

Relation between School Physical Environment and Students' Academic Achievement

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ABSTRACT The educational setting can exert a substantial influence on an individual learner's scholarly success. A supportive and nurturing educational environment may augment students' feelings of security and focus, consequently promoting improved academic performance. The study sought to establish the effect of the school environment on the academic achievement of secondary school students. A survey method was used for the present study, with simple random sampling, wherein the sample consisted of 100, 8th grade students from different schools of Dindigul District who consented for the study. The results showed that the physical environment of the school was positively and significantly related to the academic achievements. A study revealed that students who had a positive attitude towards their school environment in terms of physical environment had higher performance. Further studies could explore specific features of the physical school environment affecting students' achievement the most and evaluate the effectiveness of interventions targeting school environments in the investigated country.

INTRODUCTION

The physical environment of educational institutions significantly influences the academic performance and success of students (Berman et al. 2018; Hussain et al. 2022). An appropriate and sufficient environment is essential for the child's effective learning (Lawrence and Vimala 2012). A supportive and conducive school physical environment, replete with adequate learning resources and a positive atmosphere, enhances students' comfort and focus on their academic endeavours, thereby leading to elevated academic performance (Narang 2020). High-quality physical environments like neat classrooms, libraries, and sports offices, etc. are categorically associated with students' satisfaction as well as academic achievements (Qadeer et al. 2024). A positive school environment supports the learning-teaching process and enhances the students' academic success (Amsalu and Belay 2024; Nawaz et al. 2024). The physical learning environment within schools can also serve as a predictor of various educational outcomes, including academic achievement (Barrett et al. 2015). The children spend the majority of their time in educational settings, their environment exerts a

distinct influence on their performance through curricula, pedagogical methods, and interpersonal relationships (Harinarayanan and Pazhanivelu 2018). A positive school environment, characterised by strong student-teacher relationships, a sense of belonging, and a safe and supportive learning environment lead to higher academic achievement and lower absenteeism (Allen and Bowles 2012; Lombardi et al. 2019).

The concept of a school's physical environment encompasses a wide range of factors, both tangible and intangible (Baafi 2020). Physical aspects such as school infrastructure, classroom facilities, and access to resources contribute to the overall learning atmosphere (Adede 2012; Cuesta et al. 2016; Barrett et al. 2019). Equally important are the psychosocial dimensions of the school environment, including teacher-student relationships, peer interactions, school safety, and the overall school climate (Wang and Holcombe 2010; Othman and Kasuma 2016).

Despite the growing body of evidence highlighting the importance of the school environment, there remains a need for further research in specific contexts. The study focuses on high school students in the Dindigul District of Tamil Nadu, aiming to investigate the relationship be-

tween their perceptions of the school's physical environment and their academic achievement.

This study is particularly relevant in the context of the Dindigul District, where Dindigul also benefits from proactive government initiatives aimed at enhancing educational quality. These include infrastructure development programs, teacher training initiatives, and schemes promoting digital literacy. Furthermore, the region possesses a strong sense of community involvement in education. Local organisations and NGO's actively contribute to improving school facilities and supporting student learning (Pillai and Ramaswamy 2010; Ramesh 2021). By examining the specific factors that contribute to a positive school physical environment in this context, this study aims to provide valuable insights for policymakers, educators, and school administrators seeking to enhance the learning experiences and academic outcomes of secondary school students.

Review of Related Literature

Various studies have shown that the physical context of learning institutions determine the learning outcomes of students, fostering an environment, and positive correlation between the school environment and performance (Umroh and Darmawan 2024). In the process of progressing to higher standards of academic achievement it is crucial to work in improving and developing infrastructure of the school (Harinarayanan and Pazhanivelu 2018). Parent and school climate also exerts appreciable influence on the performance of the students in their academic activities (Werang et al. 2024). The interactions between school environment and parental involvement towards students' learning achievements show that the supportive school physical environment and good parental involvement are the service delivery factors to improve learners' achievement (Umroh and Darmawan 2024). The variables in the study environment have a significant impact on students' performance, thus the importance of creating appropriate and calm study environments for the student to excel (Swargiary 2023). It is evident from the research analysis that the physical environment of the school plays a highly significant role in enhancing the performance of students in aca-

demics, and the kind of environment students find themselves in, determines the outcome they will produce (Baafi 2020). In addition, the outcome shows the significance of the school environment on students' learning achievements, as well as social, emotional, and ethical development, implying that schools are responsible for the production of human beings in totality (Jain 2017). Research has shown that a school environment plays a crucial role in learner achievement within classrooms, and a quality physical environment enhances learning and teaching activities (Ekiugbo 2023). A conducive professional learning-teaching environment hundred percent moderates the relationship between physical environment and safety of learner's accomplishment (Amsalu and Belay 2024). However, studies reveal a direct, but weak, relationship between physical school environment and learners' performance (Islam and Khan 2017).

Objectives

The objectives of the study were:

- ♦ To ascertain the perceived quality of the physical school environment and its correlation with the academic performance of secondary school students.
- ♦ To investigate the interrelationship between the physical school environment and the academic performance of secondary school students.
- ♦ To analyse the influence of the physical school environment on the academic performance of secondary school students.

Hypotheses

The study aimed to analyse the following hypotheses:

- ♦ There exists no statistically significant difference in the academic performance of secondary school students when categorised by varying perceived levels of the school's physical environment (low, average and high).
- ♦ There needs to be a more significant relationship and association between the school's physical environment and the academic performance of secondary school students.

- ♦ The perceived quality of the physical school environment exerts little impact on the academic performance of secondary school students.

METHODOLOGY

The study employed a survey method to investigate the impact of the school's physical environment on the academic achievement of secondary school students. Survey research is a quantitative data collection method that involves systematically gathering information from a target population. In this study, data was collected directly from the participants through questionnaires.

Sample

This study focuses on secondary school students in the Dindigul District. To ensure a representative sample, a random sampling technique was employed. The final sample consists of 100 students drawn from various schools within the Dindigul District. The sample size allows for a comprehensive analysis of the relationship between the school's physical environment and academic achievement while maintaining the feasibility of the research project (Table 1).

Tool

Data for this study were collected using two primary methods, that is, a School Physical Environment Scale and academic achievement data. The School Physical Environment Scale, a 45-item scale developed explicitly for this study, was used to measure students' perceptions of their school environment. The validity of the tool was given to some experts in the relative fields so as to get their comments and opinions. The scale demonstrated good reliability with a coefficient of $r=0.82$, determined through the test-retest method. The achievement test, administered by B.Ed. trainees,

as part of their school internship training, utilised a standard set of questions across all schools in Dindigul District, Tamil Nadu. The trainees then evaluated the students' scores.

Data Collection

The researcher visited the selected schools in the Dindigul District, Tamil Nadu. With the cooperation of school administrators and class teachers, the 100 students were informed about the study's purpose and assured confidentiality. They were then provided with the school physical environment scale questionnaire and given clear instructions on how to respond to the items. Following the completion of the questionnaires, the researcher collected the students' class test scores directly from their respective class teachers. These scores, along with the questionnaire responses, constituted the primary data for the study.

The School Physical Environment Scale employed a three-point Likert scale for responses, with "Agree" receiving 3 points, "Partially Agree" receiving 2 points, and "Disagree" receiving 1 point. Each student's responses to the 45 items were summed to calculate a total score, with higher scores indicating a more positive perception of the school environment.

RESULTS

Table 2 shows that both the Kolmogorov-Smirnov and Shapiro-Wilk tests demonstrate that neither the 'School Environment' nor 'Academic Achievement' variables are normally distributed. For the 'School Environment' variable, both tests yielded p-values of 0.000, significantly smaller than the alpha level of 0.05. Similarly, the 'Academic Achievement' variable showed a p-value of 0.003 for the Kolmogorov-Smirnov test and 0.011 for the Shapiro-Wilk test, again falling below the 0.05 threshold. Hence, the investiga-

Table 1: Distribution of sample by school

S.No.	Name of the school	Sample size
1	Government High School, Batlagundu	40
2	Devangar Girls High School, Chinnalapatti	30
3	Government Girls High School, Vadamadurai	30
	Total	100

Source: Data collected in the month of February 2020 at Dindigul District, Tamil Nadu

Table 2: Normality test of school physical environment and academic achievement

	<i>Kolmogorov-Smirnov^a</i>			<i>Shapiro-Wilk</i>		
	<i>Statistic</i>	<i>df</i>	<i>Sig.</i>	<i>Statistic</i>	<i>df</i>	<i>Sig.</i>
<i>School Environment</i>	.199	100	.000	.912	100	.000
<i>Academic Achievement</i>	.113	100	.003	.966	100	.011

Source: Data collected in the month of February 2020 at Dindigul District, Tamil Nadu

tor used a non-parametric statistical test used for analysing these variables.

Table 3 presents a cross-tabulation of academic achievement and perceived levels of the school environment. Notably, a higher proportion of students who perceive the school physical environment as “High” demonstrate high academic achievement (64.5%, 20 out of 31 students). Conversely, a more significant proportion of students who perceive the school’s physical environment as “Low” also exhibit low academic achievement (58.8%, 10 out of 17 students). It reveals a potential relationship between the perceived quality of the school’s physical environment and academic performance, aligning with the previous findings of a positive correlation between these variables. Hence, the null hypothesis was rejected.

Table 4 reveals that correlation analysis showed a statistically significant, positive cor-

relation between the school’s physical environment and academic achievement ($\bar{n} = .549$, $p < .001$). It indicates that a more positive perception of the school’s physical environment is associated with higher levels of academic achievement. The strength of this correlation can be considered moderate. Hence, the null hypothesis is rejected.

The results presented in Table 5 demonstrate that Chi-Square tests indicate a statistically significant correlation between the perception of the school’s physical environment and academic performance. The Pearson Chi-Square statistic quantified at 36.960 with 4 degrees of freedom is markedly significant ($p = .000$), suggesting a considerable deviation from the hypothesis of independence among the examined variables. Similarly, the Likelihood Ratio (33.467, $df = 4$, $p = .000$) supports this conclusion. The Linear-by-Linear Association test (21.096, $df = 1$, p

Table 3: Academic achievement by students perceived at the school physical environment level

<i>School Physical</i>	<i>Academic achievement</i>				
	<i>Perceived level</i>	<i>Low</i>	<i>Average</i>	<i>High</i>	<i>Total</i>
<i>Environment</i>	<i>Low</i>	10	5	2	17
	<i>Average</i>	9	34	9	52
	<i>High</i>	4	7	20	31
	<i>Total</i>	23	46	31	100

Source: Data collected in the month of February 2020 at Dindigul District, Tamil Nadu

Table 4: Correlation of school physical environment and academic achievement

		<i>School physical environment</i>	<i>Academic achievement</i>
<i>Spearman’s Rho</i>	<i>School physical environment</i>	Correlation coefficient	1.000
		Sig (2-tailed)	.549
		N	100
	<i>Academic achievement</i>	Correlation coefficient	.549
		Sig (2-tailed)	.000
		N	100

Source: Data collected in the month of February 2020 at Dindigul District, Tamil Nadu

Table 5: Chi-Square tests perceived level of school physical environment and academic achievement

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	36.960 ^a	4	.000
Likelihood Ratio	33.467	4	.000
Linear-by-Linear Association	21.096	1	.000
N of Valid Cases	100		

Source: Data collected in the month of February 2020 at Dindigul District, Tamil Nadu

= .000) further suggests a significant linear trend in the relationship. These results, based on 100 valid cases, provide strong evidence that the perceived quality of the school's physical environment is significantly related to students' academic achievement. Hence, the null hypothesis is rejected.

Table 6 reveals that students learning in environments with "High" rating had a higher mean rank of 66.68, compared to students of "Average" environments with mean rank of 47.99 and students of "Low" environments with a mean rank of 28.68. This can be an indication that some changes made in the physical settings of the institution are relevant to positive academic performance.

Table 6: Kruskal-Wallis H Test of school physical environment and academic achievement

School physical environment		N	Mean rank
Academic achievement	Low	17	28.68
	Average	52	47.99
	High	31	66.68
	Total	100	

Table 7 shows that the Kruskal-Wallis H test reveals a statistically significant difference in academic achievement across the different school environments ($\chi^2 = 19.841$, $p < .001$). It reveals that the type of school physical environment is associated with varying levels of ac-

ademic achievement. The post hoc test shows that the student who perceived the school environment was high and their academic achievement was high. Hence, the null hypothesis was rejected.

DISCUSSION

The context of school environment includes explicit and implicit interactions, on the norms, and values in a learning establishment which have a strong bearing to learners' performance and well-being (Kaur and Kaur 2022; Dimitrova et al. 2018). Every student feels comfortable in the school environment when there is effective communication, high levels of students and staff courtesy, and every student performs their best in school (Kaur and Kaur 2022). Both, a safe school climate and parental participation, are linked with enhancing students' academic performance (Swargiary 2023; Werang et al. 2024; Handrianto et al. 2024) and the productive and supportive school climate improves the well-being of the students and academic achievement (Podiya et al. 2025). The findings highlight the importance of a school's physical environment since it has a more positive effect on a child's success in studies. This is supported by Rahaman and Kafi (2025), who found the school environment improves the academic performance, supported the teaching and learning process and enriches the school climate, and similarly Idris et al. (2025), reported that good infrastructure and well-maintained classroom improved the students' performance and academic success. They also obtained a statistically significant positive relationship between the students' perception of their schools' physical environment and their academic achievement as argued in the literature. This finding supports the study done by Harinarayanan and Pazhanivelu (2018), Umroh and Darmawan (2024), and Werang

Table 7: Test Statistics^a Post hoc

	Academic achievement
Chi-Square	19.841
df	2
Asymp. Sig.	.000

Source: Data collected in the month of February 2020 at Dindigul District, Tamil Nadu

et al. (2024), which underlined the fact that school climate, parental involvement and student achievement are directly linked. From an analysis of existing literature, the work evaluates that students who have involved parents and the school with a positive environment will exhibit higher performance in class work and activeness in co-curricular activities (Handrianto et al. 2024). The study found there no significant influence of school physical resources, library facilities and laboratory resources on student's academic achievement (Ngozi et al. 2025). In contrast to the present findings, the study by Gaisiey et al. (2025) found that the school's physical, social and psychological environment not influenced the students' academic performance. The differences between this study and the Gaisiey et al. (2025) due to contextual factors such as geographical location or school infrastructure disparities. In addition, the study bears testament to Banks (2014) and Barrett et al. (2015), considering the effects of access to functional, resource-imbued physical space on academic achievement. The study also supports the fact that a positive school physical learning environment promotes the health of students, which tallies with Jain's (2017) analyses of the varied roles of schools. The present study recorded moderate positive correlation coefficient ($p = .549$, $p < .001$), between two variables school physical facilities and students' academic performance. The findings are supported by studies conducted by Opio et al. (2024) and Okodoko and Owobete (2025). However, Islam and Khan (2017) noted a comparatively weaker association between these two variables. The future studies should be focused on the mediating variables that might impact the connection between school environment and student achievement. Such studies could be longitudinal research in a variety of schools. Also, including the student voice and perception, qualitative methods may enhance the knowledge of experiencing and internalizing environmental factors in varying school environments.

CONCLUSION

The purpose of the study was to analyse the effect of school physical environment on students' academic performance in the high schools

of the Dindigul District, Tamil Nadu. Based on the results, there was a statistically significant positive relationship between the two variables, which means that students, who have a positive perception on the landscape of school, have higher levels of academic performance. This is in consonance with the previous literature that posited that an effective and stimulating physical environment in school has a substantial influence on students' achievement. The study makes it necessary for the educational stakeholders such as policymakers, school administrators, teachers, and parents to embrace the creation and sustenance of a positive school climate. Such can be realised through promotion of consideration in interpersonal relations, proper resource provision, promotion of high academic standards, provision of students' engagement in school environment improvements.

RECOMMENDATIONS

The study confirms that high school students need a positive school physical environment in achieving academic achievement. Thus, educational stakeholders should pay more attention to the formation and sustenance of the supportive learning environments. This comprises expected and appropriate behaviour in the learning environment, enough support and resources, high standards and expectation, and professional development support for teachers in a positive teaching and learning environment. Moreover, it is important that students have a role in enhancing the physical learning environment of their school. These can be by using questionnaires that students can fill and complete, forming committees that are composed of student representatives, and student activities. It is also suggested that further studies should focus on uncovering particular characteristics of the school's physical context most beneficial for different students and assessing the efficacy of approaches targeting improvements to school contexts and, as a result, students.

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