

Building Success: The Role of Academic Facilities and Teaching Techniques in Shaping Secondary Level Students Performance in Pakistan

Zahira Asad¹, Sonia² and Saira Abrar²

¹Department of Sociology,
Riphah International University,
(Faisalabad Campus), Pakistan

²PhD Scholar, Department of
Sociology, Government College
University, Faisalabad, Pakistan

Correspondence:
syraibrar@gmail.com

Abstract

This study examines the impact of academic facilities (ACF) on academic performance (ACP), with effective teaching techniques (ETT) serving as a mediating variable. The research is grounded in the constructivist approach, which emphasizes the role of interactive teaching methods, student engagement, and institutional support in enhancing learning outcomes. Data were collected from a sample of 210 students and 40 teachers from different secondary-level schools in Multan district in the Punjab province of Pakistan. A structured questionnaire was administered to measure ECF, availability and utilization of ETT, and students' ACF. The data were analyzed using the regression model in SPSS to test direct and mediating effects. Results revealed that ECF significantly improves students' academic performance, and that ETT partially mediates this relationship. The findings suggest that teaching innovations are more impactful when supported by adequate school resources such as libraries, laboratories, and technological tools. The study underscores the importance of aligning pedagogical practices with infrastructural development to maximize academic achievement in secondary education.

KEYWORDS

Teaching techniques, Academic performance, Academic facilities, Pakistan

1 | INTRODUCTION

1.1. Background

Education is the process of imparting presumptive knowledge, abilities, attitudes, beliefs, and habits to a group of people that are then transmitted to others through dialogue, storytelling, instruction, training, and research (Glaser, 1984; Islamic, Ishaq, & Dayati, 2024; Richardson, 1996). Effective teaching and learning require careful preparation, distribution, and planning. To do this, the instructor must have a solid understanding of the subject matter and a variety of teaching methods (Yusron, Anwar, Umami, Haikal, & Mustofa, 2024). Education is one of the most promising avenues for people to lead healthier, more fruitful lives (Kurudirek & Berdieva, 2024). Teaching strategies have a significant impact on students' performance and the efficiency of their learning process (Munna & Kalam, 2021). Their main concerns are whether or not

secondary school education promotes high-quality learning, whether or not students fulfil performance requirements, and whether or not they are ready to pick up the knowledge, abilities, and attitudes necessary to develop into well-rounded individuals (Ajaz, Mehmood, Ali, & Ashraf, 2014). The teaching methods and learning environments play a major role in determining academic performance, which is frequently gauged by students' accomplishments (Ashraf, Cai, Butt, Naz, & Zafar, 2019). Learner-centred approaches, problem-based learning, and digital integration are gradually replacing traditional instruction. But if students don't have access to adequate academic resources like libraries, labs, and technology infrastructure, even the best teaching strategies might not be successful (Mgimba & Mwila, 2022).

Furthermore, the educational system in Pakistan faces several difficulties. Public and private schools

make up the nation's dual educational system, which has notable differences in resources for students, teacher preparation, and infrastructure. Inadequate facilities, packed classrooms, and restricted access to technology plague many public schools, especially those in semi-urban and rural areas (Sain, 2023). The foundation of a high-quality education is effective teaching methods (Darling-Hammond, 2021). They influence students' motivation, creativity, and critical thinking abilities in addition to assessing their conceptual understanding (Venugopal & Vinoth, 2024). A more dynamic and inclusive learning environment can be produced by a teacher who employs cutting-edge techniques like group discussions, problem-based learning, questioning techniques, and technology integration (Asad & Malik, 2024). These methods help students go beyond rote memorization and foster the analytical and problem-solving skills necessary for success in the classroom and in real-world scenarios (Javed, 2023). Additionally, the traditional lecture techniques in Pakistan's secondary education system are frequently used by teachers, which limit student engagement and critical thinking (Bari, 2021). Secondary schools are especially significant in this system because they shape students' academic and professional paths by acting as a link between foundational learning and higher education. These schools' inadequate academic facilities frequently sabotage teachers' attempts to implement cutting-edge teaching techniques, which lowers student performance overall (Ramzan & Rafiq, 2025).

1.2. Significance of the Study

In light of this, the current study examines how good teaching methods affect Multan secondary school students' academic achievement, using academic facilities as a mediating variable. In contrast to earlier studies that have mostly concentrated on infrastructure or teaching effectiveness independently, this one combines the two to offer a more thorough understanding of how pedagogy and institutional support interact to affect student outcomes. It offers a fair assessment of classroom procedures and the state of the infrastructure by incorporating the viewpoints of both teachers and students. This study's novel contribution is its examination of academic facilities as a mediating factor, which provides fresh perspectives on how infrastructure support either increases or decreases the efficacy of instructional strategies.

1.3. Theoretical Evidence and Literature Review:

1.3.1. Theoretical Evidence

The Constructivist Learning Theory, which emphasizes that students actively create knowledge through interaction, experience, and reflection rather than passively absorbing it, serves as the foundation for this study (Fosnot & Perry, 1996; Piaget, 1973). This viewpoint holds that effective teaching strategies like

group discussions, problem-based learning, and technology integration encourage deeper understanding, critical thinking, and active participation (Hmelo & Evensen, 2000). However, students must have access to the right tools and facilities for these teaching strategies to result in better academic achievement (Гуцало, Шкляр, Абросімов, Харченко, & Ордановська, 2024). Academic resources like labs, libraries, and ICT infrastructure give students the contextual assistance they need to apply and solidify their knowledge (Arumuru & David, 2024). Furthermore, resource-based theory (RBV), educational resources serve as facilitators that increase the potency of teaching techniques (Madhani, 2010). Therefore, the idea that teaching techniques have a direct impact on academic performance but only reach their full potential when academic facilities mediate this relationship is supported by constructivism and the resource-based view.

1.3.2. Academic Facilities

Most scholars agree that one of the key elements influencing students' educational experiences and academic success is their academic facilities (Fraser & Killen, 2003; Hepworth, Littlepage, & Hancock, 2018; Ramli, Zain, Campus, Chepa, & Bharu, 2018). Facilities include learning materials and technology resources in addition to the physical infrastructure (classrooms, libraries, labs, ICT centers, and playgrounds) (Ozcan, 2021). According to numerous studies, having enough facilities improves student attendance, lowers dropout rates, fosters a positive learning environment, and boosts performance (Lavy & Nixon, 2017; Muro et al., 2024; Nehemiah, 2023). Modern schools allow teachers to use a range of successful teaching techniques, such as project-based learning, digital integration, and hands-on demonstrations, which enhance student outcomes (Ahmad, 2021). Another study conducted by Ahmad (2021) stated that well-resourced schools give students the chance to put their knowledge into practice, which strengthens comprehension and promotes lifelong learning. On the other hand, low levels of engagement, subpar exam scores, and increased absenteeism are linked to inadequate facilities, packed classrooms, and poor infrastructure (Mncube, 2023). Additionally, it has been discovered that having science labs and functional libraries greatly improves students' critical thinking and problem-solving abilities (Eyenaka, Nsiti, Umoren, & Bichi, 2024).

Furthermore, public and private schools in Pakistan differ greatly in terms of the availability and caliber of academic facilities. Private schools typically have better ICT labs, libraries, and contemporary classrooms that promote student-centred learning, especially in urban (Mahmood, 2017). However, many public schools suffer from a lack of funding, poor upkeep, and a lack of technology infrastructure, particularly in rural and semi-urban areas. These drawbacks frequently force educators to use lecture-based instruction and reduce

students' chances to apply their knowledge in real-world situations (A. Hussain & Afzal, 2023). According to empirical research done in Pakistan, having sufficient facilities has a positive relationship with student motivation, performance, and overall school efficacy (Aftab, Sajjad, & Amjad, 2025). For instance, Science, Technology, Engineering, and Mathematics (STEM) subjects can be learned practically in schools with science labs, and students' research and analytical abilities are improved by having access to digital resources (Khalid, Abdullah, & Fadzil, 2024). Additionally, Umar, Sadiqi, Hussain, and Qahar (2023) found that increased student satisfaction and better exam pass rates are associated with investments in school infrastructure.

1.3.3. Effective Teaching Techniques

It is commonly accepted that one of the most important factors influencing students' learning outcomes and general academic performance is their level of education (Al Husaini & Shukor, 2022). The methods used to engage students, as well as the content presented, determine how effective a lesson is (Alalwan et al., 2019). Clear goal-setting, constructive criticism, active learning, group projects, and differentiated instruction that takes into account different learning styles are all examples of effective teaching strategies, according to Suleiman, Okunade, Dada, and Ezeanya (2024) methods improve knowledge retention, foster critical thinking, and increase student motivation. It has been demonstrated that active learning techniques like project-based learning, group discussions, and problem-solving activities greatly increase student engagement and achievement (Nagamalla, Readdy, Kumar, Kolagani, & Suryadevara, 2025).

Similar to this, teachers can now link lessons to real-world applications thanks to the increased opportunities for interactive and personalized learning brought about by the integration of technology in the classroom (Darling-Hammond, 2021). Research from developing nations shows that teachers who use creative teaching methods instead of rote learning help students grasp concepts more deeply and perform better on tests (Rehman, Bhatti, & Chaudhry, 2019). Furthermore. In the context of Pakistan, many students in classrooms continue to mainly use lecture-based teaching techniques, which restricts student engagement and creativity (Chowdhury et al., 2021). However, research indicates that students exhibit enhanced academic performance and higher-order thinking abilities when teachers use contemporary teaching methods, such as digital tools, peer learning, and questioning strategies (Shaikh et al., 2024).

This emphasizes how crucial it is to provide educators with pedagogical training that prioritizes learner-centered methodologies (Nwuke & Nwanguma, 2024). All things considered, research continuously indicates that good teaching methods improve student

outcomes by encouraging motivation, engagement, and cognitive growth (Xiong, 2025). However, when backed by sufficient academic facilities, their impact is further enhanced because students need resources to practice and apply the knowledge they have gained from creative teaching (Akungu, 2014).

1.3.4. Academic Performance in Schools

A key indicator of educational success is academic performance, which takes into account not only students' cognitive capacities but also the caliber of instruction, the resources available, and the support of families and schools (Nyhan & Alkadry, 1999). Numerous factors, such as teaching strategies, the school environment, parental involvement, socioeconomic status, and institutional facilities, have been found to influence academic performance globally (Zafeer, Maqbool, Rong, & Maqbool, 2025). Strong teacher-student relationships, dynamic learning environments, and access to learning materials that facilitate both theoretical and practical learning are frequently linked to high academic achievement (Zhou, 2025). Systemic issues like teacher-centered instruction, overcrowded classrooms, and inadequate infrastructure commonly impair academic performance in developing nations (Orina, Macharia, & Okpalaenwe, 2021). According to studies, learning outcomes and student engagement are negatively impacted by a lack of innovative teaching techniques and supportive facilities (Roza, 2025). On the other hand, schools that offer comfortable classroom settings with qualified instructors and sufficient infrastructure typically see higher test scores and higher rates of student retention. For many years, school-level academic performance has been a source of concern in Pakistan. Disparities between private and public schools persist despite initiatives like the Single National Curriculum and the National Education Policy (M. Hussain & Akhter, 2025). When compared to underfunded public schools, private schools typically report higher student performance because they are frequently outfitted with better facilities, smaller class sizes, and more adaptable teaching methods (Amjad & MacLeod, 2014). Inadequate facilities, a lack of teacher preparation, and a dependence on memorization are problems that public schools in rural and semi-urban areas face in particular. These issues have a detrimental impact on student achievement (Tayyaba, 2012).

Additionally, studies show that Pakistani secondary school pupils frequently face difficulties with critical thinking and problem-solving abilities as a result of an excessive focus on exam memorization (Jamil, Mahmood, & Masood, 2023). Furthermore, because students from low-income households have less access to supplemental learning resources and facilities, socioeconomic disparities exacerbate performance gaps. However, a research by Mahmood (2017) has demonstrated that students' performance and motivation greatly increase when educational institutions invest in

efficient teaching methods backed by scholarly resources like labs, libraries, and ICT infrastructure.

1.4. Hypothesis Development

1.4.1. Academic Facilities and Academic Performance

It is commonly acknowledged that school facilities and infrastructure play a significant role in determining academic results. According to Jean (2021) standard school facilities determine the excellence and academic performance of schools in the Nyamasheke District of Rwanda. Another study conducted by Ogu (2024) found that the majority students who attend schools with sufficient resources, such as working classrooms, libraries, labs, and access to ICT, generally perform better than those who attend schools with fewer resources. Furthermore, Mohzana (2024) using a quantitative method, including questionnaires and surveys, a study was conducted. It found that students who take part seriously in studies and align with teaching facilities tend to have better academic performance. Disparities between public and private schools in Pakistan demonstrate how facility availability affects academic performance; schools with more resources typically report higher academic achievement than those with less funding (Iqbal, Ahmad, Aftab, & Mahmood, 2025). Considering the literature evidence, we pose our first hypothesis;

H1: Academic facilities have a significant positive impact on academic performance.

1.4.2. Academic Facilities and Effective Teaching Techniques

Effective teaching is crucial, but the resources available in the classroom frequently affect how effective it is (Chew & Cerbin, 2021). A study conducted by (Badmus, 2023) utilized a large sample of 2032 respondents, including principals and teaching staff from private and public schools of Ilorin Metropolis, their study found that good behavior of teachers and updated techniques put a positive impression by the utilization of academic facilities. A recent study conducted by Fatima and Mehmood (2024) proposed that academic resources like science labs, libraries, and digital tools serve as facilitators to help teachers more successfully apply contemporary teaching techniques. Previous research has shown that the use of school facilities and effective teaching are positively correlated, indicating that resource availability and innovative teaching frequently go hand in hand (Munna & Kalam, 2021). With the past studies' evidence, we propose our 2nd hypothesis;

H2: Academic facilities positively influence the use and effectiveness of teaching techniques.

1.4.3. Effective Teaching Techniques and Academic Performance

One of the most important factors influencing student achievement is instruction. Student-centered

approaches that promote critical thinking, problem-solving, and active participation have gradually replaced traditional teaching strategies in which teachers serve as knowledge carriers (Hattie & Zierer, 2024). According to numerous studies, students exhibit greater academic achievement and motivation when teachers use creative and engaging teaching methods like project-based learning, formative assessments, group discussions, and technology integration (Darling-Hammond, 2021). Effective classroom practices result in higher test scores, retention rates, and overall learning outcomes, according to research conducted in South Asian contexts (Ikram, Kenayathulla, & Saleem, 2025). In light of these studies we pose our first hypothesis;

H3: Effective teaching techniques have a positive impact on academic performance.

1.4.4. The Mediating Role of Effective Teaching Techniques

A recent study conducted by Hasan (2025), explored the mediation role of effective teaching methods between academic innovation and academic performance. Utilizing the data of undergraduate students, they found a significant positive link between innovative academic methods and academic performance, with the mediation effect of effective teaching methods. Another study conducted by Polatcan, Arslan, and Balci (2023) found that effective methods of teaching are necessary for institutions to achieve attractive academic performance. Furthermore, Suryaman, Adha, Suharyanto, and Ariyanti (2024) found a significant mediation role of teacher work commitment as a good teaching technique between change leadership and e-learning effectiveness. Utilizing a sample of 378 respondents, they also found that work commitment and attitude are good teaching techniques that help in transforming leadership and e-learning effectiveness. In light of this evidence, we propose our fourth hypothesis;

H4: Effective teaching techniques mediate the relationship between academic facilities and academic performance.

2 MATERIAL AND METHOD

2.1. Research Model Framework

Constructivist learning theory and the Resource-Based View (RBV) are cited in this study. Constructivism emphasizes how good teaching practices turn organizational resources like academic facilities into meaningful learning experiences, while RBV emphasizes the significance of these resources in attaining superior results. Academic Performance (ACP) is the dependent variable in this model, Academic Facilities (ACF) is the independent variable, and Effective Teaching Techniques (ETT) is the mediator. It is assumed that well-equipped schools offer the

resources required for instructors to implement successful teaching strategies, which improve student achievement. Fig 1 represents the model framework of the study.

2.2. Research Design

A cross-sectional, quantitative survey design was used in the study. This method was selected because it offers reliable statistical testing of the relationships between variables and enables the collection of large amounts of data in a constrained amount of time.

2.3. Population and Sample

Teachers and secondary school students in Multan were among the population. Both groups were chosen because students experience both facilities and the quality of instruction, while teachers use teaching methods directly. This study gathered data from 413 students from different Multan secondary schools 40 teachers from the same schools. To guarantee representation from both public and private schools, a stratified random sampling technique was used to select the final sample, which included 453 respondents.

2.4. Data Collection

Three primary sections of a structured questionnaire were used to gather data. Items related to academic facilities, libraries, ICT resources, and labs are used to evaluate ACF, as suggested by (Nehemiah, 2023). Additionally, student participation, feedback, and technology integration are all used to gauge ETT, questions were observed from the study of Darling-Hammond (2021). Exam results, teachers' assessments of learning outcomes, and students' reported GPA are used to gauge ACP, as suggested by (Ramli et al., 2018) On a five-point Likert scale, 1 represented strongly disagree and 5 represented strongly agree for each item. Table 1 represents the variable description and items construct.

2.5. Research Analysis and Model Measurement

The data analysis findings from 453 secondary-level Multan students and teachers are presented in this section. Descriptive statistics, reliability tests, correlation analysis, regression models, and mediation analysis were all used in the SPSS (V.31) data analysis. With ETT acting as a mediator, the goal

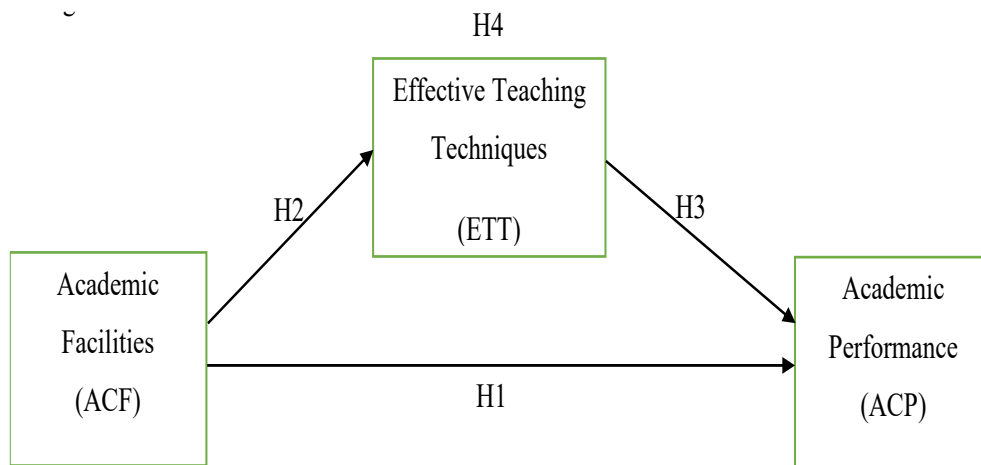


Fig 1: Model Framework

Table 1: Variable Description

Construct	Dimension / Focus	Items (Sample Statements)	References
Academic Facilities (ACF)	Availability and adequacy of school resources	1. My school provides access to a well-equipped library. 2. ICT facilities (computers, internet) are available for learning. 3. Science and computer labs are adequately maintained. 4. Classrooms are comfortable and supportive of learning. 5. There are sufficient extracurricular and sports facilities.	(Jean, 2021; Nehemiah, 2023)
Effective Teaching Techniques (ETT)	Teaching strategies, engagement, feedback	1. Teachers use interactive methods to make learning engaging. 2. I receive regular and constructive feedback from teachers. 3. Teachers apply real-life examples to explain concepts. 4. Technology is effectively integrated into teaching. 5. Teachers encourage discussions and active participation.	(Darling-Hammond, 2021; Hattie & Zierer, 2024)
Academic Performance (ACP)	Student achievement and learning outcomes	1. My grades show improvement due to effective learning. 2. I can apply classroom knowledge in real-life contexts. 3. I feel confident about my academic achievements. 4. I perform well in class tests and examinations. 5. Overall, I am satisfied with my academic progress.	(Nehemiah, 2023; Ramli et al., 2018)

was to investigate the relationship between ACF and ACP.

2.5.1. Demographics

The gender distribution of the 453 respondents was balanced, with 52.1% of them being men and 47.9% being women. As per Table 2, teachers made up 9.5% of the respondents, while students made up 90.5%. Participants from public schools (54.7%) slightly outnumbered those from private schools (45.3%). While all of the teachers were older than 20, the majority of students (51.2%) were between the ages of 16 and 20. The majority of teachers had either a Bachelor's degree (48.8%) or a Master's degree (39.5%), with a smaller percentage having an MPhil or Ph.D. (11.7%). These demographics imply that the sample is representative of the secondary school system in Multan and is diverse.

Table 2: Demographics

Variable	Category	Frequency	Percentage (%)
Gender	Male	236	52.1%
	Female	217	47.9%
Role	Students	410	90.5%
	Teachers	43	9.5%
School Type	Public	248	54.7%
	Private	205	45.3%
Age Group	11–15 years (students)	178	39.3%
	16–20 years (students)	232	51.2%
	Above 20 (teachers)	43	9.5%
Education (Teachers)	Bachelor's	21	48.8%
	Master's	17	39.5%
	MPhil/PhD	5	11.7%

2.5.2. Descriptive Statistics

Table 3 represents the descriptive statistics. As per Table 3, respondent ratings for ACF, ETT, and ACP are largely positive, according to the descriptive statistics. With the lowest mean (3.58), ACF shows some discontent with academic facilities. ETT has the highest mean (3.72), indicating that people have a more positive opinion of teaching methods. Additionally, ACP has a positive mean (3.64), indicating above-average opinions about academic achievement. All constructs exhibit moderate variability, with standard deviations falling between 0.78 and 0.82. Although the majority of respondents gave these aspects positive ratings, there is still room for improvement, particularly in academic facilities, as indicated by the slight negative skewness across all constructs.

Table 3: Descriptive Statistics

Variable	Mean	Median	Standard Deviation (SD)	Min	Max	Skewness
ACF	3.58	3.60	0.82	1.00	5.00	-0.20
ETT	3.72	3.75	0.78	1.50	5.00	-0.25
ACP	3.64	3.65	0.80	1.00	5.00	-0.18

2.5.3 Reliability Analysis

Table 4 represents the reliability analysis of the study. ACP (0.82), ETT (0.87), and ACF (0.84) all had Cronbach's Alpha values above the 0.70 cutoff as suggested by Berge, Vika, Agdal, Lie, and Skeie (2017). This attests to the validity and internal consistency of the measurement scales employed in this investigation.

2.5.4. Pearson Correlation Matrix

A Pearson correlation matrix is a table that shows the correlation coefficients between many variables. Each cell in the table represents the correlation between two variables (Sedgwick, 2012). As shown in Table 5, the ACP ($r = 0.544$, $p < 0.01$) and ETT ($r = 0.612$, $p < 0.01$) have a significant and positive correlation with ACF. Additionally, there is a strong positive correlation between ACP and ETT ($r = 0.657$, $p < 0.01$). These associations imply that enhanced teaching methods and better academic results are linked to better facilities.

2.5.5. Regression Model Analysis:

The analysis's regression models demonstrate a strong correlation between the ACF, ETT, and ACP constructs, and each model contributes to the explanation of some of the variation in academic achievement. ACF has a significant impact on academic performance, as demonstrated by Model 1 (ACF $\rightarrow$ ACP), in Table 6, which has a standardized beta coefficient (β) of 0.544 and a t-value of 11.72 ($p = 0.000$). ACF explains 29.6% of the variance in ACP, according to the R^2 value of 0.296; however, the adjusted R^2 value of 0.294 indicates a small adjustment for the number of predictors used. The model is statistically significant, as indicated by the F-statistic of 137.5 with $p = 0.000$. Furthermore, as shown in Table 7, Model 2 (ACF $\rightarrow$ ETT) shows that academic facilities account for a significant amount of the variation in teaching methods, and that ACF also has a significant impact on ETT ($\beta = 0.612$, $t = 14.98$, $p = 0.000$). ACF explains 37.5% of the variance in ETT, according to the R^2 of 0.375. The model's robustness is confirmed by the very close adjusted R^2 of 0.374, and its significance is confirmed by the F-statistic of 224.5 with $p = 0.000$. Both ACF and ETT have a significant impact on ACP, according to Model 3 (ACF $\rightarrow$ ETT $\rightarrow$ ACP), as shown in table 8, which looks at the indirect path. ETT partially mediates the overall effect of ACF on ACP. According to this model, ETT has a significant impact on ACP ($\beta = 0.501$, $t = 10.93$, $p = 0.000$), while ACF has a direct impact on ACP ($\beta = 0.242$, $t = 5.16$, $p = 0.000$). With an adjusted R^2 of 0.478, that only slightly decreases when

The number of predictors is taken into account; the combined effect of ACF and ETT accounts for 48% of the variance in academic performance, according to the R^2 of 0.480. The model is statistically significant, as indicated by the F-statistic of 207.5 with $p = 0.000$.

Table 4: Reliability Analysis (Cronbach's Alpha)

Construct	No. of Items	Cronbach's Alpha
ACF	5	0.84
ETT	5	0.87
ACP	5	0.82

Table 5: Pearson Correlation Matrix

Variables	ACF	ETT	ACP
ACF	1	0.612**	0.544**
ETT	0.612**	1	0.657**
ACP	0.544**	0.657**	1

Table 6: Model 1-Direct Effects (ACF → ACP)

Predictor	B	Std. Error	Beta (β)	t	p-value
(Constant)	1.452	0.124		11.71	0.000
ACF	0.638	0.054	0.544	11.72	0.000

$R = 0.544$, $R^2 = 0.296$, Adjusted $R^2 = 0.294$, $F(1,451) = 137.5$, $p = 0.000$

Table 7: Model 2-Direct Effect (ACF → ETT)

Predictor	B	Std. Error	Beta (β)	t	p-value
(Constant)	1.217	0.111		10.96	0.000
ACF	0.711	0.047	0.612	14.98	0.000

$R = 0.612$, $R^2 = 0.375$, Adjusted $R^2 = 0.374$, $F(1,451) = 224.5$, $p = 0.000$

Table 8: Model 3-Indirect Effect - (AF → ETT → AP)

Predictor	B	Std. Error	Beta (β)	t	p-value
(Constant)	0.923	0.132		6.99	0.000
ACF	0.284	0.055	0.242	5.16	0.000
ETT	0.517	0.047	0.501	10.93	0.000

$R = 0.693$, $R^2 = 0.480$, Adjusted $R^2 = 0.478$, $F(2,450) = 207.5$, $p = 0.000$

2.5.6. Hypothesis Testing

With a significant value of $B = 0.638$ ($t = 11.72$, $p = 0.000$), the path analysis shows that ACF has a strong direct effect on ACP, suggesting that improved academic facilities lead to better academic performance. Additionally, ACF has a significant impact on ETT ($B = 0.711$, $t = 14.98$, $p = 0.000$), indicating that better facilities result in better teaching methods. Better

teaching methods result in better academic performance, as evidenced by the significant relationship between ETT and ACP ($B = 0.517$, $t = 10.93$, $p = 0.000$). EET partially mediates the impact of ACF on ACP, as evidenced by the significant indirect effect of ACF on ACP through ETT ($B = 0.354$, $t = 6.47$, $p = 0.000$). As shown in table 8, the data supports all four routes, both direct and indirect, demonstrating the value of ACF in enhancing instructional strategies and student achievement. These results imply that enhancing ACF has a dual effect of improving teaching strategies and directly raising ACP.

3 DISCUSSION LIMITATIONS AND FUTURE IMPLICATIONS

3.1. Discussion

The importance of academic facilities (ACF) is out of question when it comes to the academic performance, not only at the secondary level but at the higher level as well. This study explored the relationship of ACF with academic performance (ACP) and the mediating role of effective teaching techniques (EET). This study measured the demographics and found that, with 52.1% of the 453 respondents being men and 47.9% being women, the demographic data show a balanced gender distribution. Teachers made up 9.5% of the sample, while students made up the majority of responders (90.5%). All variables have positive ratings according to the descriptive statistics for the three main constructs (ACF, ETT, and ACP). A moderately positive opinion of academic facilities was indicated by the ACF's mean score of 3.58. The higher mean of 3.72 for ETT indicates that respondents' opinions of teaching methods were more positive. ACP had an above-average rating of academic performance, with a mean of 3.64. The correlation analysis revealed significant positive relationships between the constructs.

Furthermore, both direct and indirect relationships between the constructs were investigated by the path analysis models. The hypothesis that improved academic facilities lead to better academic performance was supported by Model 1 (ACF → ACP), which demonstrated a direct and significant impact of ACF on ACP ($\beta = 0.544$, $t = 11.72$, $p = 0.000$). The data support this hypothesis, showing that better academic results are a direct result of improved academic facilities. This finding is aligned with the studies of Jean (2021) and

Table 9: Hypothesis Testing

Path	Effect (B)	Std. Error	t - value	p-value	Interpretation	Hypothesis Result
Direct Path						
H1- ACF → ACP	0.638	0.054	11.72	0.000	ACF strongly improves ACP without a mediator	Supported
H2-ACF → ETT	0.711	0.047	14.98	0.000	AF significantly improves ETT	Supported
H3-ETT → ACP	0.517	0.047	10.93	0.000	ETT significantly improves AP	Supported
Indirect Path						
H4-ACF → ETT → ACP	0.354	0.055	6.47	0.000	Significant mediation through ETT	Supported

Mohzana (2024). The analysis supports the hypothesis that Academic Facilities (ACF) significantly improve ETT. ETT improves by 0.711 units for every unit increase in academic facilities, according to the beta coefficient of 0.711, which is a significant effect. The conclusion that the availability of high-quality academic facilities has a positive impact on teaching practices is further supported by the high t-value (14.98), which further validates the significance of this relationship. This finding is aligned with previous studies of Badmus (2023); Fatima and Mehmood (2024) and (Munna & Kalam, 2021).

Furthermore, the analysis studied the path (ETT → ACP), which states that ACP is significantly improved by Effective Teaching Techniques (ETT). With a beta coefficient of 0.517, a t-value of 10.93, and a p-value of 0.000, the direct path from ETT to ACP exhibits a positive and statistically significant effect. Academic performance increases by 0.517 units for every unit increase in effective teaching strategies, according to the beta coefficient of 0.517 and p-value 0.000. This indicates a moderate to strong effect, indicating that improvements in teaching methods significantly impact student performance. This finding supports our third hypothesis and is supported by the study of Darling-Hammond (2021) and Ikram et al. (2025). Additionally, significant mediation through ETT supports hypothesis H4 (ACF → ETT → ACP). With a t-value of 6.47 and $p = 0.000$, the indirect effect of ACF on ACP via ETT is 0.354, suggesting that teaching strategies mediate some of the effect of academic facilities on academic performance. This demonstrates how enhancing instructional strategies increases the impact of educational resources on student achievement. This finding is supported by the study of Sain (2023) and Polatcan et al. (2023).

All things considered, the analysis shows that academic facilities have a major impact on both teaching methods and academic achievement, with teaching methods acting as a crucial mediator. These results highlight how crucial it is to raise teaching standards and infrastructure to improve student outcomes.

3.2. Limitations

One of the study's limitations is that it only included 453 secondary school students and teachers from Multan, Pakistan's public and private sectors. This may have limited the findings' applicability to other areas or educational contexts. Additionally, the cross-sectional design limits the capacity to demonstrate causal links between academic performance, teaching methods, and academic facilities. Furthermore, other possible influencing factors that might have an impact on academic results, like socioeconomic status or student engagement, were not taken into account in this study. By employing longitudinal data and a more varied sample, future studies could overcome these constraints. To improve the robustness and generalizability of the findings, these factors ought to be considered.

3.3. Future Implications

To improve the findings' generalizability, future studies should think about enlarging the sample to include a more varied group of respondents from various geographical locations and educational settings. To determine the causal relationships between academic performance, teaching methods, and academic facilities, longitudinal studies would be helpful. To obtain a more thorough understanding of academic success, future research could also examine additional mediating factors like curriculum quality, socioeconomic status, or student motivation. Future models that take into account online learning environments and technological developments may also provide insightful information about how contemporary teaching methods affect student outcomes. These actions would support a more comprehensive understanding of the variables affecting academic achievement.

3.4. Conclusion

To sum up, this study offers insightful information about the connections among academic performance, efficient teaching methods, and academic facilities. According to the analysis, teaching methods and academic achievement are significantly impacted directly by academic facilities. Additionally, the impact of academic facilities on student outcomes is amplified by teaching strategies, which act as a critical mediator. All of the model's hypotheses were validated, emphasizing the relationship between student achievement, teaching effectiveness, and infrastructure. According to the findings, efforts to improve teaching methods are just as important for raising academic achievement as improving academic facilities alone. This highlights the value of a comprehensive strategy for educational development that prioritizes both tangible resources and teaching methods. Although the study provides insightful information, it also emphasizes the need for additional research to address some of its limitations, including the cross-sectional design and sample size. To further understand the factors influencing academic performance, future research should include longitudinal data, diverse samples, and additional mediating variables like student engagement. All things considered, the findings highlight how crucial it is to fund academic facilities as well as instructional strategies to promote improved learning outcomes. Educational institutions can foster an atmosphere that encourages better learning and academic achievement by concentrating on both elements.

Acknowledgment

Our work was greatly improved by the editor's, the journal's editorial boards, and the anonymous reviewers' considerate remarks, practical recommendations, and perceptive criticism.

Contributions of the Authors

All authors contributed equally.

Disclosure of Potential Conflicts

Regarding the research, writing, and publication of this work, the authors declare that they have no conflicts of interest.

Data Availability Statement

Since this study did not involve the collection or analysis of datasets, data sharing is not pertinent to this investigation.

6 REFERENCES

- Aftab, M. J., Sajjad, R., & Amjad, F. (2025). Augmenting Tertiary-Level Scholastic Outcomes for Visually Impaired Learners via Advanced ICT Modalities. *ASSAJ*, 3(02), 2387-2402.
- Ahmad, M. (2021). Management of facilities and infrastructure in schools. *Akademika*, 10(01), 93-112.
- Ajaz, S., Mehmood, B., Ali, Z., & Ashraf, S. F. (2014). Failure Of Business Graduates: Who Is To Blame. *Researchjournal's Journal of Management*, 2(4), 2-7.
- Akungu, J. A. (2014). *Influence of teaching and learning resources on students' performance in Kenya certificate of secondary education in free day secondary education in Embakasi district, Kenya*. University of Nairobi.
- Al Husaini, Y., & Shukor, N. S. A. (2022). Factors affecting students' academic performance: A review. *Social Science Journal*, 12(6), 284-294.
- Alalwan, N., Al-Rahmi, W. M., Alfarraj, O., Alzahrani, A., Yahaya, N., & Al-Rahmi, A. M. (2019). Integrated three theories to develop a model of factors affecting students' academic performance in higher education. *Ieee Access*, 7, 98725-98742.
- Amjad, R., & MacLeod, G. (2014). Academic effectiveness of private, public and private-public partnership schools in Pakistan. *International Journal of Educational Development*, 37, 22-31.
- Arumuru, L., & David, T. O. (2024). The Impact of Instructional Resources on Academic Achievement: A Study of Library and Information Science Postgraduates in Nigeria. *Asian Journal of Information Science and Technology*, 14(1), 54-60.
- Asad, M. M., & Malik, A. (2024). Educational quality and inclusion through collaborative hybridized cybergogy: transformative learning horizons in Pakistani universities. *Interactive Technology and Smart Education*, 21(4), 672-689.
- Ashraf, S. F., Cai, L., Butt, R. S., Naz, S., & Zafar, Z. (2019). Education as moderator: integrative effect towards succession planning process of small family businesses. *Pacific Business Review International*, 11(12).
- Badmus, A. A. (2023). *Influence of School Facilities on Teachers' Effectiveness in Secondary Schools in Ilorin Metropolis*. Kwara State University (Nigeria).
- Bari, F. (2021). Pakistan's education reform test. *Current History*, 120(825), 133-139.
- Berge, K. G., Vika, M., Agdal, M. L., Lie, S. A., & Skeie, M. S. (2017). Reliability, validity and cutoff score of the Intra-Oral Injection Fear scale. *International journal of paediatric dentistry*, 27(2), 98-107.
- Chew, S. L., & Cerbin, W. J. (2021). The cognitive challenges of effective teaching. *The Journal of Economic Education*, 52(1), 17-40.
- Chowdhury, M. E., Rahman, T., Khandakar, A., Ayari, M. A., Khan, A. U., Khan, M. S., . . . Ali, S. H. M. (2021). Automatic and reliable leaf disease detection using deep learning techniques. *AgriEngineering*, 3(2), 294-312.
- Darling-Hammond, L. (2021). Defining teaching quality around the world. *European Journal of Teacher Education*, 44(3), 295-308.
- Eyenaka, F. D., Nsit, A., Umoren, F. A., & Bichi, K. (2024). Laboratory and Library Facilities: Investigating Their Potencies in Promoting Student Interest and Performance in Science Subject. *INFORMATION SCIENCE*, 6(1), 161-176.
- Fatima, N., & Mehmood, M. I. (2024). Understanding Faculty Perspectives on the Integration of Online Learning Resources within Academic Libraries. *Pakistan JL Analysis & Wisdom*, 3, 160.
- Fosnot, C. T., & Perry, R. S. (1996). Constructivism: A psychological theory of learning. *Constructivism: Theory, perspectives, and practice*, 2(1), 8-33.
- Fraser, W. J., & Killen, R. (2003). Factors influencing academic success or failure of first-year and senior university students: do education students and lecturers perceive things differently? *South African journal of education*, 23(4), 254-263.
- Glaser, R. (1984). Education and thinking: The role of knowledge. *American psychologist*, 39(2), 93.
- Hasan, A. A. H. (2025). The Teaching Methods as a Mediating. *Green Finance and Energy Transition: Innovation, Legal Frameworks and Regulation*, 75.
- Hattie, J., & Zierer, K. (2024). *10 mindframes for visible learning: Teaching for success*: Routledge.
- Hepworth, D., Littlepage, B., & Hancock, K. (2018). Factors Influencing University Student Academic Success. *Educational Research Quarterly*, 42(1), 45-61.
- Hmelo, C. E., & Evensen, D. H. (2000). Introduction: Problem-based learning: Gaining insights on learning interactions through multiple methods of inquiry. In *Problem-based learning* (pp. 1-16): Routledge.
- Hussain, A., & Afzal, S. (2023). Lack of infrastructure and educational facilities in public schools and its effects on quality education of students. *Journal of Excellence in Social Sciences*, 2(1), 37-50.
- Hussain, M., & Akhter, N. (2025). Enhancing Teacher Performance and Educational Environments in Special Education Institutions: A Study of Challenges and Opportunities in Pakistan. *The Critical Review of Social Sciences Studies*, 3(1), 1318-1332.
- Ikram, M., Kenayathulla, H. B., & Saleem, S. M. U. (2025). Unlocking the potential of technology usage in fostering education quality and students' satisfaction: a case of Pakistani higher education. *Kybernetes*, 54(3), 1938-1965.
- Iqbal, T., Ahmad, S., Aftab, F., & Mahmood, C. K. (2025). Enhancing Higher Education Institutions' Performance: The Mediating Role of Academic Accreditation in Quality Management Initiatives in UAE. *SAGE Open*, 15(3), 21582440251358980.
- Islamic, G., Ishaq, M., & Dayati, U. (2024). Character education through philosophical values in traditional

- Islamic boarding schools. *Kasetsart Journal of Social Sciences*, 45(1), 31–42–31–42.
- Jamil, M., Mahmood, A., & Masood, S. (2023). Fostering critical thinking in Pakistani secondary school science: A teacher's viewpoint. *Global Educational Studies Review*, 8(2), 645-659.
- Javed, M. (2023). The Effectiveness of Different Teaching Methods in Education: A Comprehensive Review. *Journal of Social Signs Review*, 1(1), 17-24.
- Jean, B. (2021). School Library Facilities and Students Academic Performance in Secondary Schools in Nyamasheke District-Rwanda. *Journal of Education*, 4(1).
- Khalid, I. L., Abdullah, M. N. S., & Fadzil, H. M. (2024). A systematic review: Digital learning in STEM education. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, 51(1), 98-115.
- Kurudirek, A., & Berdieva, O. (2024). The more empowered schools, the more fruitful students. *Educenter: Jurnal Ilmiah Pendidikan*, 3(1).
- Lavy, S., & Nixon, J. L. (2017). Applications, enrollment, attendance, and student performance in rebuilt school facilities: A case study. *International journal of construction education and research*, 13(2), 125-141.
- Madhani, P. M. (2010). The resource-based view (RBV): issues and perspectives. *PACE, A Journal of Research of Prestige Institute of Management*, 1(1), 43-55.
- Mahmood, S. (2017). *Testing the effectiveness of a critical thinking skills intervention for initial teacher education students in Pakistan*. University of Southampton.
- Mgimba, A. E., & Mwila, P. M. (2022). Infrastructural challenges influencing academic performance in rural public secondary schools in Iringa District, Tanzania. *Journal of Research Innovation and Implications in Education*, 6(2), 17-24.
- Mncube, D. (2023). Analysis of the impact of poor infrastructure provision on the quality of education in rural schools. *Axiom Academic Publishers*, 1 (ISBN: 978-1-991239-18-1), 71-98.
- Mohzana, M. (2024). The impact of the new student orientation program on the adaptation process and academic performance. *International Journal of Educational Narratives*, 2(2), 169-178.
- Munna, A. S., & Kalam, M. A. (2021). Teaching and learning process to enhance teaching effectiveness: a literature review. *International Journal of Humanities and Innovation (IJHI)*, 4(1), 1-4.
- Muro, E. D. A., Álvarez, L. A. S., Rodriguez, V. H. P., Lucana, F. R. V., Rojas, L. M. H., Benavides, A. M. V., & Salazar, C. A. H. (2024). Fostering equity in rural education: a literature review on student dropout and retention strategies. *Revista de Gestão Social e Ambiental*, 18(1), 1-18.
- Nagamalla, L., Readdy, V., Kumar, S., Kolagani, L., & Suryadevara, G. (2025). Impact of Active Learning Methods on Project-Based Learning (PBL): Enhancing Student Engagement and Outcomes. *Journal of Engineering Education Transformations*, 30-37.
- Nehemiah, N. C. (2023). Infrastructural facilities and academic performance of students in Imo State University, Owerri. *International Journal of Research and Innovation in Social Science*, 7(9), 1568-1583.
- Nwuke, T. J., & Nwanguma, T. K. (2024). Provision and utilization of physical resources for effective teaching and learning effectiveness in public universities in Rivers State. *International Journal of Applied and Scientific Research*, 2(2), 227-244.
- Nyhan, R. C., & Alkadry, M. G. (1999). The impact of school resources on student achievement test scores. *Journal of Education Finance*, 25(2), 211-227.
- Ogu, U. K. (2024). ASSESSMENT OF SCHOOL FACILITIES UTILIZATION AND STUDENTS ACADEMIC PERFORMANCE IN TECHNICAL AND VOCATIONAL INSTITUTIONS IN NORTHEAST, NIGERIA. *Nnadiabube Journal of Education in Africa*, 9(2).
- Orina, W. A., Macharia, S., & Okpalaenwe, E. N. (2021). Managing overcrowded classrooms to accommodate learner centered methodologies: An indispensable pillar for teachers' preparedness in implementation of competency-based curriculum in Kenya. *International Journal of Innovative Research and Development*, 10(9).
- Ozcan, M. (2021). Factors affecting students' academic achievement according to the teachers' opinion. *Education Reform Journal*, 6(1), 1-18.
- Piaget, J. (1973). Cognitive development. *The Journal of the Jean Piaget Society*. www.piaget.org/journal/index.html.
- Polatcan, M., Arslan, P., & Balci, A. (2023). The mediating effect of teacher self-efficacy regarding the relationship between transformational school leadership and teacher agency. *Educational Studies*, 49(5), 823-841.
- Ramli, A., Zain, R. M., Campus, C., Chepa, P., & Bharu, K. (2018). The impact of facilities on students' academic achievement. *Sci. Int. (Lahore)*, 30(2), 299-311.
- Ramzan, M., & Rafiq, S. (2025). A prelude to improving school education in Punjab, Pakistan. *Social Sciences Spectrum*, 4(1), 487-505.
- Rehman, S. U., Bhatti, A., & Chaudhry, N. I. (2019). Mediating effect of innovative culture and organizational learning between leadership styles at third-order and organizational performance in Malaysian SMEs. *Journal of Global Entrepreneurship Research*, 9(1), 1-24.
- Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. *Handbook of research on teacher education*, 2(102-119), 273-290.
- Roza, M. R. M. (2025). Exploring the Impact of Innovative Teaching Methods on Student Engagement and Learning Outcomes: A Phenomenological Case Study in Higher Education Institutions. *Journal of Educational Innovation and Research*, 1(1), 38-47.
- Sain, Z. H. (2023). Revitalizing education in Pakistan: Challenges and recommendations. *International Journal of Higher Education Management*, 9(2).
- Sedgwick, P. (2012). Pearson's correlation coefficient. *Bmj*, 345.
- Shaikh, G. M., Shah, M., Javed, S., Batool, R., Naz, A., & Shafiq, F. (2024). A Systematic Review on Active Learning in Dentistry Education in Undergraduate Classrooms. *Pakistan Journal of Medicine and Dentistry*, 13(4), 156-167.
- Suleiman, I. B., Okunade, O. A., Dada, E. G., & Ezeanya, U. C. (2024). Key factors influencing students' academic performance. *Journal of Electrical Systems and Information Technology*, 11(1), 41.
- Suryaman, S., Adha, M. A., Suharyanto, S., & Ariyanti, N. S. (2024). Principal change leadership and e-learning effectiveness: The mediating role of teachers work commitment and attitudes toward change. *Jurnal Cakrawala Pendidikan*, 43(1), 88-101.
- Tayyaba, S. (2012). Rural-urban gaps in academic achievement, schooling conditions, student, and teachers' characteristics in Pakistan. *International Journal of Educational Management*, 26(1), 6-26.
- Umar, Z., Sadiqi, T., Hussain, S., & Qahar, A. (2023). Compare the Quality of Infrastructure on Student

- Outcomes in Public and Punjab Education Foundation Funded Schools at Secondary Level. *International Research Journal of Management and Social Sciences*, 4(4), 26-39.
- Venugopal, N., & Vinoth, B. (2024). Technology Transforming Teaching and Learning in the 21st Century. *Transforming Education for the 21st Century-Innovative Teaching Approaches*, 230, 283-302.
- Xiong, X. (2025). Influence of teaching styles of higher education teachers on students' engagement in learning: The mediating role of learning motivation. *Education for Chemical Engineers*, 51, 87-102.
- Yusron, M. A., Anwar, S., Umami, H., Haikal, M., & Mustofa, I. (2024). Integration of Direct Instruction Methods and Independent Learning Curriculum in the Teacher Training and Development Program (TTDP) at Darussalam Gontor University. *EDUCAN: Jurnal Pendidikan Islam*, 8(2), 270-279.
- Zafeer, H. M. I., Maqbool, S., Rong, Y., & Maqbool, S. (2025). Beyond the Classroom: How Socioeconomic Status, Parental Involvement and Home Environment Impact on Students' Science Academic Performance at Secondary Schools. *European journal of education*, 60(1), e70023.
- Zhou, H. (2025). Exploring the dynamic teaching-learning relationship in interactive learning environments. *Interactive Learning Environments*, 1-31.
- Гуцало, Л., Шкляр, І., Абросімов, А., Харченко, Н., & Ордановська, О. (2024). Strategies for developing critical thinking and problem-based learning in the modern educational environment. *Multidisciplinary Science Journal*(6), 1-7.