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MEASURING THE RELATIONSHIP BETWEEN TEACHER EFFECTIVENESS AND ACADEMIC ACHIEVEMENT OF TENTH-GRADERS IN PHYSICS

Zainab Kamran
PhD Scholar, Institute of Education and Research.
University of the Punjab, Lahore, Punjab, Pakistan
zainimalik34@gmail.com
Dr. Muhammad Akram
Associate Professor, Institute of Education and Research,
University of the Punjab, Lahore, Punjab, Pakistan
(Corresponding Author) akram.ier@pu.edu.pk

Abstract

Over the past years, there had been a constant decline in the results of Physics among public secondary school students in Pakistan due to various reasons including teacher effectiveness. The main purpose of this research was to measure the correlation between teacher effectiveness measured on 5 quality standards and secondary school learners' achievement in physics. The researchers employed a quantitative, correlational research design to answer the research questions. Using stratified random sampling technique data was collected from a sample of 3,430 physics students of 10th grade across 40 public secondary schools in District Lahore. The School Teacher Effectiveness Questionnaire (STEQ) with overall Cronbach Alpha α=.84 was used to collect student perception about their teacher and academic achievement was obtained from students' 9th-grade Physics marks as awarded by the Board of Intermediate and Secondary Education (BISE), Lahore. The data were analyzed by employing descriptive statistics, Pearson r, simple and multiple linear regression. The results showed strong, positive, and significant correlation ($r = .754$, $p < .01$) between teacher effectiveness and students; achievement in Physics. Moreover, regression analysis revealed that physics teacher effectiveness had a significant effect on student achievement in physics ($r^2 = .568$). These results supported the essential part of various factors of teacher effectiveness in boosting students' success in Physics. It was recommended that there is a necessity to prioritize quality teaching through frequent evaluation and targeted professional development in science subjects where understanding of concepts is critical. Thus, strengthening teacher effectiveness is a key to reverse the trend of low learning outcome of students and equipping them with stronger scientific knowledge.

Keywords: *Teacher Effectiveness, Academic Achievement, Secondary Education, Physics Instructions, Teacher Evaluation*

Introduction

The contemporary trends in education consider scientific literacy a cornerstone for individual as well as national development and success. Among the core science subjects, Physics is a unique construct of both conceptual complexity and practical application. The knowledge of physics plays a vital role in preparing students to possess the analytical and problem-solving skills required in science, technology, engineering, and mathematics (STEM) careers (Gess-Newsome et al., 2019; Kloser, 2014). Despite the important role of understanding and applying physics principles in our lives, in Pakistan, it continues to be a subject where public secondary school students face significant challenges, particularly at foundational years where physics is introduced as a separate subject.

The chief factor contributing to academic achievement of students at any level is the effectiveness of their teachers. Teacher effectiveness refers to the degree to which instructors consistently demonstrate strong performance based on some professional standards such as subject knowledge, strategic instructions, innovative assessment techniques, clear communication, and classroom management skills (Stronge et al., 2011; Akram, 2018). These dimensions collectively define the quality of teaching practices and directly influence students' learning outcomes. The ability of Physics teachers to convey abstract concepts

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clearly, use appropriate pedagogical tools, and foster inquiry-based learning environments is essential for student success (Owusu-Fordjour et al., 2022; Berry & Van Driel, 2013).

Recent academic results of secondary school students in Pakistan highlighted a concerning trend. According to the official statistics from the Board of Intermediate and Secondary Education (BISE) Lahore, Physics failure rates among public secondary school students remain persistently high. In 2022, 26.64% of ninth-grade students failed in Physics, while 23.75% of tenth-graders failed. In 2023, the figures were 19.64% (Grade 9) and 10.21% (Grade 10), respectively. The situation in 2024 remained critical, with 30.23% of ninth-graders failing the subject. Supplementary examination results further revealed that only 44.8% of students passed Physics, indicating a systemic issue in science instruction. These outcomes underscore a pressing need to examine instructional factors particularly teacher effectiveness that may be influencing student performance.

Subject-specific teaching competence is increasingly recognized as a decisive factor in student learning. Researchers have argued that teaching effectiveness cannot be fully understood or improved without considering disciplinary differences (Charalambous et al., 2019). Effective teaching in Physics requires more than general pedagogical skill, it demands specialized content knowledge and pedagogical content knowledge (PCK) that enables teachers to explain, represent, and adapt scientific concepts to students' levels of understanding (Gess-Newsome et al., 2019; Owusu-Fordjour et al., 2022). Studies have shown that students taught by teachers with high PCK demonstrated greater conceptual gains and higher achievement in science subjects (Cicek & Taspinar, 2021).

Moreover, the focus on 10^{th} graders in this study was deliberate and pedagogically significant because in Pakistani education system, this grade finishes with high-stakes board examinations that determine the future academic journey of students. Academic achievement at this level not only impact immediate promotion to next grade but also the eligibility of students into pre-engineering and pre-medical streams, scholarships, and careers. Therefore, at this stage, the academic scores in core subjects like Physics carries lasting implications for both academic and professional paths (Khattak, 2012; Chetty et al., 2014).

Moreover, according to Jean Piaget's theory this age group (adolescence) is now at formal operational stage of cognitive development (Ahmad et al., 2024) and represents a critical change for academic identity, motivation, and interest. During this stage, cognitive and psychological transitions occur which influence how students will engage and respond to abstract and complex ideas, and various teaching strategies (Eccles & Roeser, 2011; Liu et al., 2019). Students can now comprehend abstract and scientific concept, apply logic to tackle daily life difficulties, and develop deductive reasoning. So, focus on teacher effectiveness at this educational stage offers insights not only into teaching practices but also into how this process interacts with developmental needs of students.

Previous studies in the Pakistan had examined the general factors related to academic performance, such as school environment, parental support, or socio-economic status (Haider & Hussain, 2014; Rafiq et al., 2013) and studied science as a general subject. Thus, gap of subject specific, and age specific empirical evidence is present. It is essential to address this problem given the consistent underachievement of students in Physics across public secondary schools. Therefore, the current study addressed this gap by examining how perceived teacher effectiveness across five core factors based on quality standards related with the academic achievement of learners in Physics. By focusing on a single subject, and grade level, the research aimed to offer precise, and actionable evidence to improve professional development, and teacher evaluations programs.

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Literature review

The need for improving student academic achievement in Physics at secondary level remains a major educational challenge in Pakistan over the past years according to the results of BISE (2024). The success of students in education is mainly tied to how effectively their teachers deliver the academic content and respond to their learning needs. Many research studies had indicated that teacher competence, predominantly in instructional planning, PCK, and motivation, play a key role in improving academic achievement.

Keller (2017) surveyed 77 secondary school physics teachers and 1,614 of their students to determine the effect of teacher motivation and PCK on their student's outcomes in Germany and Switzerland; the findings showed that teachers' pedagogical content knowledge had a significant effect on physics achievement ($\beta = 0.44$, $p < 0.05$), whereas teacher motivation strongly affected student interest ($\beta = 0.53$) in physics. These results inferred that both cognitive (content expertise) and affective (enthusiastic teaching) factors of teacher effectiveness significantly fostered academic success and engagement of students.

Schneider et al. (2022) measured the effect of a Project-based Learning (PBL) intervention named *Crafting Engaging Science Environments* on the physics and chemistry achievement of high schoolers, United States. The sample included over 4,200 students and determined that the experimental group scored 0.208 standard deviations higher than the control group. Implementation quality of teachers ($r^2 = 0.11$) and student engagement ($r^2 = 0.28$) both significantly predicted achievement. These results suggested that teacher effectiveness extends beyond subject knowledge and also include the capability to transfer interactive and engaging instruction.

In Nigeria, Bada and Akinbobola (2018) observed the effectiveness of Experiential Teaching Strategy (ETS) on students' physics achievement using a quasi-experimental design. Students in experimental group scored significantly higher than those in the control group ($t = 3.572$, $p = 0.001$), supporting the notion that integration of active, and experience-based instructions fostered better outcomes in Physics. Likewise, Adeyemo (2012) found that effective classroom management practices such as structured schedules, positive climate, flexible teaching, and active discipline all collectively and significantly increased student achievement in Physics ($F = 3.282$, $p < 0.05$), signifying that well-structured and supportive classrooms are imperative for encouraging academic success.

In Pakistani context, few research studies had highlighted the critical role of teacher-related variables in shaping student academic performance in science subjects. Such as Yasmeen (2023) investigated the effect of instructional leadership on student achievement in Biology, Chemistry, and Physics across six districts of Balochistan. Drawing on a sample of 2,797 students and 388 teachers, the study found that leadership practices accounted for 46% of the variance in Physics achievement, highlighting the indirect role of school leadership in enhancing teaching effectiveness and student outcomes.

Khan et al. (2017) examined the effect of Active Learning Method (ALM) on 9th grade Physics students in Haripur using a quasi-experimental design. A 12-week intervention was given, and the students in the experimental group scored significantly higher across all domains of cognitive learning in comparison to the control group ($M = 73.50$ vs. 44.02). These results emphasized the essential role of interactive, and student-centered instructions in delivering Physics education.

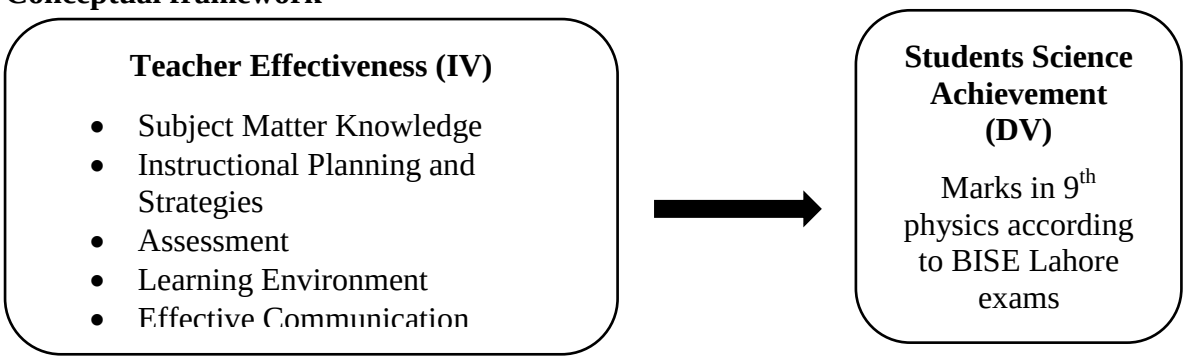
Suleman et al. (2011) evaluated the integration of technology in chemistry teaching and learning process using experimental design in Khyber Pakhtunkhwa. The findings revealed that students in the experimental group not only obtained higher scores on post-tests ($t = 5.78$, $p < 0.05$) but also exhibited greater retention and motivation. These results also underscored the potential of technology-enhanced instruction defined as contemporary

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teaching instructions in improving Physics learning. A similar context experimental study conducted on science students by Mehboob et al. (2021) provided evidence that inquiry-based learning improved academic achievement of students in biology at the secondary level. The results showed that the experimental group scored significantly higher than the control group ($p = 0.045$). This study also reinforced the notion that effectiveness of innovative teaching and instructional strategies across science subjects greatly influence student outcomes.

Collectively, these national and international studies confirmed that achievement is deeply influenced by teacher-related factors. However, many existing studies do not isolate the science subject and examined science as a general subject. This study addressed this notable gap by focusing on subject specific perceived effectiveness of teachers measured across five key factors components named subject mastery, instructional planning, communication, assessment, and classroom management and correlated it to academic performance of secondary school students in Physics, a level which marks an essential academic transition in Pakistani education system. By examining this subject-specific and age-specific relationship in a localized context with a representative data, the study offered novel insights and empirical evidence for targeted interventions, teacher evaluations, and educational reforms meant at refine physics educational outcomes in Pakistan.

Conceptual framework



The study was based on the assumption that teacher effectiveness—measured through five factors based on National Professional Standard for Teachers in Pakistan: subject matter knowledge, instructional planning, assessment practices, communication skills, and classroom management, all had a direct effect on students' academic achievement in Physics. It posited that students who perceived their teachers as effective on these factors were more likely to perform better academically. The model was informed by empirical research on teacher quality and student learning outcomes in physics, emphasizing a direct, strong, and positive relation between instructional quality and subject-specific achievement.

Significance of the Study

This study provided empirical evidence, significantly in the context of secondary education system in Pakistan by focusing specifically on ways to improve 10th graders' academic achievement, a group of students preparing for high-stakes exams. Unlike other research studies that examined science subjects collectively, this study isolated Physics achievement and explored how it is affected by students' perceptions of their teacher effectiveness across five essential dimensions. The study findings bridged this major gap in existing body of literature by offering subject-specific**,** grade-specific, and context-specific insights taken from a large and representative sample. The findings of this research are expected to inform teacher training programs**,** school leadership practices, and education policy, particularly in relation to improving science instruction in public schools.

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Furthermore, the study provided empirical evidence that can support the development of more effective teacher evaluation models and targeted interventions in Physics education. Ultimately, it contributed to enhancing the quality of teaching and learning in a subject vital to national progress in science and technology.

Research Objectives

The present study was designed to achieve the following objectives:

1. To assess tenth-grade students' perceptions of their Physics teachers' effectiveness across key instructional domains.
2. To examine the relationship between perceived teacher effectiveness and students' academic achievement in Physics.
3. To determine the extent to which teacher effectiveness predicts students' achievement in Physics at the secondary level.

Research Questions

Based on the objectives outlined above, the study sought to answer the following research questions:

1. What do tenth-grade students perceive their Physics teachers' effectiveness in public secondary schools?
2. Is there a significant relationship between students' perceptions of teacher effectiveness and their academic achievement in Physics?
3. To what extent perceived teacher effectiveness predicts Physics achievement among tenth-grade students?
4. To what extent factors of perceived teacher effectiveness affect Physics achievement among tenth-grade students?

Research Methodology

This study was grounded in the post-positivist research paradigm, which supports the use of quantitative methods to explore observable patterns and test theoretical relationships. The post-positivist approach recognizes that while reality can be measured, findings are influenced by contextual factors and participant perceptions. Given the objective of examining the association between teacher effectiveness and student academic achievement in Physics, a correlational research design was employed. This approach allowed the researchers to assess the strength and direction of the relationship between the variables without any manipulation or intervention, making it suitable for real-world educational settings.

The population for this study comprised all 10^{th} graders enrolled in public secondary schools across District Lahore, Punjab. To ensure the equal representation of the gender in sample proportionate stratified random sampling technique was used. A total of 3,430 students from 40 public secondary schools were selected. Data from the selected sample were collected using valid and reliable instrument. Perceptions of students about their Physics teachers were measured using the School Teacher Effectiveness Questionnaire (STEQ) developed by Akram (2018) with overall reliability α=.84. It had 5 factors: subject matter knowledge, instructional planning, communication skills, assessment practices, and classroom management. Whereas, academic achievement was obtained through students' marks in physics of 9^{th} grade officially announced by the Board of Intermediate and Secondary Education (BISE), Lahore. All ethical considerations were ensured during the process of data collection by obtaining formal permissions from school authorities prior to data collection and prioritizing anonymity, and confidentiality during data collection process.

The collected was organized and analyzed using SPSS 26.0. Descriptive statistics – Mean and Standard Deviation summarized the data of students' perceptions about their teacher effectiveness. To explore the relationship between perceived teacher effectiveness

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and Physics achievement, Pearson r was applied. Simple linear regression analysis was done to determine the predictive strength of teacher effectiveness on student academic outcomes. All statistical assumptions such as normality, linearity, and homoscedasticity were tested and met prior to analysis. A significance of $p < .01$ was adopted to ensure the reliability of the findings.

Results and Interpretations

This section presents the results and interpretations of the statistical analyses, descriptive and inferential, employed to answer the research questions of the study.

Research Question 1

What do tenth-grade students perceive their Physics teachers' effectiveness in public secondary schools?

Table 1

Overall Students' perception about Chemistry Teachers' Effectiveness

Factors	Mean	Std. Deviation
Subject Matter Knowledge	3.30	.841
Instructional Planning	3.34	.824
Assessment	3.41	.847
Learning Environment	3.32	.823
Effective Communication	3.35	.854
Overall	3.46	.656

Table 1 showed the results of descriptive statistics about students' perceptions of their physics teachers' effectiveness across its five key factors. Among these, the factor "Assessment" received the highest mean rating (M = 3.41, SD = 0.847), suggesting that students perceived their teachers as relatively more effective in assessing and evaluating their progress. Other factors also received significantly moderate rating "Instructional Planning" (M = 3.34, SD = 0.824), "Effective Communication" (M = 3.35, SD = 0.854), and "Learning Environment" (M = 3.32, SD = .823). Whereas the mean score of "Subject Matter Knowledge" (M = 3.30, SD = 0.841) was relatively lowest but still significant. The overall mean perception of students were M = 3.46 (SD = 0.656), which suggested that students generally viewed their physics teachers as moderately effective across the measured domains.

Research Question 2

Is there a significant relationship between students' perceptions of teacher effectiveness and their academic achievement in Physics?

Table 2

Relationship between Teacher Effectiveness and Students' Academic Achievement in Physics

	SMK	IP	A	LE	EC	PTE	SAAP
SMK	1						
IP	.665**	1					
A	.465**	.536**	1				
LE	.562**	.436**	.476**	1			
EC	.692**	.550**	.691**	.591**	1		
PTE	.496**	.764**	.649**	.672**	.760**	1	
SAAP	.721**	.679**	.689**	.674**	.695**	.754**	1

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**. Correlation is significant at the 0.01 level (2-tailed).
SMK: Subject Matter Knowledge, IP: Instructional Planning and Strategies, A: Assessment, LE: Learning Environment, EC: Effective Communication, PTE: Physics Teacher Effectiveness, SAAP: Student Academic Achievement in Physics.

Table 2 shows the Pearson correlation coefficients among the factors of teacher effectiveness and student academic achievement in physics (SAAP). All correlations were significant at the 0.01 level. The highest correlation was observed between Physics Teacher Effectiveness (PTE) and SAAP ($r = .754$, $p < .01$), indicating a strong and positive association between overall teacher effectiveness and students' academic performance. Among the individual factors, "Subject Matter Knowledge" ($r = .721$), "Assessment" ($r = .689$), and "Effective Communication" ($r = .695$) had strong positive correlations with SAAP. These results suggested that each aspect of teacher effectiveness especially communication and content mastery were significantly related to student achievement in physics, with all five factors also positively inter-correlated.

Research Question 3

To what extent factors of perceived teacher effectiveness affect Physics achievement among tenth-grade students?

Table 3

Effect of different factors of Physics Teachers' Effectiveness on Students' Academic Achievement in Physics (SAAP)

No	Model	*B*	SE	*β*	*t*	*P*
1	SAAP (constant)	-16.379	.523		-34.132	.000
2	Subject Matter Knowledge	3.426	.157	.207	24.747	.000
3	Instructional Planning	2.894	.148	.271	16.832	.000
4	Assessment	3.144	.161	.225	21.141	.000
5	Learning Environment	3.026	.154	.226	18.044	.000
6	Effective Communication	2.872	.129	.237	23.863	.000

Note: $r = .754^a$, $r^2 = .569$, $p < .05$
SAAP = Student Academic Achievement in Physics

Table 3 presents the results of multiple regression analyses examining the effect of each factor of physics teachers' effectiveness on student academic achievement in physics (SAAP). All five factors emerged as significant predictors ($p < .001$). "Subject Matter Knowledge" ($\beta = .207$, $t = 24.747$), "Instructional Planning" ($\beta = .271$, $t = 16.832$), and "Assessment" ($\beta = .225$, $t = 21.141$). "Effective Communication" ($\beta = .237$, $t = 23.863$), and "Learning Environment" ($\beta = .226$, $t = 18.044$) all significantly contributed to the student achievement. Among these factors, Instructional Planning had the strongest effect on Student Academic Achievement in Physics ($\beta = 0.27$**)**. These results inferred a substantial combined influence of these teacher-related factors on students' academic performance.

Research Question 4

To what extent perceived teacher effectiveness predict Physics achievement among tenth-grade students?

Table 4

Effect of Physics Teachers' Effectiveness (PTE) on Students' Academic Achievement in Physics (SAAP)

Sr. no	Model	*B*	SE	*B*	*t*	*P*
1	SAAP (constant)	-16.310	.512		-34.323	.000
2	PTE	14.438	.145	.753	102.220	.000

Note: $r = .753^a$, $r^2 = .568$, $p < .05$

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SAAP = Student Academic Achievement in Physics, PTE = Physics Teacher Effectiveness

Table 4 summarized the results of simple linear regression analysis applied to measure the overall effect of physics teachers' effectiveness (PTE) on students' academic achievement in physics (SAAP). The analysis revealed a strong and statistically significant effect ($B = 14.438$, $\beta = .753$, $t = 102.220$, $p < .001$), indicating that PTE was a substantial predictor of SAAP. The model accounted for 56.8% of the variance in student performance ($r^2 = .568$). These results affirmed that when considered collectively, teacher effectiveness in physics significantly enhanced students' academic success.

Major findings

Major findings of the current study were as follows:

1. A total of 3,430 tenth-grade students from public secondary schools in District Lahore participated in the study, with representation from all five tehsils: Lahore City, Model Town, Raiwind, Shalimar, and Cant.
2. Students reported highly favorable perceptions of their Physics teachers across all five domains of teacher effectiveness, with the highest ratings on Assessment ($M = 3.41$) indicating that students perceived their teachers as effective in evaluating their learning and providing timely feedback.
3. A strong, statistically significant, and positive correlation was found between perceived teacher effectiveness and students' Physics achievement ($r = .754$, $p < .01$), indicating that as perceptions of teacher quality increased, so did academic performance.
4. Simple linear regression analysis revealed that perceived teacher effectiveness significantly predicted Physics achievement ($r^2 = .568$), explaining approximately 56.8% of the variance in students' scores.
5. Among five factors of teacher effectiveness, Instructional Planning had the strongest effect on Student Academic Achievement in Physics ($\beta = 0.271$).

Conclusion

This study explored the relationship between teacher effectiveness and academic achievement of Physics students in the public secondary schools of District Lahore. A large sample of 3,430 students (boys and girls) were drawn from all five tehsils of the district Lahore. The results provided strong evidence that teacher effectiveness shaped the performance of students in Physics, a subject where academic underachievement was observed as a persistent challenge in Pakistan over the past few years.

The results showed that learners generally perceived their Physics teachers as effective across all domains of teacher effectiveness. The study established a strong, statistically significant, and positive association between perceived teacher effectiveness and Physics achievement. The results of regression analysis further ensured that teacher effectiveness was a powerful predictor of student performance, explaining nearly 56.8% of the variance in students' physics scores. These findings underscored the importance of focusing on teacher quality, not only in terms of their subject expertise, but also in how they plan, assess, and communicate concepts to engage students in classroom.

In conclusion, while many international studies explored teacher effectiveness in broader or Western educational settings, few have explored the specific focus on Physics education in Pakistani public schools. The current study added to this limited but growing body of literature relevant to the context of South Asia by providing empirical evidence from a large and representative sample ($N = 3,430$) using validated instruments that measured the effect of various aspects of teacher effectiveness (based on NPSTs in Pakistan) on students' scores in physics.

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Discussion

This study investigated the relationship between 10th grade public secondary school teachers' effectiveness and their students' achievement in Physics, Lahore. The findings of the current study endorsed the long-standing idea that effective teachers play a central in improving learning outcomes.

One of the major findings was the strong, positive, and significant correlation (r = .754) between perceptions of students about their teachers' effectiveness and academic achievement in physics. This result was supported by previous literature and added weight to the argument that when teachers are perceived as competent, organized, engaging, and knowledgeable, students are more likely to significantly succeed academically (Bera, 2024; Mohamed et al., 2024). These findings also aligned with Keller (2017) study, who found that Physics teachers' pedagogical content knowledge and motivation significantly influenced student interest and achievement in the subject.

The results of regression analysis revealed that the strongest predictor among the five factors of teacher effectiveness was instructional planning (β = 0.271) emphasizing that the successful delivery of structured and organized lesson plans and relevancy of instructional practices are crucial factors in the academic success in Physics. The results also showed that teacher effectiveness accounted for approximately 56.8% variance in Physics scores. These findings are in line with the results of Yasmeen (2023), who found that instructional leadership practices explained 46% of the variance in Physics achievement of students. Similarly, Akram and Zepeda (2015) also found that teacher effectiveness accounted for 32% of student achievement in English and 9% in mathematics. What separates the current study result is the subject-specific focus on Physics achievement and the comprehensive set of effectiveness indicators based on NPSTs named subject mastery, planning, communication, assessment, and classroom environment.

The study's findings were also supported by the international research studies. For example, Berry and Van Driel (2013) and Saldivar et al. (2022) both emphasized the significance of pedagogical content knowledge and well-organized instructions in improving educational outcomes. Moreover, the role of effective communication and classroom climate had also been emphasized in the research studies of Kasim and Joseph (2022) and Aluri and Fraser (2019), which aligned with the results of current study (classroom environment = 0.226 and effective communication = 0.237)) suggesting that classrooms where support is given and ideas are communicated freely and openly can significantly boost student engagement and academic performance.

Another important discussion is related to the age group and subject focus of the study sample. Secondary school level is a crucial stage in Pakistan's education system, as performance at this level is assessed and evaluated by the Board of Intermediate and Secondary Education of respective district. The results students obtained at this level greatly influences the future journey of students. Moreover, as far as the focus on Physics, it continues to be a subject with low marks and high dropout interest across public schools in Pakistan, with only 47.40% passing rate according to the results declared by BISE Lahore (2024). The specific focus on this particular group allowed the study to address a timely and relevant problem about students' continuous underachievement in this subject and identified that teacher effectiveness is a key leverage point to bring change in this predicament.

In summary, the study confirmed that teacher effectiveness was a powerful predictor of Physics achievement at the secondary school level. These findings validated earlier international studies as well as offered context-specific insights benefited for Pakistani policymakers, curriculum designers, and school leaders to improve teacher training programs

with special focus on benefits of timely feedback, real-life relatedness of physics concepts, and effective communication skills.

Study Limitations

The current study while offering valuable insight into the relationship among various teacher effectiveness related factors and learning outcomes of students in physics present some limitations. Firstly, the study relied solely on single source of data collection: students' perception. Secondly, the research was limited to public secondary schools in District Lahore which may affect the generalizability of the results. Lastly, psychological aspects or other constructs were not involved which may also contribute to student academic success.

Recommendations and Suggestions

The researchers keeping in mind the findings, recommended that school administration and educational authorities should invest in the subject specific professional development of their teachers. The main objective of these PD programs should be improving content and pedagogical knowledge, assessment and evaluation practices. Likewise, school authorities should invest in timely evaluations with structured and multidimensional frameworks that observe and assess key areas of teachers like content mastery, communication skills, classroom management skills, and assessment techniques. These evaluations can be made more successful and effective by incorporating student feedback and classroom observations into these evaluations. The results of these evaluations will provide bases for targeted professional development and instructional support.

The future researchers should explore the mediating or moderating effect of potential psychological or other variables named student motivation, engagement, or parental involvement, learning styles that might provide further insight into this relationship. Additionally, future researchers can conduct comparative studies across different subject areas or school types that may reveal evidence on contextual differences about how teacher effectiveness effects educational outcomes. For example, investigating rural vs urban schools, public vs private sector to offer a deeper comprehension of the broader educational dynamics.

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