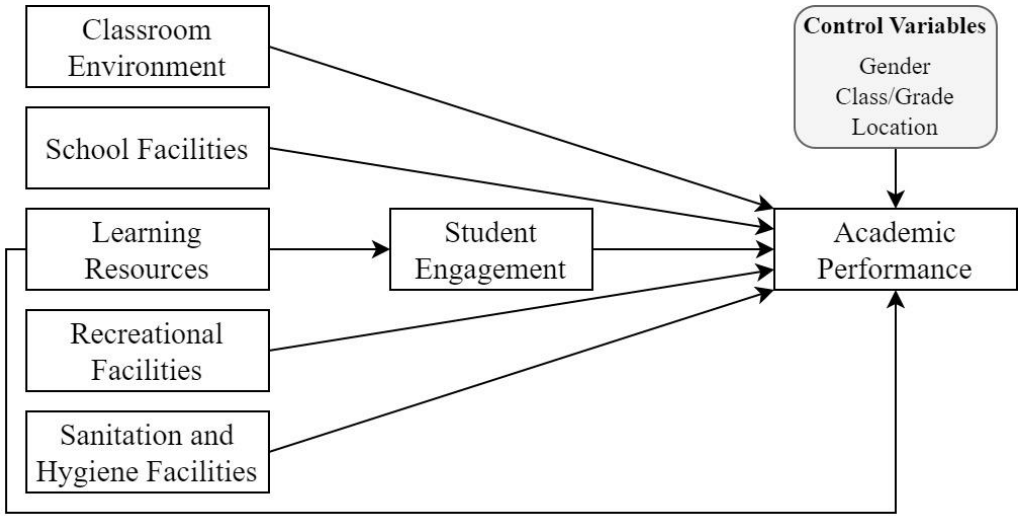

Figure 1: Research Framework

Results and Discussion

Table 2
Demographic Profile (n = 481)

		Frequency	Percent
Gender	Male	240	49.9
	Female	241	50.1
Age	13 - 15 years	118	24.5
	16 - 18 years	129	26.8
	19 - 21 years	122	25.4
	Above 21 years	112	23.3
Grade Level	Grade 6	96	20
	Grade 7	96	20
	Grade 8	95	19.8
	Grade 9	96	20
	Grade 10	98	20.4
School Location	Urban	241	50.1
	Rural	240	49.9
Family Income (Monthly)	Less than 20,000 PKR	98	20.4
	20,001 - 40,000 PKR	98	20.4
	40,001 - 60,000 PKR	96	20
	60,001 - 80,000 PKR	95	19.8
	Above 80,000 PKR	94	19.5
Mode of Transportation	Walking	96	20
	Bicycle	96	20
	Public Transport	96	20
	Private Vehicle	96	20
	School Bus	97	20.2

Assessment of the Measurement Model

The measurement model is how the latent constructs are manifested by the observed variables and is critical in differentiating valid and reliable quantitative research (Hair et al., 2010).

Indicator Reliability

Item loadings between 0.741and 0.928, as shown in Table 3.2, indicate that the indicator reliability is adequate. Of the constructs, academic performance had higher item loadings, AP1 = 0.864, AP2 = 0.905, AP3 = 0.926. Sanitation and hygiene had similar loadings; SHF1=0.928; SHF2 =0.921; SHF4 =0.914 confirming the adequacy of the indicators. The results presented here are certainly supportive of the validity of the measures that operationalize the latent variables of interest (Hair et al., 2012).

Construct Reliability

As can be seen in Table 3, all constructs exceeded the threshold. Sanitation and hygiene facilities (α = 0.911) with the highest consistency were constructs and student engagement (α = 0.899). All constructs also had composite reliability estimates in excess of the acceptable threshold of 0.70 with the highest estimates being for sanitation and hygiene facilities (CR = 0.944) and student engagement (CR = 0.937). The findings indicate that constructs in the measurement model have high internal consistency and reliability (Hair et al., 2010).

Convergent Validity

As shown in Table 3, all constructs have AVE values that exceed the cutoff. Of particular interest, had very high AVE scores indicating strong convergence, were student engagement (AVE = 0.833), sanitation and hygiene facilities (AVE = 0.849), and academic performance (AVE = 0.807). Thus there is sufficient evidence of convergent validity of the model (Hair et al., 2022; Hair et al., 2011).

Table 3
Measurement Model

Construct	Items	Loadings	Prob.	VIF	Alpha	CR	AVE
Academic Performance	AP1	0.864	0.000	2.049	0.880	0.926	0.807
	AP2	0.905	0.000	2.767			
	AP3	0.926	0.000	3.041			
Classroom Environment	CE1	0.923	0.000	4.513	0.889	0.924	0.752
	CE2	0.805	0.000	2.024			
	CE3	0.860	0.000	3.086			
	CE4	0.877	0.000	3.032			
Learning Resources	LR1	0.815	0.000	2.398	0.877	0.915	0.729
	LR2	0.924	0.000	3.578			
	LR3	0.845	0.000	2.463			
	LR4	0.826	0.000	2.001			
Recreational Facilities	RF1	0.848	0.000	2.249	0.879	0.917	0.736
	RF2	0.905	0.000	3.255			
	RF3	0.926	0.000	3.543			
	RF4	0.741	0.000	1.737			
Student Engagement	SE1	0.913	0.000	2.766	0.899	0.937	0.833
	SE2	0.918	0.000	2.872			
	SE3	0.907	0.000	2.737			
School Facilities	SF2	0.789	0.000	1.663	0.790	0.874	0.699
	SF3	0.876	0.000	1.616			
	SF4	0.841	0.000	1.719			

Sanitation and Hygiene Facilities	SHF1	0.928	0.000	3.374	0.911	0.944	0.849
	SHF2	0.921	0.000	3.219			
	SHF4	0.914	0.000	2.772			

Table 3 showed that indicators have loadings higher than the recommended threshold of 0.70 with probability level and VIF below 5% (Hair et al., 2022; Hair et al., 2011) manifesting that indicators have substantial reliability for achieving construct validity. Moreover, constructs have alpha coefficient and composite reliability higher than the recommended thresholds of 0.70 and 0.80, respectively (Hair et al., 2019), and therefore, construct reliability has been established. Finally, the AVE coefficients of the constructs exceeded 0.50, indicating that there was a large convergence of their indicators with their respective constructs (Hair et al., 2011, 2013).

Discriminant Validity

Discriminant validity refers to the degree of being unique or not overlapping; in other words, making sure that a given construct is as different as it should be from all other constructs in the model, and that each variable measures something that is not being measured by another variable (Ab Hamid et al., 2017; Cheung & Wang, 2017). One common approach is the use of the Heterotrait-Monotrait (HTMT) ratio, where values below a cut off of 0.90 are considered acceptable discriminant validity (Ab Hamid et al., 2017).

Table 4
Heterotrait-Monotrait (HTMT) Ratio

	AP	CE	LR	RF	SE	SF	SHF
AP							
CE	0.800						
LR	0.770	0.639					
RF	0.819	0.778	0.879				
SE	0.872	0.821	0.869	0.868			
SF	0.626	0.773	0.860	0.788	0.747		
SHF	0.885	0.764	0.819	0.841	0.897	0.736	

AP = Academic Performance; CE = Classroom Environment; LR = Learning Resources; RF = Recreational Facilities; SE = Student Engagement; SF = School Facilities; SHF = Sanitation and Hygiene Facilities

Henseler et al. (2016); Henseler et al. (2015) recommended that the HTMT ratio between two latent constructs should be less than 0.90 in order to establish discriminant validity. Table 4 shows that the highest HTMT ratio of 0.879 was found between RF and LR, implying that discriminant validity using HTMT ratio has been attained.

Table 5
Predictive Relevance

	R Square	Q Square
Academic Performance	0.733	0.582
Student Engagement	0.789	0.625

Table 5 shows strong prediction and relevance of academic performance and student engagement. The model is well predictive of student engagement, showing an R^2 of 0.789 and a Q^2 of 0.625, which indicates substantial evidence of a major portion of the dependent variable being explained by the model and strong relevance of the model to prediction. Similarly, academic performance can be predicted with R^2 of 0.733 and Q^2 of 0.582. These findings suggest that the model has sufficient explained variance and good predictive relevance in academic performance (Chin, 1998; Cohen, 1988, 1992).

Assessment of the Structural Model

The structural model depicts the possible relationships between the elements of the study. It explores the impact of dependent variables as a result of independent variables, while also testing the causal pathways among the constructs, which allows measurement of the strength and significance of the relationship between them (Hair et al., 2021). Such a framework allows to formulate the reasons behind complex behaviors in terms of the interaction of multiple factors, as well as control variables effects on such interactions. The analysis of direct effects in this model shows the direct impact of each variable on another. Specific indirect effects show the mediating variables in these associations, and moderation analyzes the circumstances in which certain effects are stronger or weaker (Hair et al., 2022; Hair et al., 2011).

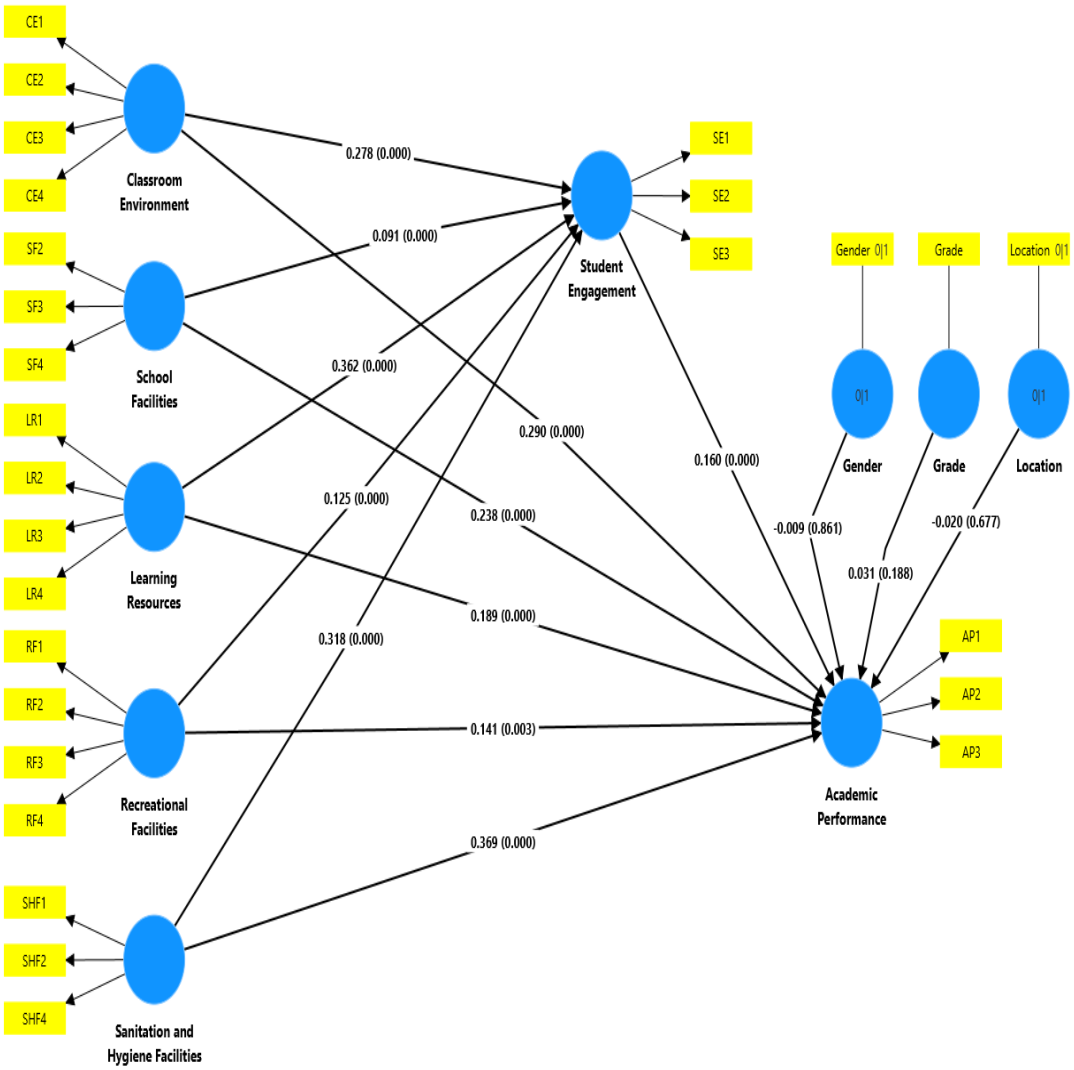

Figure 2: PLS Bootstrapping using Smart PLS

Table 6
Control Variables

	Estimate	S. D.	t-Stats	Prob.	Decision
Gender -> Academic Performance	-0.009	0.049	0.175	0.861	Not Supported
Grade -> Academic Performance	0.031	0.023	1.317	0.188	Not Supported
Location -> Academic Performance	-0.020	0.048	0.416	0.677	Not Supported

The table showed that gender (β = -0.009; p > 0.05) has a negative and insignificant effect on academic performance. Similarly, grade (β = 0.031; p > 0.05) has a positive and significant effect on academic performance. Location (β = -0.020; p > 0.05) has a negative and insignificant effect on academic performance.

Table 7
Direct-Effect Analysis

	Estimate	S. D.	t-Stats	Prob.	Decision
CE -> AP	0.290	0.035	8.257	0.000	Supported
CE -> SE	0.278	0.027	10.249	0.000	Supported
LR -> AP	0.189	0.046	4.089	0.000	Supported
LR -> SE	0.362	0.031	11.787	0.000	Supported
RF -> AP	0.141	0.047	2.999	0.003	Supported
RF -> SE	0.125	0.035	3.562	0.000	Supported
SE -> AP	0.160	0.039	4.068	0.000	Supported
SF -> AP	0.238	0.059	4.023	0.000	Supported
SF -> SE	0.091	0.023	3.897	0.000	Supported
SHF -> AP	0.369	0.054	6.890	0.000	Supported
SHF -> SE	0.318	0.039	8.213	0.000	Supported

AP = Academic Performance; CE = Classroom Environment; LR = Learning Resources; RF = Recreational Facilities; SE = Student Engagement; SF = School Facilities; SHF = Sanitation and Hygiene Facilities

Table 7 result showed that CE (β = 0.290; p < 0.05) has a positive and significant effect on AP. Similarly, CE (β = 0.278; p < 0.05) has a positive and significant effect on SE. LR (β = 0.189; p < 0.05) has positively and significant effects on AP. LR (β = 0.362; p < 0.05) has a positive and significant effect on SE. Additionally, RF (β = 0.141; p < 0.05) has a positive and significant effect on AP. RF (β = 0.125; p < 0.05) has a positive and significant effects on SE. SE (β = 0.160; p < 0.05) has a positive and significant effect on AP. SF (β = 0.238; p < 0.05) has positively and significant effects on AP. Moreover, SF (β = 0.091; p < 0.05) has a positive and significant effects on SE. SHF (β = 0.369; p < 0.05) has a positive and significant effects on AP. Also, SHF (β = 0.318; p < 0.05) has a positive and significant effects on SE.

Table 8
Specific Indirect-Effect Analysis

	Estimate	S. D.	t-Stats	Prob.	Decision
SF -> SE -> AP	0.015	0.005	2.691	0.007	Supported
SHF -> SE -> AP	0.051	0.012	4.110	0.000	Supported
CE -> SE -> AP	0.045	0.012	3.627	0.000	Supported
LR -> SE -> AP	0.058	0.015	3.798	0.000	Supported
RF -> SE -> AP	0.020	0.009	2.293	0.022	Supported

AP = Academic Performance; CE = Classroom Environment; LR = Learning Resources; RF = Recreational Facilities; SE = Student Engagement; SF = School Facilities; SHF = Sanitation and Hygiene Facilities

Table 8 showed that SE (β = 0.015; p < 0.05) has positive and significantly mediates between SF and AP. Likewise, SE (β = 0.051; p < 0.05) has positive and significantly mediates between SHF and AP. In addition, SE (β = 0.045; p < 0.05) has positive and significantly mediates between CE and AP. SE (β = 0.058; p < 0.05) has positive and significantly mediates between LR and AP. Lastly, SE (β = 0.020; p < 0.05) has positive and significantly mediates between RF and AP.

Conclusion

The study concluded that various school environmental factors were found to have a positively significant effect on student engagement as well as academic performance. The supportive classroom environment, well-equipped school facilities, accessible learning resources, quality recreational amenities, and proper sanitation and hygiene all such other factors were found to positively and significantly influence engagement. The focus on environmental factors is because the enabling characteristics produce an encouraging atmosphere for learning, which leads to higher student engagement on the part of the pupils.

Student engagement has been shown to positively and significantly influence academic performance. This means that students tend to perform better academically when they are engaged emotionally, behaviorally, and cognitively. Therefore, engagement becomes very critical not only as an outcome of a conducive school environment but also as a direct contributor to student achievement. In addition, student engagement was found to have a positive significant mediating effect on the relationship between environmental factors and academic performance. The effects of a classroom environment, school facilities, learning resources, recreational facilities, sanitation on academic performance are amplified when student engagement is examined as a mediator. This implies the indirect role of these environmental features on academic achievement via their positive influence on engagement. Overall, the results highlight the benefits of a good educational climate full of resources that encourages student engagement as a means toward academic achievement.

Recommendations

This study provided a number of managerial recommendations. Firstly, student engagement and academic performance are directly impacted by school facilities. Accordingly, school facilities (such as sitting areas, study spaces, and libraries) are essential for fostering a positive learning environment for students. To enhance school facilities and students' involvement, school managers also ought to prioritize proactive maintenance, creating an inviting learning environment, and conducting student-centered activities. This means spending money on the technology, creating an inviting school environment, and actively engaging the students who are part of the learning process. Along the same lines, creating a pleasant and engaging learning environment also involves structure and support, good communication, and active involvement of students. It includes making explicit expectations, giving positive reinforcement, and having multiple pedagogical strategies, all of which serves to adapt to diverse students' needs. Similarly, materials for learning assist in enhancing student engagement. Resources need to be continually updated, taking into consideration the latest findings and trends, and should be consistent with what education today is trying to accomplish and how students learn. Managers may recommend improving the resources for learning and students' engagement by incorporating different, easy to reach, and relevant materials; forming a comfortable environment for learning; and setting stage for active engagement and interaction among students .

On top of that, managers should also promote interactive learning materials, online work, multimedia, books, etc. for those students who perhaps couldn't otherwise afford them. Establishing processes and protocols for retrieving and using learning resources, both digitally and physically, in such a way that knowledge can be easily and quickly retrieved . Access to hygiene and sanitation facilities also has a considerable positive impact on participation of students. Therefore, understanding that in an effort to do better in the

aspects of sanitation and hygiene in schools, or students' involvement or participation, it is recommended that managers focus on toilets that are clean and functioning, broad education in hygiene, and a mindset of responsibility and ownership among students. This means providing hygiene products; providing sanitary facilities; promoting habits of hygiene through clubs, and awareness programs. School programs and subsequently managers should also incorporate hygiene education such as hand washing and toilet usage education. Help teachers to implement good hygiene education techniques and train them to do so. Similarly managers, should also collaborate with community organizations to promote advocacy and promotion of hygiene. Encouraging initiative and student independence as well as allowing children to take ownership of their learning can have a powerful positive impact on student engagement and performance, as activities such as peer-teaching can show. In fact, given that each student has his own learning style and rhythm of learning, managers' should support teachers' efforts in using personalized learning, for example, flexible teaching methods and learning technologies. For example, in order to enhance students´ performance and involvement in learning, a manager could adopt a focus on building a safe, attractive learning space, individually catering to every student's needs, and providing adequate resources. This includes rapport and connection with students, clear norms and procedures, and opportunities for student voice and critique. Similarly, managers can create a warm and supportive learning environment, one that fosters students' involvement and feelings of belongingness, as well as academic performance.

References

Ab Hamid, M., Sami, W., & Sidek, M. (2017). Discriminant validity assessment: Use of Fornell & Larcker criterion versus HTMT criterion. Journal of Physics: Conference Series,

Abdul Latip, M. S., Abdul Latip, S. N. N., Tamrin, M., & Rahim, F. A. (2024). Modelling physical ergonomics and student performance in higher education: the mediating effect of student motivation. *Journal of Applied Research in Higher Education*, *17*(3), 1081–1098.

Ahmed, S., Baloch, M. A., & Karim, H. (2024). Investigating the Impact of Teaching-Learning Materials on Students' Academic Performance in Government Primary Schools in the Naseerabad Division, Balochistan, Pakistan. *Journal of Development and Social Sciences*, *5*(1), 538-545.

Ali, S., Bhutta, S. M., Ahmad, S., Ansari, A. N., Ahmed, A., & Qadir, Y. (2024). PROTOCOL: Effectiveness of public-private partnerships on educational access and quality of primary and secondary schooling in low-and middle-income countries: A systematic review. *Campbell Systematic Reviews*, *20*(2), 1-18.

Alsauidi, F. (2015). Effect of the school facilities factor and sport activities factor on parents in terms of private and public school choice at Riyadh City Saudi Arabia. *Universal Journal of Educational Research*, *3*(12), 1054-1069.

Awais, M. (2024). *Designing educational platform for primary education in Pakistan* [Master's Thesis, Masaryk University]. Czech Republic. https://is.muni.cz/th/sark3/Thesis.pdf

Bonna, K. (2023). Concept and nature of classroom management practices. *International Journal of Multidisciplinary Studies and Innovative Research*, *11*(4), 1601-1615.

Cheung, G. W., & Wang, C. (2017). Current approaches for assessing convergent and discriminant validity with SEM: Issues and solutions. Academy of Management Annual Meeting Proceedings, Briarcliff Manor, NY.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern methods for business research*, *295*(2), 295-336.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Cohen, J. (1992). A power primer. *Psychological bulletin*, *112*(1), 155-159.

Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). Qualitative research designs: Selection and implementation. *The counseling psychologist*, *35*(2), 236-264.

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, *5*(1), 1-4.

Fatima, K., Ali, M., & Salman, V. (2024). *The Economic Cost of Inadequate Water and Sanitation in Pakistan* [Working Paper]. School of Social Sciences and Humanities (S3H), NUST.

Fatima, N., & Mehmood, M. I. (2024). Understanding Faculty Perspectives on the Integration of Online Learning Resources within Academic Libraries. *Pakistan JL Analysis & Wisdom*, *3*, 160.

Fisher, K. (2023). *Building Better Outcomes: The Impact of School Infrastructure on Student Outcomes and Behaviour. Schooling Issues Digest*. ERIC.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate data analysis. In *Multivariate data analysis* (7th ed., pp. 785-785). Pearson Education.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer Nature.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice*, *19*(2), 139-152.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long range planning*, *46*(1-2), 1-12.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, *31*(1), 2-24.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2023). *Advanced issues in partial least squares structural equation modeling*. SAGE Publications.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the academy of marketing science*, *40*, 414-433.

Hanaysha, J. R., Shriedeh, F. B., & In'airat, M. (2023). Impact of classroom environment, teacher competency, information and communication technology resources, and university facilities on student engagement and academic performance. *International Journal of Information Management Data Insights*, *3*(2), 100188.

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: updated guidelines. *Industrial management & data systems*, *116*(1), 2-20.

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.

Hussain, I., Ahmed, M., Ahmad, S., Suleman, Q., & Khalid, N. (2012). A Study to Investigate the Availability of Educational Facilities at the Secondary School Level in District Karak. *Language in India*, *12*(10), 1-17.

Hussain, M. M., Iqbal, A., & Abbas, S. J. (2024). Water, Sanitation, Hygiene Facilities and Economic Well-Being: A Multilevel and Spatial Analysis in Punjab, Pakistan. *Journal of International Development*, *37*(2), 405-419.

Jabeen, S., Siddique, M., Mughal, K. A., Khalid, H., & Shoukat, W. (2023). School environment: A predictor of students' performance at secondary level in Pakistan. *Journal of Positive School Psychology*, *6*(10), 2528-2552.

James, N. T. G. (2024). Educational Facilities Management for Effective Administration in Public Senior Secondary Schools in Rivers State. *Top Journal of Educational Technology*, *9*(6), 111-127. https://topjournals.org/index.php/TJET/article/view/971

Katbar, A., Khan, N., & Shah, A. (2025). An Analysis of Effectiveness of Initial Professional Development Program In Enhancing Pedagogical Skills of Newly Recruited Junior Elementary School Teachers of Sindh: A Qualitative Investigation. *Journal of Social & Organizational Matters*, *4*(1), 74-86.

Khan, S. A., Tabassum, R., & Muhammad, N. (2023). A Survey of Secondary School Students in Lahore, Pakistan on the Relationship Between Co-Curricular Activities and Personality Development. *Pakistan Journal of Law, Analysis and Wisdom*, *2*(2), 984-1002.

Kirran, R., Inam, A., Bukhari, S. A., Hameed, H., Khan, R., Sattar, S., & Bukhari, I. (2025). Mental Health and Education: Investigating the Relationship Between School Environment and Psychological Well-being in Pakistani Teenagers. *Dialogue Social Science Review (DSSR)*, *3*(1), 1312-1325.

Kuranga, Y., Kayode, S., & Ahned, T. (2020). Availability and utilization of sanitation and hygiene facilities in public Primary schools in Ilorin metropolis, Kwara State. *AL-HIKMAH JOURNAL OF EDUCATION*, *7*(2), 138-144.

Majeed, M. K., & Ahmad, T. B. B. T. (2025). From Chalkboard Era to Digital Literacy Era: The Effect of Audio-Visual Tools on Modern Classroom at Islamic Secondary School Teachers in District Kot Addu. *Journal of Islamic Studies and Education*, *4*(1), 1-7.

Muslim, M., Chang, U., Rifat, A., Khan, M., & Jabeen, F. (2025). Teaching ESL in Rural Sindh: An Investigation of Challenges and Disparities in Selected Public Schools at Secondary Level. *Journal of Arts and Linguistics Studies*, *3*(1), 325-353.

Nasiry, F. (2024). *Exploring the Impact of lack of Wash facilities on Girls' Education and Health in Higher Secondary Schools in Afghanistan* [Master's Thesis, Asian University for Women (AUW)]. https://repository.auw.edu.bd/bitstream/handle/123456789/175/Fatima%20Nasiry_Thesis-Final-May%2024.pdf?sequence=1&isAllowed=y

Orun, P. A. R. (2024). The Students' Perception of The Impacts of Classroom Physical Environment towards Students' English Learning Motivation. *Applied Linguistics: Innovative Approaches and Emerging Trends*, *1*(1), 57-71.

Pradhan, N. A., Haider, F., Khudadad, U., Zahidie, A., Asim, M., Ladak, A. A., Iqbal, S., Mevawalla, A., Siddiqi, U., & Ali, T. S. (2023). Gaps in hygiene promotion at schools in Pakistan: qualitative descriptive research. *Health promotion international*, *38*(3), 1-12.

Rafiq, S., Iqbal, S., & Afzal, A. (2024). The impact of digital tools and online learning platforms on higher education learning outcomes. *Al-Mahdi research journal (MRJ)*, *5*(4), 359-369.

Ramzan, M., Javaid, Z. K., Kareem, A., & Mobeen, S. (2023). Amplifying classroom enjoyment and cultivating positive learning attitudes among ESL learners. *Pakistan Journal of Humanities and Social Sciences*, *11*(2), 2236-2246.

Rind, I. A. (2024). Leadership Strategies in Addressing Out-of-School Children: A Comparative Study of Heads of Government and Public–Private-Managed Schools in Sindh, Pakistan. *Education Sciences*, *14*(11), 1230-1247.

Rouse, J. (1997). Business Research: A Practical Guide for Undergraduate and Postgraduate Students. *International Small Business Journal*, *15*(4), 103-105.

Sabri, S., Zhang, M.-Y., Guo, L., Dang, J., & Mao, Z.-X. (2024). Effectiveness of school-based physical activity programs in enhancing attention, academic performance, and social relationships among children with intellectual disabilities: evidence from Pakistani schools. *Frontiers in Psychology*, *15*, 1431890.

Sarwat, S., Iftikhar, I., Sahito, J. K. M., & Shahzad, W. (2024). Impact of Student Engagement in Language Support Classes Through Cooperative Learning: A Study of Pakistani Educational Institutions. *Research Journal for Societal Issues*, *6*(1), 199-210.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students*. Pearson Education.

School Education & Literacy Department. (2017). *Sindh Non-Formal Education Policy 2017*. G. o. Sindh.

Shah, D. B., Gurr, D., & Drysdale, L. (2024). School Leadership and Management in Sindh Pakistan: Examining Headteachers' Evolving Roles, Contemporary Challenges, and Adaptive Strategies. *Education Sciences*, *14*(5), 440.

Siddique, M. A., Tagar, A. A., Khoso, Z. A., & Tagar, H. K. (2023). Role of infrastructure to improve quantity and enhance quality of school education in Sindh province of Pakistan. *Advances in Social Sciences Research Journal*, *6*(3), 198-206.

Syed, S., & Gul, M. (2023). Comparing the influence of critical thinking on the academic performance of two secondary education boards in Pakistan. *International Journal of Social Science & Entrepreneurship*, *3*(1), 205-231.

Taguma, M., Makowiecki, K., & Gabriel, F. (2023). OECD Learning Compass 2030: Implications for Mathematics Curricula. In *Mathematics Curriculum Reforms Around the World: The 24th ICMI Study* (pp. 479-509). Springer International Publishing.

Thuo, Z. W., Ronoh, A., & Edward, T. (2024). EGRA Teaching and Learning Resources on Reading Abilities of Early-Grade Learners in Public Primary Schools in Kiambu County, Kenya. *The International Journal of Humanities & Social Studies*, *12*(6), 45-55.

Ullah, N., Nawaz, K., Khoso, F. J., & Ghunio, A. (2023). Evaluating the Influence of School Leadership on Cultivating a Positive Educational Environment in Secondary Education in Balochistan, Pakistan. *Journal of Arts & Social Sciences*, *10*(1), 219-227.

Umar, Z., Sadiqi, T., Hussain, S., & Qahar, A. (2023). Compare the Quality of Infrastructure on Student Outcomes in Public and Punjab Education Foundation Funded Schools at Secondary Level. *International Research Journal of Management and Social Sciences*, *4*(4), 26-39.

Wang, Y., & Wang, Y. (2023). *Education in a changing world: Flexibility, skills, and employability*. W. Bank.

Zaman, M., Sajjad, S., & Gharsheen, L. U. (2023). Exploring The Dynamics of Teacher-Student Relationships in Overcrowded Secondary School Classrooms. *International Research Journal of Management and Social Sciences*, *4*(4), 245-261.