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Impact of Educational Facilities on Students' Academic Achievement at the Secondary School Level in Pakistan

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ABSTRACT This study investigated the impact of educational facilities at the secondary school level in Pakistan. The research aims to identify educational facilities and examine their impact. The sample comprised 700 respondents, including 500 students and 200 teachers from government secondary schools. The validity percentage was determined using a 60 percent rejection rate, and Cronbach's alpha was employed to calculate the internal consistency. Data was analysed using SPSS, and descriptive approaches were applied. Regression analysis was conducted to assess the relationship between academic achievement and educational facilities. The results revealed a statistically significant relationship between educational facilities and students' academic achievement. However, no significant relationships were found between first aid facilities, transportation and students' academic achievement, although these facilities are crucial for ensuring access to high-quality education and students' safety.

INTRODUCTION

A significant factor in increasing learning achievements across the globe is the availability of basic infrastructure and amenities, including school buildings, science laboratories, computers, lab equipment, classrooms, water and electricity supplies, sports fields, libraries and sufficient numbers of books (Santika et al. 2021). Physical facilities such as buildings, tables, chairs, cabinets, and writing instruments are crucial for creating a conducive learning environment. The infrastructure should be thoughtfully constructed and maintained in schools to improve its durability. The goal of elevating the quality of education has resulted in a global focus on providing school infrastructure, encompassing classrooms, desks, restrooms, and well-equipped study areas (Nurabadi et al. 2020).

In Indonesia, for example, school facilities contribute to a more effective education system, thereby enhancing the skills and achievement of most students (Nurabadi et al. 2020). Notably, investment in education, along with human and physical resources, is essential for raising educational standards. However, in Spain, school failure has been identified as a significant challenge for the education system due to insufficient infrastructure, and basic educational facilities have been recommended to ensure successful education and student achievement (Martinez-Valdivia and Burgos-García 2020). According to Iqbal (2005), provision of physical facilities at public and private schools play a vital role to boost the students' progress and provide them a well secured and peaceful environment.

Similarly, e-learning, system administration, instructional materials, libraries, dormitories and sports facilities significantly influence academic success in Malaysia. Therefore, schools should improve academic achievement by investing in school infrastructure, drawing on the example of academic institutions in all the mentioned countries (Ramli et al. 2018). Additionally, Godson and Ngusa (2020) found that it is essential for Tanzanian schools' administration to work hard to enhance the school physical environment, which has a significant impact on students' learning.

Schools must make effective investments in their facilities and infrastructure to achieve bet-

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ter academic outcomes and high-quality instruction (Damien 2010). However, there are concerns regarding class sizes in California and New York. Large size classes hinder students' ability to attain high academic grades, and limited learning opportunities arise from a lack of infrastructure in Latin America that supports the health of teachers and children, including electricity, clean water, sanitary drainage, and toilets (Barret and Treves 2019). Kirch et al. (2021) observed that educational facilities such as laboratories, books, hostels, classrooms and libraries significantly influence students' academic achievement.

A study conducted by Alani and Hawas (2021) identified physical facilities affecting students' academic achievement, including school building, classrooms, laboratories, campus layout and library. Findings from the study by Baafi (2020) revealed that students in senior high school in Ghana with good physical facilities performed better than those whose learning environment was not conducive due to inadequate school facilities. However, Olayinka et al. (2021) investigated the influence of school facilities on students' academic performance in basic sciences and technology in Osum State, Nigeria and stated that the poor status of school facilities such as electricity, health care services and laboratories has shown an insignificant impact on students' achievement.

School Library

School libraries play a critical role in shaping students' reading habits for testing, pleasure and knowledge acquisition. The school library should be located within the school, ensuring that all students have easy access to and can benefit from the resources available (Murillo and Roman 2011). Moreover, they reported that students who regularly read in the library achieved better academic results than those who did not utilise the school library. In light of this, Berner (1993) stated that students' performance significantly improved when they consistently studied in the school library, encouraging them to develop their skills and abilities. Piracha (2006) emphasised that school libraries play a crucial role that should not be overlooked. However, a study conducted by Noori et al. (2017) revealed a notable level of library anxiety among Universiti Technologi Mara students. Further, Ayaz et al. (2017) stated that lack of a library is a major contributing factor to students' poor performance.

The primary purpose of the school is to ensure the quality of the teaching environment. According to Lance et al. (1993) the school library serves as an educational resource that supports the teaching and learning process in classrooms. The school library assists students by providing resources to meet various needs, as well as encouraging their reading. A study conducted by Murillo and Roman (2011) and Jimenez-Castellanos (2010) found a significant relationship between students' achievement and their use of the school library.

School Laboratory

The school science laboratory is a vital element in shaping students' academic success and enhancing their practical understanding in real-time (Soyibo 1987). Describing the significance of the school laboratory, the researchers explained that it is impossible to clarify students' concepts in science subjects, particularly in physics and chemistry, without effectively utilising science laboratories. Gifted and talented students displayed greater interest in science laboratories than in classrooms because they acquired more knowledge there than in traditional classroom settings. According to Simons et al. (2010), the primary aim of school laboratories is to enhance and improve practical teaching and learning practices for both students and teachers. Furthermore, they concluded that students who regularly engaged with science laboratories showed significant improvement in their creative thinking skills. Effective use of the laboratory has a direct influence on students' attitudes and academic performance (Hager 1974). Okafor (2000) stated that the availability of a well-equipped science laboratory has a substantial effect on the academic success of students, particularly in the subject of chemistry. Moreover, Aburime (2004) examined how laboratory facilities impact students' academic achievement in science subjects. He revealed that the provision of adequate laboratory facilities in schools has a significant relationship with students' performance and the teaching of science subjects.

In alignment with the study conducted by Aburime (2004), Heyneman and Loxley (1983) explored and suggested that a well-equipped laboratory is a key element in promoting a high level of students' thinking in subjects such as biology and chemistry. From the above description, it is clear that well-equipped science laboratories significantly influence students' achievement.

Ventilated and Airy-Classrooms

The significance of a well-designed classroom setting lies in its key role in raising a constructive and supportive atmosphere that significantly affects students' academic achievement and cultivates favourable conditions for an active teaching-learning process (Lyons 2001). Similarly, it has been noted that a well-designed classroom environment is essential for enhancing the quality of education by creating a supportive and energising atmosphere, as it is a critical factor influencing students' academic success and the overall excellence of the classroom setting. Adelman and Taylor (2002) stated that classrooms should be open, airy, well-ventilated, located in areas free from noise, and should meet the requirements of the teaching-learning process. They emphasised that it is the responsibility of both teachers and students to create a peaceful learning atmosphere in the classroom for effective learning. MacAulay (1990) asserted that students develop academically and behaviourally in well-structured and facilitated classrooms. Furthermore, Adeyemi (2005) suggested that classrooms with adequate size can significantly improve the learning process. In line with the importance of a ventilated classroom, Culp (2006) investigated the correlation between academic achievement and the availability of adequate classroom facilities that directly impact students' academic performance.

Audio Visual Aids

Webster's Dictionary (2020) defines audio-visual aids as materials that engage the senses of hearing and sight. These aids encompass recordings, photos, and other related resources used in classroom instruction. All these learning materials are employed in the classroom to support and enhance the teaching-learning process. According to Oladejo et al. (2011) teaching aids are highly beneficial for students' comprehension during instruction as well as for teachers, as they simplify the process of thinking, remembering, judging, and problem-solving. A study conducted by Quarcoo-Nelson et al. (2012) indicated that learners' brain function, perception, cognition, and concentration significantly improved in response to audio-visual aids.

Research by Suleman et al. (2011) revealed that many developing nations, including Pakistan, do not adequately utilise teaching and learning resources during instruction. This improper use of teaching resources can be attributed to several factors, such as a lack of trained teachers and insufficient audio-visual materials. Furthermore, it was suggested that the use of audio-visual aids during teaching is essential for achieving high academic scores. Likewise, in the classroom their usage promotes individual and group learning. Ahmad et al. (2016) asserted that the availability of audio-visual aids significantly improved students' academic achievement. Students can take part in group projects, group discussions and multimedia presentations to promote teamwork and communication. Teachers can also play a positive role in the setting of interactive classrooms and establish a constructive learning environment for the satisfaction and encouragement of students to ask questions, share their ideas and learn from one another by implementing the effective use of audio-visual aids (Ode 2014).

Clean Drinking Water

The health and academic performance of students have been significantly affected by the availability of clean drinking water in schools. Students with access to safe drinking water at their schools face a lower risk of waterborne illness, dehydration, and other health issues (Jasper et al. 2012). Similarly, schools with enhanced water and sanitation facilities experience low absenteeism rates among students, particularly girls, which leads to improved educational outcomes. A study conducted by Lopez-Quintero et al. (2009) revealed that children with access to clean drinking water at school had no chronic illnesses such as tooth decay, stomach disorders, indigestion, typhoid, cholera or diarrhoea.

According to O'Reilly et al. (2008), dehydration is a significant concern for students in schools lacking water facilities. Curtis et al. (2001) examined how amenities such as swimming pools, flush toilets, VIP latrines, and washrooms affect students' academic performance and learning environment in both positive and negative ways. Pinfold (1990) established that students without access to clean and distilled water are constantly at risk for infections, health issues, and environmental problems. Students' academic performance suffers as a result of viruses, bacteria and parasites attacking them when they use unhygienic water. To establish an effective and healthy learning environment, a focus on safe water and hygiene facilities is crucial to minimise the risk of disease (Burgers 2000). However, simply having facilities does not always produce the desired effect. According to the IRC and UNICEF report (1998)' the Sanitation of School and Hygiene Education (SSHE) involves the software and hardware mechanisms necessary for creating a comfortable environment in schools, as well as for maintaining hygiene and safe water initiatives. Furthermore, it has been shown that access to clean drinking water is essential for improving students' performance and enriching their educational experiences to support their health.

Proper School Building

School buildings are crucial to the educational system. According to Ali et al. (2020) schools with better, more functional buildings that offer all the amenities students need, exhibit higher academic achievement than do old, antiquated institutions that negatively impact students' academic performance and learning outcomes. Upton (1996) suggested that school buildings should be constructed in areas with fresh, natural air and minimal noise to avoid disturbing students' learning. Supporting this study, Berner (1993) emphasised that school buildings must be located in safe and secure places that meet all the needs of both students and teachers. Moreover, schools should be equipped with adequate facilities such as libraries, science labs, hostels and dispensaries. Samuel (1997) noted that selecting a school's location without consulting administrators or other experts, such as engineers, can lead to an unsatisfactory work environment for human resources. He argued that before anything can take practical shape, planning is very essential. Furthermore, in his study, he stated that a school's physical structure is the most essential component that directly affects students' engagement and academic performance.

Dispensary and First Aid Facility

Connor (1990) stated that the availability of first aid facilities in schools is essential. He claimed that students in good health never experienced issues with sleep or required antibiotics because they were free of infections that could cause problems or disturbances. Instead, these students demonstrated exceptional intelligence, were highly motivated, cooperative, and creative thinkers, and achieved the best academic grades. Further, it is emphasised that schools should promote the concept of healthy eating among students (Rutledge 2011). McGuire (2014) highlighted that distribution of health protocols at school encourages students' against their health issues. McPake and Bande (1994) reported that the school dispensary provides aid to students from a medical and health perspective. In schools, numerous students face poor health-conditions such as asthma, typhoid, cholera, flu, fever, and diarrhoea, and receive special care from doctors in school pharmacies. Hessou and Fargier (1994) found that students without physical, mental, or psychological issues performed significantly better academically than those with various illnesses who were not receiving adequate care. As Gorsky (2008) stated, academic performance was found to be worse in those institutions where there was a lack of medical dispensaries. Students at these institutions also consistently experienced physical pain, chest infections, ear infections, distress, fever, and other severe health issues, which negatively impacted their academic performance.

Sports Facilities

Thompson (1995) explained that having sports facilities on campus is vital for educational institutions, as it promotes discipline, teamwork, and physical fitness. Playgrounds,

sports fields, gyms, and swimming pools are among these amenities. These offer students the chance to participate in various sports activities, including basketball, football, swimming, and athletics. In addition to serving recreational purposes and interschool competitions, sports facilities help students cultivate a healthy sense of competition and camaraderie. According to Stratton (1996), students who participated in sports were content, relaxed, and motivated to learn. Research conducted by Pepler et al. (1998) indicated that participation in sports helped learners concentrate better in class. It is essential to sustain positive outcomes and increase awareness among adults such as coaches and teachers regarding relationships and interactions with well-educated individuals and school aspirations related to gaming contributions.

Shukla (2003) asserted that playgrounds at schools should be strategically located in relation to the surrounding area and environment. The presence of a playground enhances sports-related activities. Ginsburg (2007) described playing sports as essential for students' intellectual, physical, and social development. Furthermore, it was stated that it significantly impacts students' lives and their physical health. The UNCRC's Article 31 states that children's right to play has been acknowledged for more than thirty years, highlighting the necessity of its widespread acceptance and appropriate application in real-world situations (United Nations 1989).

Transport Facilities

For students to attend school regularly and have safe access to learning, the availability of school transportation is essential. According to Câmara and Banister (1993), transportation significantly influences students' academic achievement. For instance, students at institutions without transportation facilities face various challenges in their education and cannot fully utilise transportation services. However, Nayat (2008) found that students who received transportation showed improvements in attendance, punctuality, and academic performance. A recent study conducted by Hopson et al. (2024) demonstrated the critical role of transportation in enhancing students' achievement and improving the quality of learning.

In Pakistan, the rise in the number of private educational institutions is a debatable topic for the educationist. Awan and Saeed (2014) stated that there are more private schools, and they provide mechanisms for enhancing students' academic skills by providing them with a better educational environment. They assert that provision of better facilities and quality education to attract parents' attention as compared to the public is the most important point of interest. Furthermore, no study was conducted at secondary school level in Pakistan to examine the influence of educational facilities. Therefore, the researchers aimed to identify educational facilities at secondary school level. Furthermore, to investigate the impact of educational facilities on the academic achievement of students at secondary school level. To accomplish these goals, this study addressed the following research questions.

1. What are the educational facilities available at the secondary school level?
2. What is the impact of educational facilities on students' academic achievement at the secondary school level?

Objectives of the Study

The objectives of the present study were as follows:

1. To identify educational facilities at secondary school level.
2. To investigate the impact of educational facilities on the academic achievement of students at secondary school level.

Statement of the Problem

The availability of proper educational facilities is very important for both teachers and students at their institutions. Without adequate facilities, it is difficult to run the educational program smoothly. Schools that have good facilities, such as laboratories, school buildings, ventilated classrooms and libraries, play an important role in providing quality education. This minimises the dropout rate and increases enrolment. Therefore, to promote a good learning atmosphere and inspire students toward outstanding performance and achievement, the present study will be very helpful and crucial.

Significance of the Study

The significance of this study lies in its nature to identify the educational facilities at secondary school level, which encourages parents and students to pursue quality education. The purpose of the current study is to clarify the relationship between educational facilities and students' achievement by analysing their impact. Furthermore, this study helps educational administrators and planners in developing effective strategies. However, the current study also aims to identify the shortcomings in the provision of educational facilities and provide a summary of the existing academic achievement levels, which will serve as a foundation for future research in different parts of Pakistan.

Delimitations of the Study

Characters that define boundaries and restrict the study's scope are known as delimitations. The researchers restricted this investigation to the following because of the similar educational system, culture, customs, and religious beliefs.

1. The study was delimited to only twelve male and female secondary schools.
2. The study was delimited to the two southern districts of Khyber Pakhtunkhwa in Pakistan.
3. The study was delimited to the 2016 session's 10th grade students

METHODOLOGY

Research Design

The existing research employs a quantitative methodology, which facilitates the collection and analysis of data and helps in understanding the relationship and patterns within it (Creswell and Creswell 2017). The design of the study was descriptive. It allows the researchers to identify and describe the trends, patterns and characteristics of a specific group (Shields and Rangarajan 2013). Furthermore, in educational research, a descriptive research design is very useful for understanding the practices and prevailing circumstances of participants (Gall et al. 1996).

Population of the Study

As a population, all female and male students, along with teachers, were selected from government secondary schools in Khyber Pakhtunkwa's southern districts (see Table 1).

Table 1: Total number of secondary school students and teachers

District-wise secondary schools students		*District-wise secondary schools teachers*	
District Bannu:	8081	District Bannu:	1290
District Karak:	7591	District Karak:	1163
District Lakki:	9246	District Lakki:	1002
District DI. Khan:	10182	District DI. Khan:	1557
District Kohat:	9121	District Kohat:	1005
District Tank:	2081	District Tank:	440
Total:	**46302**	**Total:**	**6457**

Source: KPK District Educational Management Information System 2015-2016

Sample Size

A total of 700 respondents of the study were divided into two categories. Among them, 200 were female and male teachers from twelve secondary schools, and 500 were male and female students from the same schools.

Sampling Technique

The stratified random sample technique was used to select the respondents in accordance with John Curry's (1984) sample size rule of thumb.

Research Instruments

Research instruments are tools used to collect information to achieve the desired objectives (Ihemeje 2021). Based on the existing literature review, the researchers developed two self-made questionnaires using a dichotomous scale with "Yes" and "No" options to collect data from the respondents. The first questionnaire consisted of 30 items divided into 4 parts. To facilitate the researchers' use of the statements, this questionnaire was translated into Urdu (native language) for students, while the second questionnaire was intended for teachers. This questionnaire consisted of 30 items divided into three

parts. Completion of each questionnaire was estimated to take approximately 25-30 minutes. The students' grades from the Board of Intermediate and Secondary Education Bannu's Grade 9 were used to assess the students' academic achievement.

Data Collection Procedure

Before collecting data through a questionnaire from the respondents, approval must be obtained. As a result, the researchers sent a request letter to the heads of each sampled school seeking permission to collect data. Prior to distributing the questionnaire, the researchers introduced the purpose of the survey. To ensure the confidentiality of the respondents, both questionnaires included a consent letter asking for their permission to participate in this study. The researchers collected the data using paper and pencil. The respondents were informed that this survey was solely for academic purposes. They completed the questionnaire and returned it to the researchers.

Pilot Testing

To confirm the questionnaires' validity and reliability, the next important step was pilot testing.

Validity of Instruments

According to Altheide and Johnson (1994), validity is the accuracy of the results. The researcher sent the research instruments to eleven (11) education experts for validation. Of these, five experts were from the Institute of Education and Research at the University of Science and Technology, Bannu, while six experts were from Gomal University in Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan.

Reliability of Questionnaires

The questionnaire's reliability is very important. A reliable questionnaire provides accurate and useful data. The researchers collected information from 50 respondents, consisting of 25 female and male students, and 25 male and female teachers to assess the questionnaire's reliability. Using a dichotomous scale with "Yes" and "No" options, the researchers collected the respondents' opinions. The Software Package for Social Science (SPSS) was applied to analyse the data. The Cronbach alpha formula was applied after the analysis. The questionnaire comprised forty-one items. After dropping 11 items due to reliability issues, items with an item-total correlation of less than 0.25 were excluded from consideration. Thirty questionnaires remained after refining the items. It was considered adequate to administer the questionnaire because its overall Cronbach alpha was 0.893.

Data Analysis

SPSS (Software Package for Social Science) was utilised to analyse the data. By delivering precise and accurate results, SPSS aided the researcher in enhancing the productivity and reliability of the research project. The basic facilities associated with students' academic achievement at the secondary school level in Pakistan were identified during analysis using descriptive statistics, along with their impact on students' academic achievement.

Demographic Representation of the Selected Respondents

Table 2 shows the division of the respondents into two districts that are Lakki and Bannu. Six government secondary schools, three of which were female and three of which were male,

Table 2: Distribution of the respondents selected for the present study

			Respondents				*Respondents*	
District Bannu	Male schools	3	Students Teachers	125 52	Female schools	3	Students Teachers	125 48
District Lakki Marwat	Female schools	3	Students Teachers	125 52	Female schools	3	Students Teachers	125 48

were selected from Bannu district. Of these, 52 were teachers and 125 were students. However, three female schools included 125 student respondents and 48 teachers. Equally, three male and three female schools were selected from the district of Lakki Marwat, totaling six secondary schools. A total of 125 respondents were students from three female secondary schools, and 48 were teachers from three male secondary schools. There were 125 students and 52 teacher respondents. Overall, the sample consisted of 700 respondents, comprising 200 teachers and 500 students of both genders.

RESULTS

Research Question 1: What are the educational facilities available at secondary school level?

To identify the educational facilities, frequency and percentage of the responses were estimated (Table 3).

Results revealed that 75 percent of respondents believe classrooms are well-ventilated, indicating a conducive environment for students' health and comfort. Additionally, 75 percent confirm the availability of playgrounds, indicating the importance of physical activity. 71 percent of respondents believe school buildings are sufficient to meet educational needs, with 29 percent expressing concerns about overcrowding or infrastructure. 76 percent of respondents agree to "My knowledge improves due to use of AV aids in the class". Clean drinking water is a strong priority, with 95 percent of respondents stating it is available. However, 55 percent disagree that transport facilities are available, indicating a significant gap in access to education, especially in remote areas. 65 percent of respondents agree that science labs are available, but 35 percent still report a lack, indicating a need for more investment in practical science learning environments. Library facilities are also available, but improvements may be needed in remaining schools. Lastly, 75 percent disagree that first aid facilities are available, indicating a lack of adequate equipment to handle medical emergencies, potentially putting students at risk.

Research Question 2: What is the impact of educational facilities on students' academic achievement?

Table 4 shows the results of the linear regression for each variable. First, a significant relationship was found between access to school libraries and students' academic achievement. For teachers, the relationship was ($\beta = 0.290$, $p < 0.001$) whereas for students, it was ($\beta = 0.317$, $p < 0.001$). This shows moderate **e**ffect size, with access to school libraries explaining 8.4 percent for teachers' and 10 percent of students' aca-

Table 3: Participants' responses regarding availability of educational facilities

S. No.	*Variables*	*Frequency Percentage*	*Yes*	*No*	*N*
1	*Library*	Frequency	383	77	500
		Percentage	77	33	100
2	*Laboratories*	Frequency	333	167	500
		Percentage	65	35	100
3	*Ventilated Classroom*	Frequency	380	120	500
		Percentage	75	25	100
4	*Audio-Visual Aids*	Frequency	386	114	500
		Percentage	76	24	100
5	*Clean Drinking Water*	Frequency	485	15	500
		Percentage	95	5	100
6	*School Building*	Frequency	362	138	500
		Percentage	71	29	100
7	*First aid Facility*	Frequency	118	382	500
		Percentage	25	75	100
8	*Sports Facilities*	Frequency	382	118	500
		Percentage	75	25	100
9	*Transportation*	Frequency	230	270	500
		Percentage	45	55	100

Table 4: Linear regression model showing the impact of educational facilities on students' academic achievement

Dependent Variable	*Independent variables*	*Respon-dents*	*R*	R^2	*DF*	*F*	*P*	*Beta*	*Sig*
	School	Students	.317 [a]	0.1	1	55.571	.000[a]	0.317	0
	Library	Teachers	.290[a]	0.084	498	18.132	.000[a]	0.29	0
					1				
					198				
	School	Students	.520[a]	0.27	1	184.133	.000[a]	0.52	0
	laboratory	Teachers	.290[a]	0.084	498	18.132	.000[a]	0.29	0
					1				
					198				
	Sports	Students	.721[a]	0.52	1	53.87	.000[a]	0.721	0
	facilities	Teachers	.262[a]	0.069	498	14.605	.000[a]	0.262	0
					1				
					198				
	Ventilated		.304[a]	0.092	1	50.673	.000[a]	0.304	0
	Classroom				498				
Academic	A.V aids	Students	.133[a]	0.018	1	8.979	.003[a]	0.1330	
achievement					498				
	Water	Students	.162[a]	0.026	1	13.426	.000[a]	0.162	0
	facilities	Teachers	.251[a]	0.063	498	13.342	.000[a]	0.251	0
					1				
					198				
	Proper school	Students	.208[a]	0.043	1	22.593	.000[a]	0.208	0
	Building	Teachers	0.088	0.088	498	19.082	.000[a]	0.296	0
					1				
					198				
	First-Aid	Students	.034[a]	0.001	1	0.58	.447[a]	-0.034	0
	facilities	Teachers	.037[a]	0.001	498	0.267	.606[a]	-0.037	0
					1				
					198				
	Transport	Students	.071[a]	0.005	1	2.518	.113[a]	-0.071	0
	facilities	Teachers	.040[a]	0.002	498	0.321	.571[a]	-0.04	0
					1				
					198				

demic achievement. The results revealed that having access to well-equipped school libraries plays a vital role in students' learning. The researchers found that school laboratories had a significant effect on academic achievement (β = 0.520, $p < 0.0001$), which explained 27 percent of the variance in academic performance. This finding shows that the availability of laboratory facilities significantly enhances students' outcomes. A significant relationship was found between sports facilities and student achievement (β= 0.72, $p < 0.001$), with a large effect size that accounted for 52 percent of the variance. This suggests that access to proper sports facilities is not only important for health but also plays an important role in enhancing students' learning, which can lead to better academic achievement. Furthermore, this relationship indicates that engaging in sports activities may provide academic benefits to students, through teamwork and social skills. For ventilated classrooms, the researchers found a significant relationship with students' academic achievement. β= 0.304, $p < 0.001$ indicated a moderate effect. This means that classroom ventilation is crucial for maintaining a good learning atmosphere. These findings suggest that well-ventilated classrooms help with students' engagement and concentration, which directly reflect their academic achievement. Moreover, a significantly positive relationship was found between water facilities and the academic achievement of students' prospects (β= 0.162, $p < 0.001$) and teachers (β= 0.251, $p < 0.001$). This significant relationship highlights the role of water facilities in promoting a healthy school environment, which plays a vital role in students' academic achievement and well-being.

The results revealed a significant relationship between school buildings and students' academic achievement. For students it was (β= 0.208, $p < 0.001$) and for teachers it was ($\beta = 0.296$, $p < 0.001$). However, the size of the effect is small, which indicates that proper school building accounts for 4.3 percent of the variance from the students' perspective and that from the teachers' perspective, it accounts for 8.8 percent. This result suggests that proper school buildings are not only essential for conducive learning but also play an important role in better academic achievement. However, audio-visual aids had a minimal effect on students' academic achievement ($\beta = 0.133$, $p = 0.003$), which explained 1.8 percent of the variance. While audio-visual aids enhance students' learning, their limited availability suggests the extent to which they use in teaching and how they are integrated with the curriculum. Similarly, transport facilities had an insignificant relationship with students' academic achievement (β= 0.071 for the students and $\beta = 0.040$ for the teachers; $p = 0.571$ and $p = 0.113$, respectively). The above statistics indicated that transport facilities were not provided for students or teachers.

DISCUSSION

The present study investigates the impact of education facilities on students' academic achievement at the secondary school level in Pakistan. Educational facilities play an essential role in shaping the learning environment, directly influencing students' performance. This discussion analyses the findings in relation to existing literature, identifying both strengths and limitations in the provision of educational facilities. The findings of the current study indicate that the majority of respondents reported the availability of well-ventilated classrooms, adequately equipped science laboratories, and functional libraries. Furthermore, a significant number of schools provided audio-visual aids, clean drinking water, and sports facilities. These resources collectively contribute to a favourable learning environment, aligning with prior research (Kimaro 2020; Kirch et al. 2021) that emphasizes the importance of educational facilities in enhancing academic achievement. Moreover, this supports Mokaya (2013) who investigated that enhanced students' academic achievement is related with proper science laboratories, well-spaced classrooms, well-equipped libraries, sports facilities and sanitation facilities. In contrast, Wambua et al. (2018) indicated that the classroom environment in Kibwezi Zone's lower primary schools was not conducive to students' effective learning of social studies, and students rushed to utilise the limited resources available, and the availability and utilisation of physical facilities in social studies were below average. However, lacks were noted in the provision of transportation and first aid facilities, with a considerable number of respondents highlighting their absence. This suggests that while significant progress has been made in developing essential educational facilities, certain critical support services remain underdeveloped. Chaudhry and Elumalai (2020) indicated that student gender, grade level, and distance to school are significant factors positively influencing the choice of school transportation. These findings suggest that demographic and logistical considerations play a crucial role in students' transportation preferences, highlighting the need for tailored transportation policies to accommodate diverse student needs.

The results demonstrate a significant positive relationship between the availability of essential educational facilities and students' academic achievement. Well-equipped libraries, efficient science laboratories, and structured classroom environments were found to enhance learning outcomes. These findings are consistent with those of Onyebuenyi et al. (2002) who identified school facilities such as, school buildings, libraries and laboratories as primary determinants of student performance. Moreover, Ajayi and Ayodele (2001) emphasised the necessity of infrastructure for effective instructional delivery and management.

While educational facilities such as libraries and classrooms have a direct impact on academic achievement of students, the current study did not find a significant relationship between transportation and first aid facilities and student's achievement. This contrasts with the findings from Ramli et al. (2018), which reported that transportation accessibility positively influenced academic outcomes. The difference may be attributed to contextual differences, as many students in Pakistan reside in close proximity to

schools, reducing their reliance on school provided transportation services. This corroborates the findings of Boh (2024), which emphasised the importance of supportive school atmosphere and optimal resource utilisation in enhancing student success. Similarly, Umukoro and Sobowale (2023) acknowledged well-constructed school buildings, adequate classroom space, and proper infrastructure as essential contributors to effective teacher-student interaction and improved learning outcomes.

Contrastingly, Vincent et al. (2022) and Gao and Lafortune (2020) highlighted the negative effect of outdated and underfunded school infrastructure in California's public PK-12 schools, where nearly 40 percent of students attend institutions that fail to meet minimum facility standards. However, as Wali (2016) explains, updated school facilities provide students with safe and secure, comfortable and precisely equipped spaces that are favourable to learn. This underscores the necessity for continuous investment in educational infrastructure to sustain and enhance academic performance. Further, the findings highlight the critical role of educational infrastructure in shaping student achievement. This requires prioritising the development of well-equipped libraries, modernised science laboratories, and technologically integrated classrooms to enhance learning experiences. This is supported by Barrett et al. (2019) that proper school infrastructure plays an important role in establishing a positive teaching learning environment.

This study contributes to the growing body of literature affirming the importance of educational facilities in enhancing students' academic success. The findings suggest that well-maintained educational facilities are positively associated with student achievement, reinforcing the necessity for targeted investments in educational resources. This is aligned with the recent study by Monity and Abam (2024) who found that adequate school infrastructure such as, well-equipped classrooms, functional laboratories and well stocked libraries significantly enhance students' academic achievement by ensuring students have proper access to these important resources. While first aid and transportation facilities may not directly impact academic achievement, their availability is vital for ensuring student safety and well-being. Addressing existing gaps through further research can enhance overall educational standards at the secondary school level, promoting a holistic approach to students' academic progress.

CONCLUSION

This study investigated the impact of educational facilities on students' academic achievement at the secondary school level in Pakistan. A survey research design was employed, and regression analysis was conducted to assess the relationship between academic achievement and educational facilities. The results indicate that there is a significant relationship between students' academic achievement and school library facilities, with the impact of these resources being statistically significant. Similarly, school buildings, audio-visual aids, science labs, ventilated classrooms, and clean drinking water were found to be important elements that were positively related to students' academic achievement. Notably, the addition of recreational areas, particularly sports facilities, was associated with a significant improvement in students' academic performance. The results underscore the importance of specific facilities including sports facilities, laboratories and libraries in creating an environment that supports academic success. These findings enhance the understanding that various factors contribute to students' academic achievement. However, the results revealed that first aid facilities and transportation had no positive impact on students' academic performance. These findings suggest that access to first aid and transportation facilities may not significantly influence students' academic success. According to the respondents' views, there was a lack of or were not provided first aid facilities and transportation, which reported no relationship with students' academic achievement.

RECOMMENDATIONS

In this study, the researchers acknowledged several recommendations. First, the government can provide guidelines for educational organisations to effectively manage all aspects of the classroom to achieve better outcomes. Second, education departments may offer transportation facilities for students and teachers in remote ar-

eas to ensure their access to quality education and reduce the dropout rate.

LIMITATIONS

For this study, the data were collected through questionnaires. Other researchers might utilise interviews, observations, checklists and so forth. Additionally, this study was survey-based within a quantitative framework and could not address qualitative aspects. Research employing mixed methods could provide more predictive insights into educational facilities regarding academic achievement.

SUBMISSION DECLARATION AND VERIFICATION

This research represents the authors' original work and has neither been previously published nor is currently under consideration for publication elsewhere in any form.

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