Examining the Association between School Environment and Students' Academic Performance: A Study of a Public University in Bangladesh

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Abstract: The study aimed to examine the association between school environment and students' academic performance at tertiary level of education in Bangladesh. The study basically used cross-sectional survey design in which primary data were gathered from 220 samples randomly chosen out of 7140 undergraduate students of a public university in Bangladesh. *Gamma coefficient* was applied to find out the nature of association between various aspects of school environment and students' academic performance. The study asserted that several aspects of physical dimension, socio-cultural dimension, health and safety dimension, and institutional dimension of school environment were positively associated with students' academic performance with statistical significance (p< 0.01). As such, the study claimed that a sound school environment positively affects students' academic performance. The study indicated that a university should improve its infrastructural facilities, learning facilities, and institutional capacities, maintain a favourable learning environment and ensure students' sound mental health that would cause their better academic performance.

Keywords: School Climate, School Environment, Mental Health, Students' Academic Performance

1. Introduction

School environment is the complex of physical, social, cultural and institutional settings in which teaching and learning activities are carried out (Lone, 2021; Preeti, 2020). The organisational climate of a school was first discussed by Halpin and Croft (1963) in 1960s in order to study organizational structure and its related processes in school (Chirkina &Khavenson, 2018; Galloway, 2002). However, in course of time, the meaning and dimension of the concept have evolved. School environment, sometimes interchangeably used with school climate, has been defined in academia in various ways. Wang and Degol (2015) argued that school climate signifies virtually every feature of the school experiences, including the quality of teaching and learning, school community relationships, school organization, and the institutional and structural aspects of the school setting, and involves three important aspects – academic climate, community, safety, and institutional environment. Rudasill et al. (2017) asserted that the school environment involves physical environment, shared beliefs and values, relationships and social interactions, safety, teaching and instruction and leadership. However, Saldarriaga and Moreno (2020) stated that school environment refers to academic, socio-cultural, emotional and physical conditions of an educational institution that affect teaching-learning process and school outcomes. Hence, a school environment involves

physical and social environments, institutional arrangements and setting of a school. In other words, it represents physical aspects, socio-cultural aspects, health and safety aspects, and institutional aspects of a school while some aspects are overlapping.

A sound school environment provides adequate classrooms, better learning facilities and teaching-learning methods and materials, maintains healthier interpersonal relationships among learners and teachers, ensures teachers' quality and teaching efforts and students' spontaneous engagements in diverse learning activities, promotes students' mental health and well-being and creates a congenial atmosphere that allows the learners to develop their necessary knowledge, skills and attitudes in order to reach their full potential as members of society (Chirkina &Khavenson, 2018; Lone, 2021; Preeti, 2020; Saldarriaga & Moreno, 2020; Sarah, 2002; Thapa et al., 2013; Uline et al., 2010). As such, the school environment not only affects students' cognitive development and learning outcomes but also promotes their all-round development, that is, their physical, mental, intellectual and social development. Hence, the school environment has been recognized as a key component of the teaching-learning process and is central to fruitful learning. Given its vital role in ensuring quality education, it has received enormous attention from the scholars, researchers and policy makers around the world and become an important arena of academic discourse, research and policy-matters. A number of studies available in the academia show that school environment influences students' academic performance (Adeyemi & Adeyemi, 2014; Alam & Islam, 2022; Alani & Hawas, 2021; Amaechina& Ezeh, 2019; Baafi, 2020; Chime, Obineme, &Ekweogu, 2023; Dhanapala, 2021; Frimpong, Agyeman, & Ofosu, 2016; Harinarayanan &Pazhanivelu, 2018; Koroye, 2016; Melaiye et al., 2021; Nehemiah, 2023; Rafiq, Afzal, & Kamran, 2022; Usaini, Abubakar, &Bichi, 2015).

Adeyemi and Adeyemi (2014) identified the institutional factors that affect students' academic performance and observed that the factors such as student-teacher ratio, teachers' interests and commitment, and teaching method significantly affect students' academic performance while the factors such as school leadership and library facilities do not have such effects. Hence, their study was primarily related to institutional aspects of the school environment rather than other dimensions of school environment. Usaini et al. (2015) investigated the influence of school environment on students' academic performance in Malaysia and revealed that school's adequate facilities, good teachers and favourable environment have effects on students' academic performance. However, their study did not take into account various social, cultural and institutional aspects of the school environment. Frimpong et al. (2016) opined that the institutional aspects of school environment such as favourable learning environment, better library facilities, availability of books, adequate internet service, and so on affect students' academic performance. Hence, the researchers only investigated institutional factors; other factors were not taken into consideration. Moreover, based on percentage distribution and mean values, the researchers claimed such effects without examining any bivariate analysis. Harinarayanan and Pazhanivelu (2018) indicated that there is a positive association between school environment and students' academic achievement. However, the researchers did not measure the school environment in terms of several dimensions.

Amaechina and Ezeh (2019) suggested that students' security, socio-emotional health and school support affect their academic performance. However, they did not employ any measure of association to investigate the nature and degree of association. Moreover, few aspects of the school environment were examined. Baafi (2020) studied the impact of school physical environment on students' academic performance in Ghana and found a positive effect. However, the researcher only examined whether measures of the physical environment affect students' academic performance. Other dimensions such as social and institutional aspects of the school environment were not taken into consideration in his study. Khan and Golder (2020) sought to identify the factors that affect students' academic performance in Bangladesh and indicated that besides some personal factors, student-teacher relationships affect students' academic performance. Hence, their study was very narrow in scope relating to the school environment. Raji and Owodunni (2020) claimed that school social environments involving supportive teacher relationship, supportive peer relationship, supportive student relationship and supportive learning environment have significant effects on students' academic wellbeing. However, in their research, students' academic grades were not studied while examining the effects of the school social environment on students' academic wellbeing. Alani and Hawas (2021) examined the factors affecting students' academic performance in Iraq and found

several facets of school environment such as favourable learning environment, university facilities including classrooms, library rooms, and laboratories, teacher support, teaching skills and practices that significantly affect students' academic performance. However, the researchers did not consider various socio-cultural factors that might affect students' academic performance.

Melaiye et al. (2021) indicated that school learning environments involving libraries, laboratories, sport facilities and instructional materials have positive effects on students' academic performance. However, the researchers did not examine the effects of various important aspects related to the school environment. Alam and Islam (2022) stated that choice of major, study environment, and internet service are significantly associated with students' academic performance in the context of Bangladeshi universities. However, they did not look into other factors associated with the school environment. Rafiq et al. (2022) examined the impact of school environment on students' academic achievements at university level and observed that several aspects such as teacher support, physical environment, hygiene and sanitation, cooperation among students, and extra-curricular activities affect students' achievements. However, the researchers did not take into account several important social, cultural and institutional aspects of the school environment. Moreover, students' actual academic grade was not considered as a dependent variable. Chime et al. (2023) found that various aspects of school environment such as infrastructural facilities, instructional materials and school social relationships involving student-student relationship, student-teacher relationship and teacher-teacher relationship influence students' academic performance. However, the researchers claimed such influence without examining any association analysis. Nehemiah (2023) indicated that school's infrastructural facilities such as favourable classrooms, ICT facilities and well-equipped libraries have significant effects on students' academic performance. The researchers only examined the effects of infrastructural facilities on students' academic performance. Other important aspects of the school environment were overlooked.

While the aforesaid studies are of importance from an academic point of view, the association between students' academic performance and each of the physical aspects, socio-cultural aspects, health and safety aspects, and institutional aspects of the school environment has been ignored so far. Moreover, most of the studies available in the academic world were conducted at school levels, rather than at university levels. Furthermore, most of the empirical studies which are available in the academic world do not describe the extent to which several aspects of the school environment are associated with students' academic performance. In addition, while some studies are available as to the factors that affect students' academic performance in Bangladesh context, school environment has not yet been highlighted in empirical research (Akhter & Siddiky, 2024; Alam & Islam, 2022; Khan & Golder, 2020; Siddiky& Haque, 2024). As such, the study was aimed to examine the association between school environment and students' academic performance of a public university in Bangladesh. In this regard, five research queries were investigated in the study in line with the overall intent of the study which are presented below in Table 1:

Table1

Statement of research queries

No.	Research queries
1.	To investigate students' perceptions about various aspects of school environment
2.	To examine the association between physical dimension of school environment and students' academic performance
3.	To examine the association between socio-cultural dimension of school environment and students' academic performance
4.	To examine the association between health and safety dimension of school environment and students' academic performance
5.	To examine the association between institutional dimension of school environment and students' academic performance

2.   Methodology

2.1   Research Design and Participants

Noakhali Science and Technology (NSTU) – a public university in Bangladesh was deliberately selected by the researchers for conducting this study. The study was principally a survey research involving a cross-sectional design where data were observed and several variables pertaining to the characteristics of the population were investigated at one point in time (Babbie, 2010; Neuman, 2014). Since the study mainly sought to find out the nature and magnitudes of relationship among several variables, the study may be termed as correlational research, sometimes known as associational study (Bordens & Abbott, 2018; Fraenkel & Wallen, 2009). To substantiate the findings generated through quantitative analysis, the study conducted some qualitative interviews. As such, the study also involved a mixed design.

The NSTU has thirty-three academic departments or academic majors under six faculties and two institutes. Out of 33 departments, a total of 28 were purposely selected for the study. As of August, 2023, the total number of undergraduate students of the NSTU was 7140, of whom 3779 were males and the rest (3361) were females. As the study was conducted among the undergraduate students only, a total of 7140 students were the target population. Yamane's (1967) formula$(n = \frac{N}{1+N*e^2})$, was employed to determine the sample size from the target population where n = sample size, N = population size and e = level of precision. Hence, by using Yamane's formula, $[n = \frac{7140}{1+7140*(.05)^2}$] = a total of 379 was determined as samples. However, the researchers could not cover all the samples, and got access to a total of 220 samples. As such, due to convenience of the researchers, the sample size for the study was set as 220. On the basis of simple random sampling – a type of probability sampling – via lottery method, the aforesaid samples were chosen from the target population to make sure that each and every unit of population has an equal chance to be included in the sample (Babbie, 2010; Fraenkel & Wallen, 2009). The descriptive statistics of the respondents' socio-demographic characteristics are presented in Table 2:

Table 2

Respondents' socio-demographic characteristics

Variables			Frequency (f)	Percent (%)
Department		ACCE	6	2.7
		AGR	8	3.6
		APM	9	4.1
		BA	8	3.6
		BAN	6	2.7
		BMB	7	3.2
		BMS	9	4.1
		CHEM	6	2.7
		ECO	7	3.2
		EDA	7	3.2
		EDU	9	4.1
		EEE	7	3.2
		ENG	6	2.7
		ESDM	10	4.5
		FIMS	6	2.7
		FTNS	7	3.2
		ICE	6	2.7

Variables			
	ISLM	10	4.5
	LW	7	3.2
	MB	8	3.6
	MIS	11	5.0
	PHARM	7	3.2
	PHY	5	2.3
	SOC	8	3.6
	SOW	11	5.0
	STAT	10	4.5
	THM	10	4.5
	ZOO	9	4.1
	Total	**220**	**100.0**
Faculty		Frequency (f)	Percent (%)
	Faculty of Science	91	41.4
	Faculty of Engineering	20	9.1
	Faculty of Business Studies	29	13.2
	Faculty of Social Science and Humanities	47	21.4
	Faculty of Education	16	7.3
	Others	17	7.7
	Total	**220**	**100.0**
Gender		Frequency (f)	Percent (%)
	Male	144	65.5
	Female	76	34.5
	Total	**220**	**100.0**
Academic Year		Frequency (f)	Percent (%)
	First year	24	10.9
	Second year	69	31.4
	Third year	55	25.0
	Fourth year	72	32.7
	Total	**220**	**100.0**
Age	Gender	Mean	Median	SD
	Male	22.74	23.00	1.409
	Female	22.83	23.00	1.314
	Total	**22.76**	**23.00**	**1.374**

Note: ACCE = Applied Chemistry and Chemical Engineering; AGR = Agriculture; APM = Applied Mathematics; BA = Business Administration, BAN = Bangla; BMB = Bio-chemistry and Molecular Biology; BMS = Bangladesh and Muktijudhho Studies; CHEM = Chemistry; ECO = Economics; EDA = Educational Administration, EDU = Education, EEE = Electrical and Electronics Engineering; ENG = English; ESDM = Environmental Science and Disaster Management; FIMS = Fisheries and Marine Science; FTNS = Food Technology and Nutrition Science; ICE = Information and Communication Engineering; ISLM = Information Science and Library Management; LW = Law; MB = Microbiology; PHARM = Pharmacy; PHY = Physics, SOC = Sociology; SOW = Social Work; STAT = Statistics; THM = Tourism and Hospitality Management; and ZOO = Zoology.

2.2 Measurement and Data Collection

The term 'school environment' was measured with four dimensions involving physical dimension, socio-cultural dimension, health and safety dimension, and institutional dimension. The perceptions of the respondents with regard to several dimensions of school environment were measured on five-point Likert type scale, specifically an ordinal scale defined from very negative to very positive degree of attitudes where '1' indicates very negative attitudes, '3' indicates moderate

attitudes and '5' indicates very positive attitudes. The physical dimension of the school environment was measured by five aspects or indicators such as adequacy of academic buildings, adequacy of classrooms, adequacy of laboratories, adequacy of libraries, and adequacy of playgrounds and sport facilities. The socio-cultural dimension of the school environment was measured by five indicators involving intimacy of peer group relationship, closeness of student-teacher relationship, adequacy of co-curricular activities, adequacy of cooperation among students, and the favourableness of learning climate. The health and safety dimension of the school environment was measured by five indicators involving adequacy of medical services, adequacy of sanitation services, adequacy of counselling services, soundness of students' mental health, and adequacy of students' feeling of safety. The institutional dimension of school environment was measured by nine indicators involving adequacy of teachers, adequacy of teaching-learning materials, adequacy of internet service, adequacy of teachers' quality, adequacy of teachers' efforts and dedications, adequacy of teachers' supports, favourableness of teaching methods and strategies, supportiveness of academic discipline and supportiveness of university leadership. In contrast, to measure students' academic performance, the respondents were asked to provide their current Cumulative Grade Point Average (CGPA), and then the points were converted into grades in order to ensure ordinal level of measurement. As interviewer-administered questionnaire was most suitable for obtaining the highest responses and facilitating clarifications of the questions to the respondents, it was adopted by the researchers as an instrument for data collection.

To construct an interviewer-administered questionnaire, the researchers went through several relevant journal articles available in academia pertaining to the effects of the school environment on students' academic performance and consulted with some academics. After constructing the questionnaire, it was placed to three experts who had expertise in this field to ensure its face validity. Then based on their evaluations, the questionnaire was updated. Then the questionnaire was tested among a group of undergraduate students of the NSTU of various departments. After checking the inaccuracies and inconsistencies via pre-test evaluation, the final version of the questionnaire was constructed through modification, and it became ready for survey. Then primary data were gathered from the samples via survey method conducted by the researchers and their team by means of face-to-face interview. Among the participants, six were purposely chosen for in-depth interviews to assess their perceptions as to how their studies, especially academic grades, were affected by the school environment.

The survey was carried out from 15 August2023 to 15 October 2023 through careful fieldwork. The researchers properly maintained honesty, sincerity and confidentiality during the research work. After collecting primary data, they were edited properly by checking whether there were any omissions. The Cronbach's alpha test was employed to weigh the reliability of the items of the measurement and test results are presented in the Table 3

Table 3

Cronbach's alpha coefficients

No.	Dimensions/Factors	Items	Cronbach's alpha Coefficient
1	Physical dimension	4	.837
2	Socio-cultural dimension	5	.882
3	Health and safety dimension	5	.887
4	Institutional dimension	9	.932

As shown above in Table 3, the Cronbach's alpha coefficients for the 24 items relating to four categories of dimensions of school environment – physical dimension, socio-cultural dimension, health and safety dimension, and institutional dimension – were .837, .882, .887, and .932 respectively (greater than .70) which indicated that the items of scales in the measurement were reliable (Nawi et al., 2020; Taber, 2017).

2.3   Data Analysis

Primary data collected via cross-sectional survey were analysed by employing both descriptive and inferential statistics. Descriptive statistics involved frequency distribution, central tendency, measure of association, and so on while inferential statistics involved hypothesis tests in order to make inferences about population characteristics (Bordens& Abbott, 2018; Fraenkel & Wallen, 2009). Median is the appropriate measure when data are ordinal in nature (Nachmias & Nachmias, 2008). As such, due to ordinal character of data, the study reasonably used medians rather than means to measure or rate the perceptions of the respondents pertaining to the various dimensions of school environment. Since primary data pertinent to research queries were measured on ordinal scale, the study logically employed *Gamma Coefficient* in order to find out the nature and significance of association between each of the aspects of physical dimension, socio-cultural dimension, health and safety dimension and institutional dimension of school environment and students' academic performance. As Nachmias and Nachmias (2008) duly stated, *Gamma* Coefficient is a measure of association used for ordinal variables. All kinds of statistical applications used in the study were performed by SPSS 20.0.

3.   Findings

Table 4

Students' academic performance

Students' academic Performance (Academic Grades)	Responses	Frequency (f)	Percent (%)
	B-	13	5.9
	B	54	24.5
	B+	79	35.9
	A-	57	25.9
	A	17	7.7
	Total	**220**	**100.0**

Table 4 above shows students' academic performance in their term final exams. It is evident that majority of the respondents (about 36%) achieved B+ in their term final exams, followed by grade A- which represents about 26% of the respondents, grade B which represents 24.5% of the respondents, grade A which represents 7.7% of the respondents and grade B- which represents about 6% of the respondents. It is noteworthy that no one student achieved grade C+.

Table 5 as shown below describes the magnitudes of students' perceptions about various aspects of the school environment which are categorized under four dimensions – physical dimension, socio-cultural dimension, health and safety dimension, and institutional dimension.

Table 5

Ratings of students' perceptions about school environment

Dimension		Mean (x̄)	Median (M)	SD	Rating
Physical Dimension	**Measurement Indicators**				
	Adequacy of academic buildings	2.32	2.00	.714	Slightly
	Adequacy of classrooms	2.98	3.00	.682	Moderately
	Adequacy of laboratories	2.96	3.00	.766	Moderately
	Adequacy of libraries	2.93	3.00	.676	Moderately

	Measurement Indicators	Mean (x̄)	Median (M)	SD	Rating
	Adequacy of playgrounds and sport facilities	2.90	3.00	.623	Moderately
Socio-cultural Dimension	**Measurement Indicators**	**Mean (x̄)**	**Median (M)**	**SD**	**Rating**
	Intimacy of peer group relationship	3.41	3.00	.826	Moderately
	Closeness of teacher-student relationship	3.38	3.00	.799	Moderately
	Adequacy of cooperation among students	3.15	3.00	.728	Moderately
	Adequacy of co-curricular activities	3.39	3.00	.806	Moderately
	Favourableness of university learning climate	3.14	3.00	.698	Moderately
Health and Safety Dimension	**Measurement Indicators**	**Mean (x̄)**	**Median (M)**	**SD**	**Rating**
	Adequacy of medical services	2.84	3.00	.595	Moderately
	Adequacy of sanitation services	2.89	3.00	.597	Moderately
	Adequacy of counselling services	2.70	3.00	.678	Moderately
	Soundness of students' mental health	3.06	3.00	.813	Moderately
	Students' feeling of safety	3.01	3.00	.689	Moderately
Institutional Dimension	**Measurement Indicators**	**Mean (x̄)**	**Median (M)**	**SD**	**Rating**
	Adequacy of teachers	3.20	3.00	.770	Moderately
	Adequacy of teaching-learning materials	3.28	3.00	.736	Moderately
	Adequacy of internet service	3.32	3.00	.661	Moderately
	Adequacy of teachers' quality	3.40	3.00	.790	Moderately
	Adequacy of teachers' efforts and dedications	3.37	3.00	.815	Moderately
	Adequacy of teachers' supports	3.33	3.00	.846	Moderately
	Favourableness teaching methods and strategies	3.07	3.00	.689	Moderately
	Supportiveness of university academic discipline	2.93	3.00	.669	Moderately
	Supportiveness of university leadership	2.81	3.00	.702	Moderately

Note: 1= not at all; 2= slightly; 3= moderately; 4= much; 5= very much

The study sought to investigate the nature and significance of association between each of the aspects of physical dimension of school environment and students' academic performance through validating some research hypotheses as shown below in Table 6:

Table 6

Association between physical dimension and students' academic performance

No.	Research hypotheses (H$_a$)	Statistical Technique	Value	Nature of Association	Alpha-value	*p*-value
1	There is an association between students' academic performance and adequacy of academic buildings[*]	Gamma	.570	Positive	0.01	.000
2	There is an association between students' academic performance and adequacy of classrooms[*]	Gamma	.568	Positive	0.01	.000
3	There is an association between students' academic performance and adequacy of laboratories [*]	Gamma	.506	Positive	0.01	.000
4	There is an association between students' academic performance and adequacy of libraries[*]	Gamma	.651	Positive	0.01	.000
5	There is an association between students' academic performance and adequacy of playgrounds and sport facilities[*]	Gamma	.305	Positive	0.01	.000

Note: [*] Statistically significant at 99% confidence level

As shown in Table 6, all research hypotheses with regard to the association between physical dimension of school environment and students' academic performance were supported by the observed evidence. Each aspect of the physical dimension of the school environment was positively associated with students' academic performance while their degrees of association varied from low to high. As can be seen, the empirical evidence supported that there is a significant association between students' academic performance and each of the aspects of physical dimension of school environment involving adequacy of academic buildings (γ = .570; p< 0.01), adequacy of classrooms (γ = .568; p< 0.01), adequacy of laboratories (γ = .506; p< 0.01), adequacy of libraries (γ = .651; p< 0.01), and adequacy of playgrounds and sport facilities (γ = .305; p< 0.01). In this regard, two participants were asked how the physical environment of the University affects their academic grades. A participant stated as follows:

> We don't have any seminar library and lab in our department. We have only two classrooms which are very inadequate. We can't study in groups due to the lack of seminar library and we can't practice due to lack of a lab. Moreover, there are very inadequate books in our central library. Hence, inadequate facilities of our university interrupt my study and thereby affect my academic grades (P-90, SOC).

Another participant added:

> Theory and practice are two important elements of learning. However, we can't apply theory in practice. Because, we don't have any lab. Moreover, we don't have a seminar library, and other necessary infrastructural facilities which are instrumental in learning. Consequently, my academic grades are not up to the mark. (P-197, PHY).

The above excerpts reveal that physical environment involving libraries, labs and classrooms are very important aspects for learning effectiveness. The study sought to examine the nature and significance of association between each of the aspects of socio-cultural dimension of school

environment and students' academic performance via validating some hypotheses as depicted below in Table 7:

Table 7

Association between socio-cultural dimension and students' academic performance

No.	Research hypotheses (H$_a$)	Statistical Technique	Value	Nature of Association	Alpha -value	*p-*value
1	There is an association between students' academic performance and intimacy of peer group relationship[*]	Gamma	.772	Positive	0.01	.000
2	There is an association between students' academic performance and closeness of student-teacher relationship[*]	Gamma	.699	Positive	0.01	.000
3	There is an association between students' academic performance and the adequacy of co-curricular activities[*]	Gamma	.682	Positive	0.01	.000
4	There is an association between students' academic performance and the cooperation among students[*]	Gamma	.640	Positive	0.01	.000
5	There is an association between students' academic performance and favourableness of learning climate[*]	Gamma	.774	Positive	0.01	.000

Note: [*] Statistically significant at 99% confidence level

As shown in Table 7, all research hypotheses concerning the association between socio-cultural dimension of school environment and students' academic performance were supported by the empirical evidence. Each of the aspects of the socio-cultural dimension of the school environment was positively associated with students' academic performance and their magnitudes of association were high. As can be seen, the empirical evidences supported that there is a significant association between students' academic performance and each of the socio-cultural dimension of school environment involving intimacy of peer group relationship (γ = .772; p< 0.01), closeness of student-teacher relationship (γ = .699; p< 0.01), the adequacy of co-curricular activities (γ = .682; p< 0.01), the cooperation of among students (γ = .640; p< 0.01), and favourableness of university learning climate (γ = .774; p< 0.01). In this regard, two students were interviewed as to how the school socio-cultural environment affected their academic performance. A participant reported as follows:

> We have cordial relationships with our friends and teachers. Our teachers are very helpful in our academic matters. Moreover, our department often organizes various co-currocular activities which are very helpful for our soft skill development. Hence, we have a very good academic environment that boosts up our morale, motivation and academic engagement which lead to my better academic performance. (P-190, EEE).

Another participant stated:

> We have a very congenial atmosphere in our institute. We have very good relations with our friends and teachers. All the teachers are very interactive and supportive. Our institute regularly organizes several co-curricular activities that strengthen our social interaction and bonding. Hence, our institute has a sound learning environment that enhances our motivation for learning and academic engagement which are attributed to my good academic grades (P-13, ISLM).

The above excerpts reveal that school socio-cultural environment involving peer relationships, student-teacher relationships, mutual cooperation, and co-curricular activities boost up students' morale, motivation and academic engagement that lead to their better academic performance.

The study sought to investigate the nature and significance of association between each of the aspects of health and safety dimension of school environment and students' academic performance via validating some hypotheses as shown below in Table 8:

Table 8

Association between health and safety dimension and students' academic performance

No.	Research hypotheses (H$_a$)	Statistical Technique	Value	Nature of Association	Alpha-value	*p*-value
1	There is an association between students' academic performance and adequacy of medical services[*]	Gamma	.680	Positive	0.01	.000
2	There is an association between students' academic performance and sanitation services[*]	Gamma	.473	Positive	0.01	.000
3	There is an association between students' academic performance and counselling services[*]	Gamma	.520	Positive	0.01	.000
4	There is an association between students' academic performance and soundness of students' mental health[*]	Gamma	.730	Positive	0.01	.000
5	There is an association between the students' academic performance and students' feeling of safety[*.]	Gamma	.626	Positive	0.01	.000

Note: [*] Statistically significant at 99% confidence level

As shown in Table 8, all research hypotheses relating to the association between the health and safety dimension of the school environment and students' academic performance were supported by the empirical evidence. Each of the aspects of the health and safety dimension of the school environment was positively associated with students' academic performance while their magnitudes of association ranged from moderate to high. As can be seen, the empirical evidence supported that there is a significant association between students' academic performance and each of the health and safety dimension of school environment involving adequacy of university medical services ($\gamma = .680$; p< 0.01), adequacy of sanitation services ($\gamma = .473$; p< 0.01), the adequacy of counselling services ($\gamma = .520$; p< 0.01), soundness of students' mental health ($\gamma = .730$; p< 0.01), and students' feeling of safety ($\gamma = .626$; p< 0.01). In this regard, one student was interviewed as to how school health and safety environment affected their academic performance. A participant stated as follows:

Due to the unusual delay of our academic activities and feeling of insecurity, we have anxiety and tensions. The university has inadequate counselling services and medical treatment facilities that greatly influence our physical and mental health and thereby affect academic performance (P-87, SOC).

The above excerpt reveals that inadequate medical and counselling services, feeling of insecurity and mental ill health affect students' academic performance.

The study aimed to investigate the nature and significance of association between each of the aspects of institutional dimension of school environment and students' academic performance via validating some hypotheses as shown below in Table 9:

Table 9

Association between institutional dimension and students' academic performance

No.	Research hypotheses (H$_a$)	Statistical Technique	Value	Nature of Association	Alpha-value	*p*-value
1	There is an association between students' academic performance and adequacy of teachers*	Gamma	.587	Positive	0.01	.000
2	There is an association between students' academic performance and adequacy of teaching-learning materials*	Gamma	.655	Positive	0.01	.000
3	There is an association between students' academic performance and adequacy of internet service*	Gamma	.797	Positive	0.01	.000
4	There is an association between the students' academic performance and adequacy of teachers' quality*	Gamma	.507	Positive	0.01	.000
5	There is an association between the students' academic performance and adequacy of teachers' efforts and dedications*	Gamma	.554	Positive	0.01	.000
6	There is an association between the students' academic performance and adequacy of teachers' supports*	Gamma	.672	Positive	0.01	.000
7	There is an association between the students' academic performance and favourableness of teaching methods and strategies*	Gamma	.396	Positive	0.01	.000
8	There is an association between the students' academic performance and supportiveness of university academic discipline*	Gamma	.302	Positive	0.01	.000
9	There is an association between the students' academic performance and supportiveness of university leadership*	Gamma	.300	Positive	0.01	.000

Note: * Statistically significant at 99% confidence level

As shown in Table 9, all research hypotheses pertaining to the association between institutional dimension of school environment and students' academic performance were supported by the empirical evidence. Each of the aspects of the institutional dimension of the school environment was positively associated with students' academic performance while their magnitudes of association ranged from low to high. As can be seen, the empirical evidences supported that there is a significant association between students' academic performance and each of the institutional dimension of school environment involving adequacy of teachers ($\gamma = .587$; p< 0.01), adequacy of teaching-learning materials ($\gamma = .655$; p< 0.01), the adequacy of internet service ($\gamma = .797$; p< 0.01), adequacy of teachers' quality ($\gamma = .507$; p< 0.01), adequacy of teachers' efforts and dedications ($\gamma = .554$; p< 0.01), adequacy of teachers' supports ($\gamma = .672$; p< 0.01), favourableness of teaching methods and strategies ($\gamma = .396$; p< 0.01), supportiveness of university academic discipline ($\gamma = .302$; p< 0.01), and supportiveness of university leadership ($\gamma = .300$; p< 0.01). In this regard, one student was interviewed as to how the school institutional environment affected their academic performance. A participant stated as follows:

> Our teachers are very brilliant and dedicated to us. They put their best efforts and use supportive teaching-learning materials to instruct us. The institutional facilities of our department and university academic disciplines are very supportive to our acquisition of knowledge and skills that lead to our better academic grades (P-200, MICRO).

The above excerpt indicates that the school institutional environment involving learning facilities, teachers' quality and efforts, and university academic discipline are very helpful to students' better academic performance.

4. Discussion

School physical environment is one of the important dimensions of a school's environment. It includes academic buildings, classrooms, libraries, laboratories, playgrounds and other infrastructure facilities of a school that influence teaching-learning process and learning effectiveness (Baafi, 2020; Saldarriaga & Moreno, 2020; Wang & Degol, 2015). The study indicated that the physical dimension of school environment involving adequacy of academic buildings, adequacy of classroom, adequacy of laboratories, adequacy of libraries, and adequacy of playgrounds and sport facilities was positively associated with students' academic performance with statistical significance. Hence, the study claimed that the school physical environment affects students' academic performance. These findings are supported by the findings of several studies (Alani & Hawas, 2021; Baafi, 2020; Koroye, 2016; Nehemiah, 2023; Saldarriaga & Moreno, 2020). School socio-cultural environment represents peer group relationship, student-teacher relationship, teacher-teacher relationship, the level of social interaction, learning environment, and so on that affect teaching-learning process and learning outcomes (Chirkina & Khavenson, 2018; Khan et al., 2023; Paschal & Mkulu 2020; Rudasill et al., 2017; Raji & Owodunni, 2020). The results of the study suggested that the socio-cultural dimension of school environment involving intimacy of peer group relationship, closeness of student-teacher relationship, adequacy of cooperation among students, adequacy of co-curricular activities, and favourableness of learning climate was positively associated with students' academic performance with statistical significance. Hence, the study claimed that the school socio-cultural environment affects students' academic performance. These findings are substantiated by several studies (Alani & Hawas, 2021; Ali et al., 2018; Chime et al., 2023; Dhanapala, 2021; Khan & Golder, 2020; Khan et al., 2023; Liu, 2023; Raji & Owodunni, 2020; Melaiye et al., 2021; Paschal & Mkulu 2020). Co-curricular activities, integral to a school's socio-cultural activities and skill development tasks, are also observed to be associated with students' academic performance in many studies (Ali et al., 2018; Khan & Golder, 2020; Rafiq et al., 2022; Siddiky, 2019). These activities enhance students' various soft skills such as communication skill, creative-thinking skill, analytical skill, problem-solving skill, self-motivational skill, raise their attentiveness and contribute to their physical and mental fitness that led to their better academic performance (Ali et al., 2018; Siddiky, 2019, 2020). A sound school learning climate involves better peer group relationship, better student-teacher relationship, better

student cooperation, better learning facilities, and so on (Alani & Hawas, 2021; Melaiye et al., 2021). The study indicated that sound learning climate contributes to students' better academic grades. This finding is consistent with the findings presented by several studies (Alani & Hawas, 2021; Dhanapala, 2021; Chime et al., 2023; Melaiye et al., 2021; Paschal & Mkulu 2020; Raji & Owodunni, 2020). However, the aforesaid studies did not investigate the extent to which school learning climate is associated with students' academic performance.

Health and safety dimension is one of the important facets of school environment affecting students' physical and mental health and academic achievement in many ways (Chirkina & Khavenson, 2018; Rudasill et al., 2017; Oluwaferanmi & Uzun, 2021; Sarah, 2002; Wang & Degol, 2015). The study revealed that the health and safety dimension of the school environment involving adequacy of medical services, adequacy of sanitation services, adequacy of counselling services, soundness of students' mental health and students' feeling of security was positively associated with students' academic performance with statistical significance. Hence, the study argued that the health and safety dimension of the school environment affects students' academic performance. These findings are in line with the findings of several studies (Amaechina & Ezeh, 2019; Babu, 2013; Das & Dhar, 2023; Kawaka et al., 2023; Oluwaferanmi & Uzun, 2021; Rafiq et al., 2022; Rehman et al., 2023). School counselling services and safety measures are important factors of students' mental health and their academic performance. Some studies suggested that after receiving school counselling services, students' academic results have improved (Kawaka et al., 2023; Oluwaferanmi & Uzun, 2021; Rehman et al., 2023). As Ibrahim et al. (2021) found in their study that 80% of respondents' academic results have improved after receiving school's counselling services. Amaechina and Ezeh (2019) claimed that the students, who feel secure in the school environment and who are supported in school and who have better mental health, have better academic performance in school. A study indicated that students' positive mental health contributes to their academic success through improving their cognitive functioning, motivation and engagement for learning (Das & Dhar, 2023). A study indicated that students' academic performance increased as their depression, anxiety and frustration decreased (Akhter, & Siddiky, 2024). A study conducted by Siddiky and Haque (2024) asserted that students' sound physical and mental health positively affect their academic performance mediated by their motivation for learning. Hence, the study claimed that school's medical and counselling services, learning environment, and safety measures contribute to students' motivation for learning and sound mental health that led to their better academic achievements.

Institutional environment reflecting organizational features, institutional arrangements, rules and regulations, and teaching-learning resources of a school is one of the vital facets of the school environment that affect overall teaching-learning process and school academic outcomes (Wang & Degol, 2015). The study asserted that institutional dimension of school environment involving adequacy of teachers, adequacy of teaching-learning materials, adequacy of internet service, adequacy of teachers' quality, adequacy of teachers' efforts and dedications, adequacy of teachers' supports, favourableness of teaching methods and strategies, supportiveness of university academic discipline, and supportiveness of university leadership was positively associated with students' academic performance with statistical significance. Hence, the study claimed that the institutional dimension of the school environment affects students' academic performance. These findings are supported by the findings presented by several studies (Alam & Islam, 2022; Alani & Hawas, 2021; Amaechina & Ezeh, 2019; Frimpong et al. 2016; Melaiye et al., 2021; Obed & Baptiste, 2024; Rafiq et al., 2022; Usaini et al., 2015). However, unlike the present study, the aforesaid studies do not describe the extent to which various aspects of the institutional dimension of the school environment are associated with students' academic performance. A study claimed that students' academic achievement varies depending on the course delivery approach (Hussen, 2022). Hence, teaching method and strategy affects students' academic performance. However, one element of the institutional factor was studied in that study. As such, a favourable institutional environment is a contributing factor to students' academic achievements (Govindarajoo, Selvarajoo & Ali, 2022; Siddiky & Haque, 2024). While the study accepted the findings of Koroye (2016) that school infrastructural facilities have effect on students' academic performance but negated his findings that teaching-learning equipment and materials do not have effect on students' academic performance. Moreover, while the study supported the findings of Adeyemi and Adeyemi (2014) as a whole that the institutional factors affect students'

academic performance but contradict with their findings that school leadership and library facilities do not have effects on students' academic performance. Finally the study claimed that the quality and characteristics of the school environment affect students' academic performance. As such, the study negates the findings of Lawrence (2012) and Narang (2020) that the school environment does not affect students' academic performance.

5. Conclusion

The study revealed that the physical dimension of school environment involving adequacy of academic buildings, adequacy of classrooms, adequacy of laboratories, adequacy of libraries, and adequacy of playgrounds and sport facilities, the socio-cultural dimension of school environment involving intimacy of peer group relationship, closeness of student-teacher relationship, adequacy of cooperation among students, adequacy of co-curricular activities, favourableness of learning climate, the health and safety dimension of school environment involving adequacy of medical services, adequacy of sanitation services, adequacy of counselling services, soundness of students' mental health and students' feeling of security, and institutional dimension of school environment involving adequacy of teachers, adequacy of teaching-learning materials, adequacy of internet service, adequacy of teachers' quality, adequacy of teachers' efforts and dedications, adequacy of teachers' supports, favourableness of teaching methods and strategies, supportiveness of university academic discipline, and supportiveness of university leadership were positively associated with students' academic performance with statistical significance. Hence, the study claimed that the conditions and characteristics of school physical environment, school socio-cultural environment, school health and safety environment, and school institutional environment have effects on students' academic performance.

The study found that while the various aspects of school environment were associated with students' academic performance, the NSTU had several drawbacks with regard to its infrastructural facilities especially academic buildings and classrooms, learning facilities, availability of teachers, availability of teaching-learning materials, instructional methods, and so on. Hence, given the present situation and global needs, the NSTU should undertake proper measures to improve its infrastructural capacities, learning facilities, instructional methods and strategies, and strengthen its institutional capacities. The study found that students' mental health is an important determinant of students' academic performance. Some studies indicated that mental health affects students' academic performance since major mental health concerns such as depression, stress and anxiety adversely contributes to students' exam results (Akhter & Siddiky, 2024; Rehman et al., 2023). Nevertheless, students' mental health of the NSTU is somewhat or moderately sound.

As such, the NSTU authority should pay utmost attention to students' mental health and wellbeing through undertaking several measures such as provision of student counselling and guidance services, sound school learning environment, and proper school safety measures and thereby contribute to students' learning effectiveness and better academic achievements. Hence, the study carries much significance from the policy perspective. However, the study contains two important shortcomings or limitations. First, although motivation is at the core of our voluntary behaviours and determines the intensity and direction of human action, students' motivation for learning was not investigated in this study. Second, students' academic engagement or study time was not investigated in this study. However, the study adopted a mixed approach where quantitative analysis was substantiated by qualitative findings that reflected how school environment affected students' academic performance.

6. Co-Author Contribution

While author-1 was the principal researcher of the research project, he was assisted by author-2 and three undergraduate students during the process of research work. The author-2 helped the principal researcher in the process of data collection. He also helped him to write up the conclusion section of the paper.

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9.　References

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