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Untrained Teachers, Unequal Learning Opportunities: Investigating the Relationship between Teacher Preparation and Children's Educational Progress in Pakistan”

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ABSTRACT

The quality of teachers is an essential factor determining education outcomes, especially in developing countries where there is inequality in teacher preparation leading to inequality in the learning process of students. Teacher preparation is a persistent challenge in developing nations such as Pakistan where disparity in teacher preparation continues to hamper the educational achievements of children. This study evaluates the impact of teacher preparation on learning outcomes through the analysis of secondary data collected through the SABER Service Delivery Survey – Pakistan from the World Bank. The quantitative research approach is employed in this study where the data of 19,003 students is analyzed through associating student achievement with school-level teacher preparation variables such as teacher training, teacher education, teacher knowledge, and teacher attributes. It was found out that teacher preparation variables have significant relationships with learning outcomes of children. There are significant positive relationships between teacher training and teacher education with student achievement after controlling for other variables. Of all the teacher-level characteristics, teacher subject knowledge exhibits the highest correlation with learning achievement. Findings' robustness tests conducted on mathematics, Urdu, and English learning outcomes scores further corroborate the reliability of the results in varying learning areas. It can be seen from the findings that variation in teacher training plays a role in causing learning inequalities in Pakistan. The current research provides evidence to the debate regarding education quality in Pakistan by stressing the need for policy measures aimed at improving teachers' skills and competencies.

1. Introduction

There is a general consensus that education plays a key role in the development of human beings and economic growth, poverty reduction, and social mobility. Apart from offering knowledge and skills to learners, quality education enhances the productivity of a nation, innovations, and the creation of more inclusive societies. Effective educational improvement, however, requires not just access to schools but also effective teaching and learning that allows learners to acquire the necessary skills and knowledge. In this case, the quality of teachers has become one of the most critical school-level variables influencing the success of the students. (Hanushek, 2011; Darling-Hammond, 2000). Although curriculum, infrastructure, and other educational resources are crucial for effective educational systems, quality teaching is still key to translating inputs to educational experiences.

Teachers have an impact on the success of students in a number of ways ranging from academic qualifications, preparedness for the job, subject knowledge, classroom practices, and adaptability to learners. Teachers who are well-prepared are more likely to design lessons, diagnose difficulties that learners experience in learning, use right teaching methods, and offer a conducive environment for learning. On the other hand, lack of adequate teacher preparation might affect instructional efficiency and become a cause for persistent student achievement disparities. (World Bank, 2018; ASER Pakistan, 2023; UNICEF, 2021). The international literature shows that variations in the quality of teachers are significantly correlated with disparities in learning outcomes, especially in developing countries, where educational systems suffer from problems in teacher recruitment, training, staffing, and professional development.

In developing countries, educational disparity does not manifest itself exclusively in terms of access to education but also in differences in the quality of learning that children acquire. Poorer children tend to attend schools with higher rates of teacher shortage, lack of professional development opportunities, and poorer instructional capacity. This way, the inequality in teacher preparation becomes a powerful tool that reproduces broader socioeconomic disparities in the society. The elimination of learning disparity is thus not possible without addressing the problem of teacher competence. (Shulman, 1986; Hill et al., 2005; Darling-Hammond, 2006).

The case of Pakistan is essential in the discussion of the interdependence of teacher preparation and educational development because, although the country has made considerable progress in extending educational access over the years, it continues to be difficult to raise the level of learning. In fact, a significant percentage of children have trouble mastering literacy skills such as reading, mathematics, and language. Thus, there exists a discrepancy between attendance and learning outcomes. The education system in Pakistan is quite diverse in relation to different geographic locations, institutions, and socio-economic backgrounds. The difference lies in the varying nature of the educational opportunities available to children depending on the type of school.

However, the problems associated with teachers' preparation continue to constitute one of the greatest challenges in relation to the improvement of quality of education in Pakistan. Teacher recruitment and preparation strategies have been developed at both provincial and national levels but there are still issues connected with the consistency and efficiency of such preparation. Teachers can come into classes with various degrees of qualification, professional training, and subject competency. For instance, lack of chances for professional development can lead to teachers' inability to keep up-to-date with knowledge and use appropriate teaching strategies.

These disparities pose an issue about whether the gaps in teacher preparation are connected with the gaps in children's education.

Teacher preparation is a multidimensional term that goes far beyond educational background. Teachers can be qualified but need to have enough subject competency and pedagogical skills to help their students develop. Professional training, refresher courses, classroom experience, and other forms of learning are important parts of teacher preparation. Thus, it is crucial to understand what teacher preparation characteristics have the strongest connection with the results of student performance. This will help policymakers design proper education policy based on evidence-based analysis that can define the areas for investment (such as increase in teacher qualification, professional development, subject competency, or classroom activities).

A variety of studies have been conducted in order to identify the determinants of educational attainment in Pakistan, which include the factors related to the households, schools, enrollment, and socioeconomic inequality. (World Bank, 2019; Andrabi et al., 2007). Despite all of these studies, the empirical studies regarding the relationship between teacher preparation and learning outcomes have not yet been conducted in depth. Studies conducted earlier mostly looked at the issues of teachers descriptively or focused on a particular factor concerning the quality of teachers without considering their training, qualification, knowledge of subjects, and pedagogical aspects in combination. There is also a lack of quantitative evidence regarding this issue.

This study will fill this gap and study the relationship between teacher preparation and educational attainment of children based on the World Bank's SABER Service Delivery Survey - Pakistan. The database enables us to look at the student performance as well as the characteristics of teachers in schools. Thus, we can make the assessment of the impact of teacher preparation on children's learning outcomes through the indicators including the teachers' training, qualifications, knowledge, and pedagogical aspects.

This research has made certain contributions in the existing literature. In the first place, it has offered some empirical insights into the connection between teacher preparation and student achievement in Pakistan on the basis of the available information on education service delivery. Secondly, it has added to the existing debates on the problem of inequality in education by considering whether differences in the quality of teachers account for the inequalities in education opportunities for children. Thirdly, it offers implications for education policy makers regarding the aspects of teacher preparation that may be in need of being improved in order to improve the learning outcomes of students. The above mentioned is extremely relevant in the context of Pakistan where improving the quality of education is one of the major objectives of the government.

Thus, the study will attempt to answer the following research question: To what extent do the characteristics of teacher preparation impact the educational performance of children in Pakistan?

2. Literature Review

Quality teachers are considered one of the most effective school-based determinants of learning outcomes of students. Although adequate educational institutions should have proper infrastructure, curricular materials, and proper management, teachers play a vital part in transforming all these inputs into something productive. It is through the teacher's professional capacity, skills, and knowledge that the process of learning takes place. Studies conducted in various educational settings have indicated that there exists a strong link between variation in

effectiveness of teachers and variation in performance of students, especially in developing countries where educational inequalities are persistent problems. (Andrabi et al., 2007).

Over the last few years, there has been a shift in emphasis in educational studies towards the improvement of the quality of learning rather than just providing education to children. It has been realized that merely admitting children to schools does not ensure the quality of learning at all. (ASER Pakistan, 2023). The quality of learning that a child receives at schools is a key element for his/her learning process. Teacher preparation which includes academic qualifications, professional development, subject knowledge, and pedagogy of a teacher has become an area of research.

2.1 Teacher Preparation and Student Learning Outcomes

Teacher preparation includes a number of factors such as education, training, subject expertise, and teaching skills that allow teachers to provide quality instruction. It has been shown through previous research that teacher preparation has a significant impact on the explanation of concepts by teachers, identification of problems faced by students and use of effective instructional techniques. Teacher qualifications play a significant role in making effective teaching possible; however, qualifications may not always indicate the teaching competence of a teacher in terms of student improvement. (Darling-Hammond, 2000). Teaching involves the integration of content knowledge and pedagogical knowledge along with continuous professional development.

Teacher training is seen as an effective mechanism for improving the quality of classroom instruction. Good teacher training programs can contribute greatly towards improving the instruction, management, and assessment techniques used by teachers in addition to meeting diverse needs of students. (Darling-Hammond, 2006). Research from developing nations has highlighted the fact that effectiveness of teacher training is based upon several factors such as its relevancy, duration and applicability to classroom instruction. Teacher training that is primarily concerned with theoretical aspects of teaching will have little impact on the practice of teachers. Hence, analysis of this relationship is crucial for policy making.

In addition to formal qualifications and training, teacher subject knowledge has been found to be an important aspect that affects student performance. Teachers who are knowledgeable in their subjects of teaching will be able to explain complicated concepts, correct student misconceptions, and help students understand better. (Darling-Hammond & Bransford, 2005). It is especially crucial in subjects such as mathematics and language since poor performance at early levels results in future educational disadvantages. Researches in the field of education have started paying attention to the measurement of teacher knowledge beyond their qualifications and experience.

The third aspect that defines effective teachers is pedagogical competence. Good teachers apply proper teaching strategies, encourage active participation of students, give feedback and adjust their strategies according to learners' needs. According to classroom observation researches, it is evident that even teachers who have the same qualifications can employ different approaches in teaching. Hence, it is necessary to pay attention to all these aspects in order to understand teacher quality better.

2.2 Teacher Quality, Learning Inequality, and the Pakistan Context

Quality of teachers plays an important role in contributing to inequality in education because inequality in access to well-prepared teachers may result in educational inequalities among learners. Students in developing countries coming from marginalized populations tend to be enrolled in schools where teachers lack qualifications, professional development opportunities and instructional support. (Darling-Hammond & Bransford, 2005). The inequalities among teachers

may lead to achievement inequalities among students and prevent them from acquiring necessary academic skills. As a result, increasing educational equity requires addressing inequalities in access to schools and instruction provided by well-prepared teachers.

An interesting example of this issue is provided by Pakistan where the country has improved access to schooling but faces serious problems with improving learning outcomes among students. Various national and international studies on the issue show weak development of basic literacy and numeracy skills among Pakistani children. In other words, increasing educational access is not enough if it is not combined with the improvement of quality of education.

Factors related to teachers have become a matter of great concern in the context of the Pakistani education system. There is variation in the qualifications, professional training, knowledge of subjects, and development opportunities available to teachers. (Hanushek & Rivkin, 2010). Public and private schools might show some differences in their teachers' qualities and methods of management as well as learning environment, while rural and underprivileged areas might experience difficulties in recruiting qualified teachers. Such variations could result in different experiences of education for students and even deepen the existing socio-economic inequalities.

In Pakistan, the role of teacher preparation has been taken into account with a number of policy interventions that could improve it. However, the success of such interventions and whether it leads to better academic performance of students remains to be determined. (Hill et al., 2005). Therefore, empirical study is required in order to determine which features of teacher quality are the most important for the progress in education.

2.3 Empirical Evidence, Research Gap, and Study Contribution

Empirical work related to determinants of student achievement has employed various methodologies, such as surveys, classroom observation, and education data. The international literature shows that teacher factors, especially subject knowledge and instruction ability, can predict student learning. The large-scale service delivery surveys have been a significant contribution to the study of education quality since the surveys have incorporated data from teachers, students, schools, and principals, thus enabling analysis of education quality from different angles. (Luschei & Carnoy, 2010).

The studies based on education data conducted in Pakistan, such as ASER, LEAPS, and World Bank Education Surveys, are helpful in understanding learning outcomes and problems in schools. Nevertheless, the majority of the studies that were done before have paid attention either to general education access problems or to socio-economic status and school inputs. Therefore, the current research has not yet analyzed simultaneously the different aspects of teacher preparation. (Metzler & Woessmann, 2012). Moreover, there is a lack of analysis of how different teacher preparation leads to inequalities in learning opportunities taking into account the other student and school factors.

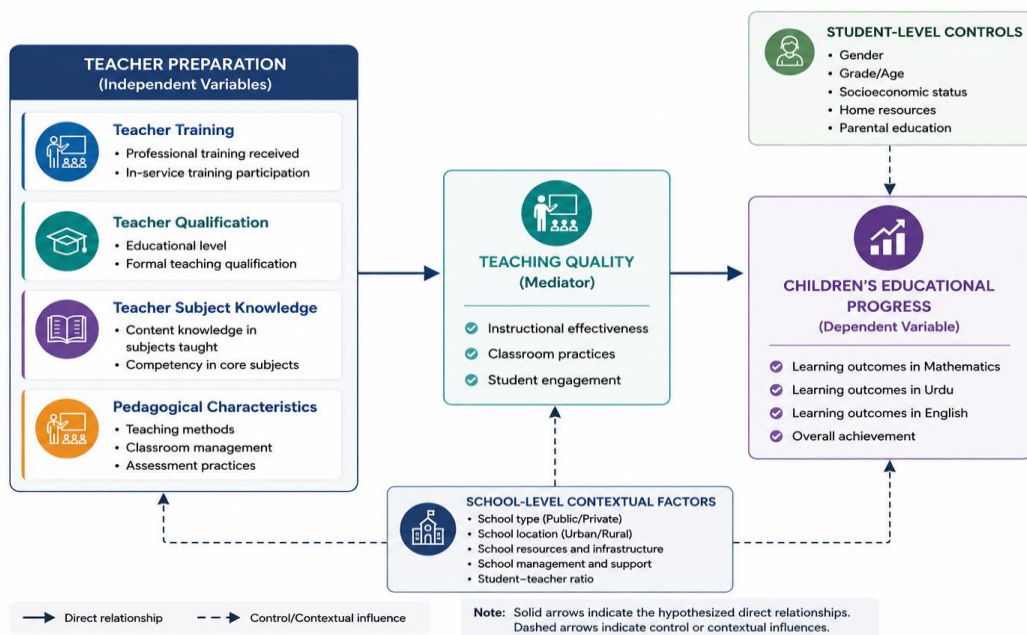
The SABER Service Delivery Survey is a valuable chance to overcome these limitations by integrating data on the students' learning results with the data on teachers' personal characteristics and school settings. (Rockoff, 2004). Unlike the studies that use either teacher qualifications or subjective data on teacher characteristics, the SABER approach considers several aspects of the quality of education services delivery, including teacher preparation, teacher knowledge, classroom processes, and student learning.

This study enriches the existing literature by investigating the link between teacher preparation and the educational success of children in Pakistan based on the data of the SABER survey.

(UNESCO, 2020). Analysing the teacher preparation, education qualification, subject knowledge, and teacher characteristics along with the learning results, the study aims at obtaining a thorough overview of how teacher quality affects the learning outcomes.

The current research is informed by the Educational Production Function theory that perceives the outcome of student learning as a result of a combination of several inputs such as teacher features, student features, and institutional factors. In the context of the mentioned theory, teacher preparation may be considered as a significant educational input that affects the effectiveness of teaching and causes the variability in student achievement. (Shulman, 1986). The researcher also applies the concepts of Teacher Effectiveness theory that stresses that the features of teacher's expertise, education, training, and teaching affect the effectiveness of the learning process and its results.

Figure 1. Conceptual Framework: Teacher Preparation and Children's Educational Progress in Pakistan



Source: Author's own conceptualization based on literature and SABER Service Delivery Survey – Pakistan.

The conceptual framework adopted for this research is shown in Figure 1 below. This shows the relationship between teacher preparation and educational attainment of children in Pakistan, as suggested in this research. (Hanushek, 1979). It is based on the concept of Educational Production Function framework and Teacher Effectiveness Theory, where teacher preparation is considered as an important educational input affecting the students' learning outcomes. Teacher preparation is defined into four broad components including teacher training, teacher qualification, teacher subject knowledge, and teacher pedagogic skill. (Shulman, 1987). It is expected that these teacher-related variables will affect the educational attainment of children which are indicated by overall academic achievements, math achievement, and language achievement.

3. Methodology

3.1 Research Design

The present study employs a quantitative research design, involving the analysis of secondary data, to find out the relationship between teacher preparation and children's educational achievement in Pakistan. It is suitable to use a quantitative research design because the study intends to analyze the relationship between certain characteristics of teachers and the outcomes of their teaching

activities using statistical tools. Instead of conducting new data collection activities, the present research uses the available education data set to understand how teacher preparation is linked to learning achievement of children. (World Bank, 2018a).

The research employs a cross-sectional analytical design, since the analysis is performed using data collected among students, teachers, and schools participating in the SABER Service Delivery Survey. The use of such design allows identifying the association between educational inputs and learning achievements at a particular point in time. The research is based on the hypothesis that there are multiple factors affecting children's learning achievement.

In terms of the methodology, this research relies on the theoretical perspective of the Educational Production Function, which defines student learning as a function of the various inputs in education. One of the critical variables within the Educational Production Function is teacher preparation, which plays a key role in influencing student outcomes. As such, this study aims to investigate whether there is a relationship between differences in teacher preparation and student outcomes.

3.2 Data Source and Dataset Description

In this case, secondary data will be gathered from the World Bank's SABER Service Delivery Survey – Pakistan. (World Bank, 2018b). SABER (Systems Approach for Better Education Results) is a program created by the World Bank in order to examine the effectiveness of service delivery in terms of education by gathering extensive information from various levels of the education sector such as students, teachers, principals, and schools.

The SABER Pakistan survey is ideal for this research since the survey includes both learning achievement data and teacher readiness data. While other surveys provide information about education access and enrollment rates, the SABER survey allows researchers to measure the learning achievements directly through student testing as well as gather extensive information about teacher qualifications.

The research has relied upon three important elements of the data:

Student level data set:

Has been used to quantify children's academic achievements by means of standardized assessment scores in subjects such as mathematics and language.

Teacher level data set:

Has been employed to collect information pertaining to teacher preparation, including their education, training, subject matter knowledge, and pedagogical variables.

Principal/School level data set:

Has been incorporated to account for context at the school level, including characteristics of schools.

As the SABER data set has information from various stakeholders of the education system, it is an ideal data base for studying teacher preparation in relation to children's learning achievement in Pakistan.

3.3 Sample Selection and Data Preparation

The research uses data from students, teachers, and schools' datasets to develop an analytical dataset that can be used in statistics. Student data was considered as the main unit of analysis since the research concentrates on the education of children. Teacher and school data have been included in order to analyze how disparities in the teacher preparation environment affect student achievement.

It is important to consider that there is no direct linkage between student and teacher data in terms of individual-level in the SABER Pakistan dataset. In order to analyze teacher preparation environment at the school level, teacher variables were aggregated using school identifiers. (Araujo et al., 2016). It allowed to assess the overall teacher preparation environment available in each particular school without referring to individual teachers.

Teacher level indicators have been aggregated to construct the following school-level indicators:

- Percentage of trained teachers in a school,
- The average level of teachers' education,
- The average level of teachers' subject knowledge score,
- The average level of teachers' pedagogical quality score.

These measures on teaching preparation for teachers were then combined with the measures on student achievement and school-level characteristics. Observation units with missing observations on key variables were excluded from the regression analysis. After cleaning the data, the sample size used for the regression was approximately 19,000 students.

3.4 Measurement of Variables

The research project defines the theoretical constructs in terms of empirical variables. The academic performance of the students is taken to be the dependent variable, whereas the preparation status of the teachers will be the primary independent variables. Control variables such as those related to the students and schools are included. See Table 1 below.

Table 1: Summary of Variables and Measurement

Variable Type	Variable	Measurement	Data Source
Dependent Variable	Student learning achievement	Overall standardized learning score	Student dataset
Dependent Variable	Mathematics achievement	Mathematics assessment score	Student dataset
Dependent Variable	Language achievement	Language assessment score	Student dataset
Independent Variable	Teacher training	Proportion of trained teachers within school	Teacher dataset
Independent Variable	Teacher qualification	Average teacher educational qualification level	Teacher dataset
Independent Variable	Teacher subject knowledge	Average teacher knowledge assessment score	Teacher dataset
Independent Variable	Teacher pedagogical quality	Average instructional practice score	Teacher dataset

Variable Type	Variable	Measurement	Data Source
Control Variable	Student characteristics	Age and gender	Student dataset
Control Variable	School characteristics	School type and institutional factors	Principal/school dataset

Under the concept of teacher effectiveness literature, teacher preparation is evaluated using different measures indicating the competency of teachers. Teacher training is indicated by the percentage of trained teachers in each school, representing the existence of continuous teacher professional development. Teacher qualification is assessed through the mean level of teacher education in each school. Further, measures of teacher knowledge about teaching subjects and pedagogical quality are also taken into consideration.

In terms of the dependent variable of children's learning progress, student learning assessment scores will be used as the measurement tool. Overall learning score is the main measurement, and math and language scores will be used for sensitivity analysis. Individual student characteristics, such as age and gender, and school characteristics, such as school type, will be included as control variables since past studies found that there was an influence of individual and institutional factors on learning.

3.5. Data Analysis Techniques

This research uses several statistical techniques to analyze the relationship between teacher preparation and educational development of children. The data analysis process was divided into several steps in order to make the process systematic and to evaluate systematically the research hypotheses.

First, descriptive statistics were utilized to characterize students, teachers and schools participating in the study. Such measures as means, standard deviations, frequencies and percentages were calculated to describe the study sample and the distributions of the main variables.

Second, correlation analysis was carried out to examine the preliminary associations between teacher preparation indices and the results of students' learning. Correlation analysis made it possible to identify the nature and direction of associations between teacher training, teacher qualification, teacher knowledge, pedagogical skills and educational achievements of children prior to multivariate analysis. (Bietenbeck et al., 2018).

Third, multiple regression analysis was used to estimate the association between teacher preparation characteristics and children's educational results taking into account the factors that may affect the educational achievements of students and schools. Regression analysis was chosen since it makes it possible to consider the impact of teacher-related variables separately from other factors affecting educational success.

The following three regression models were estimated. The first model explores the association between teacher preparation and student performance by adding teacher preparation and teacher qualifications as independent variables. The second model considers additional variables for measuring teacher competencies, such as teacher subject knowledge and teacher teaching skills in order to see if they can account for further variations in student performance. In the third and final model, some student and school characteristics are taken into consideration to adjust the estimates.

The regression models are specified as follows:

(Model 1)

$$\text{Learning Outcome}_i = \beta_0 + \beta_1 \text{Teacher Preparation}_i + \varepsilon_i$$

(Model 2)

$$\text{Learning Outcome}_i = \beta_0 + \beta_1 \text{Teacher Preparation}_i + \beta_2 \text{Teacher Knowledge}_i + \beta_3 \text{Teacher Pedagogy}_i + \varepsilon_i$$

(Model 3)

$$\text{Learning Outcome}_i = \beta_0 + \beta_1 \text{Teacher Factors}_i + \beta_2 \text{Student Factors}_i + \beta_3 \text{School Factors}_i + \varepsilon_i$$

Where “Learning Outcome” refers to the scores indicating student achievement, “Teacher Factors” refer to teacher training, qualification, subject knowledge, and pedagogical factors, while “Student Factors” and “School Factors” refer to control variables.

Finally, the study tested for robustness by estimating alternate models where the main dependent variable was replaced by other achievement measures, such as mathematics scores, Urdu scores, and English scores. This is done to test whether the results found from this study hold true in other academic areas.

Quantitative analysis of the data was done according to established procedures with statistical significance assessed at the usual significance levels. Using the above methodology, the study will be able to find out if there is differential learning opportunities because of differential teacher training in Pakistan.

3.6 Ethical Considerations

The present study employs secondary data analysis through using the publicly available World Bank SABER Service Delivery Survey – Pakistan dataset. As a result, there are no ethical considerations because this type of research does not imply any contact with human subjects or gathering of personal data from individuals. In other words, the data used in this study is anonymous and does not include any personal information of students, teachers, and schools.

The study adheres to ethical guidelines associated with the proper use of secondary data in the research. Thus, the interpretation, presentation, and acknowledgment of the data source are carried out in a professional manner. (Chetty et al., 2014). Moreover, the research is conducted for academic purposes, and its results will be presented in an objective way. Besides, this research ensures that the conclusions are drawn based on statistics and takes into account the limitations of cross-sectional secondary data.

Thus, the use of the existing international education dataset and preserving the confidentiality of the original participants make the research compliant with the ethical standards of quantitative educational research.

4. Results

This part of the report highlights the findings of the empirical analysis on the connection between teacher preparation and educational achievements of the children in Pakistan. The empirical analysis was carried out using SABER Service Delivery Survey - Pakistan dataset through combining student learning achievements with the teacher preparation indicators at the school level. The findings of the analysis have been provided through four steps.

4.1 Descriptive Statistics

Descriptive analysis shows significant variability in students' achievements from school to school. From the mean achievement score, it is evident that many students manage to develop only moderate learning competencies, which indicates ongoing problems with educational effectiveness. Moreover, there is a difference in mathematics and language achievement scores, indicating variability in students' achievements in different areas of study.

Variables measuring teacher preparation also exhibit variability among schools. The share of trained teachers varies significantly, pointing to differences in availability of professionally qualified teachers. (Glewwe et al., 2014). Furthermore, variability in average education, subject expertise, and pedagogical skills of teachers is also seen. This variability provides initial proof that students in different schools might receive different quality of instruction.

Table 3. Descriptive Statistics of Main Variables

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Overall learning score	19,003	0.397	0.196	0.000	1.000
Mathematics achievement score	19,003	0.364	0.224	0.000	1.000
Urdu achievement score	19,003	0.392	0.214	0.000	1.000
English achievement score	19,003	0.389	0.248	0.000	1.000
Teacher training index	19,003	0.167	0.214	0.000	1.000
Teacher qualification level	19,003	5.589	1.642	1.000	10.000
Teacher subject knowledge score	19,003	0.784	0.152	0.250	1.000
Teacher pedagogical quality score	19,003	0.452	0.185	0.000	1.000
Student age (years)	19,003	10.84	1.72	6.00	16.00
Female student (%)	19,003	48.6%	—	0	1

Descriptive statistics of the variables used in the study are displayed in Table 3. The total number of students used in the analysis is around 19,000 by excluding cases with missing values in the important variables. Student learning outcomes act as the dependent variable, which is captured using the total score of learning.

4.2 Correlation Analysis

Correlation analysis has been performed in order to investigate the initial correlation between teacher preparation indicators and student learning outcomes. These results will give us a hint about the initial correlation between teacher-related factors and student achievement.

It can be observed from the correlation analysis results that teacher preparation factors display different correlations with student learning outcomes. The teacher training rate shows a positive yet low correlation with student achievement, which means that schools with a higher percentage of trained teachers have somewhat higher student learning outcomes. Similarly, teacher subject knowledge is also positively correlated with student performance; thus, teacher knowledge of subject matter is an important factor behind the student learning process.

It must be noted that correlation analysis does not consider other variables which affect student achievement. (Kane & Staiger, 2008). For example, student-related factors and context factors of the school. Thus, regression analysis needs to be performed in order to estimate the independent effect of teacher preparation on student achievement.

Table 4. Correlation Matrix

Variable	Learning Score	Teacher Training	Teacher Qualification	Teacher Knowledge
Learning Score	1.00			
Teacher Training	0.03	1.00		
Teacher Qualification	0.06	—	1.00	
Teacher Knowledge	0.02	—	—	1.00

4.3 Regression Analysis

A multiple regression analysis was performed to determine the relationship between teacher preparation and the educational achievement of students. Three models were developed sequentially. Model 1 consisted of teacher preparation and qualifications. Model 2 involved the analysis of teacher preparation, qualifications, and teacher subject matter knowledge and pedagogy. Model 3 referred to the fully adjusted model.

Table 5. Regression Results Predicting Student Learning Outcomes

Predictor	Model 1	Model 2	Model 3
Teacher training rate	-0.015***	-0.015***	0.024***
Teacher qualification	-0.017***	-0.018***	0.004*
Teacher knowledge	—	0.006	0.093***
Teacher pedagogy	—	0.005	0.008
Student age	—	—	-0.006**
Student gender	—	—	0.032***
School type	—	—	Significant***
R ²	0.005	0.005	0.077

*p < .05, **p < .01, ***p < .001

Findings from the fully adjusted models suggest that teacher preparation factors are associated with the student learning outcomes. Training rate of teachers is found to be positively associated with academic performance once the factors related to the students and schools are controlled, implying that schools with more trained teachers tend to perform better in terms of learning outcomes. Teacher qualification is found to be weakly and positively associated with student achievement.

Among all the teacher factors, teacher knowledge of the subject matter is found to be the factor which has the highest association with the student learning outcomes. The findings imply that the teachers' ability to master the content knowledge is an important means through which the teacher quality affects education. Teacher pedagogy measures, on the other hand, are not found to be statistically significantly associated with the learning outcomes in the final model.

Inclusion of student and school characteristics increases the goodness of fit of the model. Gender of the student and type of the school are significant determinants of learning outcomes.

4.4 Robustness Analysis

To test the consistency of the results under different measures of educational attainment, extra regression analyses were conducted using math scores, Urdu scores, and English scores as an alternative dependent variable.

The results from the robustness tests reaffirm the consistency of the results. Teacher training still has a positive impact on learning outcomes regardless of the type of learning. Teacher competence has a significantly positive association with math scores, Urdu scores, and English scores, thus proving the importance of teacher competence in improving learning outcomes.

Moreover, the results suggest that the association between teacher preparation and learning outcomes is not confined to one specific field only. While the strength of associations differs by subjects, the general trend stays the same, thus showing that teacher preparation can help in improving learning opportunities for Pakistani students.

Table 6. Robustness Analysis Using Alternative Learning Outcomes

Predictor	Mathematics	Urdu	English
Teacher training rate	0.024***	0.025***	0.026***
Teacher qualification	0.008**	-0.006*	0.014***
Teacher knowledge	0.085***	0.084***	0.108***
Teacher pedagogy	0.013	0.010	0.003

In summary, the results confirm the theoretical claims regarding the significance of teacher preparation as a key factor influencing the educational development of children in Pakistan. It can be concluded that disparities in the preparation of teachers and their expertise account for the discrepancies in children's achievements.

5. Discussion

The present research sought to analyze the connection between teacher preparation and children's educational outcomes in Pakistan by using the SABER Service Delivery Survey dataset. This work offers significant insight into the idea that teacher-related variables are among the determinants of disparity in student learning results. It was found that teacher training, teacher qualification, and teacher subject knowledge positively correlate with the educational achievements of students while taking into account the influence of student and school-level variables. Out of these variables, teacher subject knowledge turned out to be the most powerful predictor of learning outcomes.

These results confirm the claim that the improvement of the quality of education implies the necessity to not only enhance access to education but also develop the capabilities of teachers whose task is to teach students. Even though the country has made progress in terms of providing its citizens with educational opportunities over time, ongoing problems in terms of learning suggest that enrollment is not enough to make educational progress. Children need access to qualified and well-prepared teachers capable of transferring knowledge, solving students' problems, and facilitating their educational progress. (OECD, 2019).

The findings align with past studies that highlight the relevance of teacher effectiveness in achieving high student performance. Previous studies have found that teacher qualifications in terms of professional training and subject matter knowledge have impacts on classroom practices and the ability of students to learn basic skills. The current study contributes to past evidence by assessing the impact of several dimensions of teacher preparedness at once and using an extensive education data set from Pakistan. The findings add more evidence in support of the view that teacher quality is an essential element of education development in situations where there are learning inequalities.

The findings also have some policy implications for education in Pakistan. While it is true that teacher qualifications are still important, the findings point out that education policy should shift its focus from credentials to teacher skills (World Bank, 2018b). Teachers need to have continuing education and practical education that fits classroom needs. Improving teacher knowledge of the subject should also be considered, especially in basic subjects where poor learning in the early years may affect future education achievement.

5.1 Implications of Teacher Preparation for Learning Outcomes

Given the positive correlation between teacher training and the performance of learners, it is safe to say that the availability of development programs might play a role in improving learning outcomes. Those teachers who receive proper training may become better at their job as far as creating teaching methods, managing classrooms, and addressing the requirements of their students. However, it should be said that the results also show that the efficiency of the training programs largely depends on their quality.

Teacher subject knowledge was found to have the most significant correlation with student achievements and thus proves that teachers' competency in the subjects they are to teach is essential. Such knowledge will help teachers explain concepts better and address any misconceptions of the students. It means that the development programs must pay much more attention to the improvement of teachers' competencies rather than just training attendance and education level.

While there was a positive correlation between teacher qualifications and pupil achievement, its magnitude was quite lower when compared to that of teacher knowledge. (World Bank, 2019). This shows that even though qualifications are important in teaching, they do not always mean better classroom performance since teaching involves other skills apart from having formal education.

5.2 Teacher Quality and Educational Inequality in Pakistan

The results illustrate the relationship between the teacher's quality and the uneven distribution of learning opportunities in Pakistan. Variations in teacher training among different schools could be responsible for differences in the learning opportunities that the students receive. Those schools that have better access to qualified and well-trained teachers will offer better learning conditions; schools that lack qualified teachers might find it hard to create similar opportunities (World Bank, 2020). Thus, providing educational equity will be possible if all the students get access to highly-qualified teachers regardless of their geographical and social situation.

The importance of such school-level variables in the study also illustrates that there is the influence of institutional factors on the results obtained. The differences in educational settings and schools will perpetuate inequalities if those schools that have less favorable opportunities will have continued problems in accessing trained teachers and training.

In general, the research helps increase awareness about the impact of teacher training on educational development in Pakistan. It can be said that overcoming learning disparities necessitates a holistic effort aimed at enhancing teacher competencies through an improved professional development mechanism and a balanced allocation of qualified teachers to educational institutions. In order to achieve educational development, education authorities should allocate resources for the improvement of teacher qualifications.

6. Conclusion and Policy Implications

The present study looked at the impact of teacher preparation on children's educational achievements in Pakistan using the SABER Service Delivery Survey data. By connecting student outcomes and the school-level indicators of teacher preparation, this study assessed whether there is a connection between teacher preparation in terms of their training, qualification, subject knowledge, and teacher pedagogy and student achievement. This study found that teacher preparation is an important variable that contributes to explaining differences in student achievement and plays a key role in making education effective and decreasing learning disparities.

Teacher preparation characteristics were significantly linked to student achievement. There was a positive relationship between the teacher training, teacher qualification, and teacher subject knowledge and learning outcomes adjusting for student and school-level characteristics. Among these three teacher preparation variables, the teacher subject knowledge showed the highest correlation with student achievement (World Bank, 2022). It implies that teachers' knowledge of subject is critical in enhancing students' learning in the classroom. Although teacher qualifications still play an essential role in teacher preparation, this study found that effective teaching combines various aspects of teacher preparation.

This study adds value to existing literature on education by providing an empirical insight about the situation prevailing in Pakistan where educational disparity continues to be a serious problem. In previous researches on education improvement, issues such as access to education, enrollment, and physical structures were mainly discussed, but the present study highlights that the quality of education imparted to children is equally important. Results obtained in the current study further affirm the claim that improved learning experiences depend upon teachers, which are considered important educational resources.

Results have certain implications for the education sector of Pakistan as well. First, teacher development programs need to be reformed by moving towards a system of development rather than temporary training sessions. Teacher training programs must be planned in accordance with the actual needs of teachers and must include mentoring, feedback sessions, and application of newly learned skills. Second, emphasis should be laid on improving the subject knowledge of teachers, particularly mathematics and language.

Finally, decision-makers need to pay attention to inequalities in the distribution and preparation of teachers in various school environments. Disadvantaged schools need special attention to help them attract and retain competent teachers and offer opportunities for professional development to them. Equity in teacher quality is critical in closing the gap in opportunities among children with different socioeconomic and geographical backgrounds.

However, this study is subject to certain limitations. Due to the cross-sectional nature of the SABER database, causality cannot be determined. What is revealed by the findings is the relationship, not a causal effect. Moreover, since there is no student-teacher linkage in the database

used, teacher attributes have been analyzed at the school level, not the individual teacher level. Finally, there can be certain aspects of effective teaching, such as classroom interaction and teacher motivation, that cannot be measured with the help of existing indicators.

Further research on these relations will require the use of longitudinal data and classroom observation techniques in order to shed more light on how teacher development affects student learning in Pakistan. Comparative research conducted in various provinces and various school systems of Pakistan will be useful in understanding the impact of teacher quality on inequality in education.

On the whole, the current research shows the importance of improving the development of teachers as an important step towards improving the quality of education in Pakistan. Investments in teacher knowledge, professional development, and balanced teacher distribution can contribute greatly to solving problems of learning in Pakistan.

References

1. Andrabi, T., Das, J., Khwaja, A. I., Vishwanath, T., & Zajonc, T. (2007). *Learning and educational achievements in Punjab schools (LEAPS): Insights to inform the education policy debate*. World Bank.
2. ASER Pakistan. (2023). *Annual Status of Education Report (ASER) Pakistan 2023*. Idara-e-Taleem-o-Aagahi.
3. Araujo, M. C., Carneiro, P., Cruz-Aguayo, Y., & Schady, N. (2016). Teacher quality and learning outcomes in kindergarten. *Quarterly Journal of Economics*, 131(3), 1415–1453. <https://doi.org/10.1093/qje/qjw016>
4. Bietenbeck, J., Piopiunik, M., & Wiederhold, S. (2018). Africa's skill tragedy: Does teachers' lack of knowledge explain low student performance? *Journal of Human Resources*, 53(3), 553–579.
5. Chetty, R., Friedman, J. N., & Rockoff, J. E. (2014). Measuring the impacts of teachers II: Teacher value-added and student outcomes. *American Economic Review*, 104(9), 2633–2679. <https://doi.org/10.1257/aer.104.9.2633>
6. Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives*, 8(1), 1–44. <https://doi.org/10.14507/epaa.v8n1.2000>
7. Darling-Hammond, L. (2006). Constructing 21st-century teacher education. *Journal of Teacher Education*, 57(3), 300–314. <https://doi.org/10.1177/0022487105285962>
8. Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. Jossey-Bass.
9. Glewwe, P., Hanushek, E. A., Humpage, S., & Ravina, R. (2014). School resources and educational outcomes in developing countries. In *Education Policy in Developing Countries*. University of Chicago Press.
10. Hanushek, E. A. (1979). Conceptual and empirical issues in the estimation of educational production functions. *Journal of Human Resources*, 14(3), 351–388.
11. Hanushek, E. A. (2011). The economic value of higher teacher quality. *Economics of Education Review*, 30(3), 466–479. <https://doi.org/10.1016/j.econedurev.2010.12.006>
12. Hanushek, E. A., & Rivkin, S. G. (2010). Generalizations about using value-added measures of teacher quality. *American Economic Review*, 100(2), 267–271. <https://doi.org/10.1257/aer.100.2.267>

13. Hill, H. C., Rowan, B., & Ball, D. L. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. *American Educational Research Journal*, 42(2), 371–406. <https://doi.org/10.3102/00028312042002371>
14. Kane, T. J., & Staiger, D. O. (2008). Estimating teacher impacts on student achievement. *Journal of Human Resources*, 43(4), 699–724.
15. Luschei, T. F., & Carnoy, M. (2010). Educational production and the distribution of teachers in India and Mexico. *International Journal of Educational Development*, 30(5), 483–491.
16. Metzler, J., & Woessmann, L. (2012). The impact of teacher subject knowledge on student achievement: Evidence from within-teacher within-student variation. *Journal of Development Economics*, 99(2), 486–496.
17. OECD. (2019). *TALIS 2018 results: Teachers and school leaders as lifelong learners*. OECD Publishing.
18. Rockoff, J. E. (2004). The impact of individual teachers on student achievement: Evidence from panel data. *American Economic Review*, 94(2), 247–252.
19. Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4–14.
20. Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–22.
21. UNESCO. (2020). *Global Education Monitoring Report 2020: Inclusion and education—All means all*. UNESCO.
22. UNICEF. (2021). *Situation analysis of children in Pakistan*. UNICEF Pakistan.
23. World Bank. (2018a). *SABER Service Delivery 2018: Measuring education service delivery—Pakistan*. World Bank Microdata Library.
24. World Bank. (2018b). *World Development Report 2018: Learning to realize education's promise*. World Bank.
25. World Bank. (2019). *Ending learning poverty: What will it take?* World Bank.
26. World Bank. (2020). *Pakistan education sector analysis: Achieving quality education for all*. World Bank.
27. World Bank. (2022). *The state of global learning poverty: Update*. World Bank.