

<https://doi.org/10.5281/zenodo.18956322>

Enhancing the Quality of Students Learning Outcomes at Primary Level in Punjab, Pakistan



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Abstract: *Primary school is the backbone of human capital and development of social and economic systems. In the most populated Pakistani province of Punjab, the improvement of learning outcomes or SLOs among students at the primary education level has become a very significant policy issue despite several decades of educational reforms. This is a multifactorial research paper that explores the multi-pronged issues that affect the quality of learning and the challenges that remain to be experienced and the effectiveness of governmental interventions in the primary education system of Punjab. Based on information provided by the Punjab Examination Commission (PEC) during the period of 2018-2023, teacher survey, and program analysis, this research makes surprising discoveries related to low proficiency of students, especially those in the area of science education, with the overall Grade V proficiency of 42.7. The excessive rural-urban differences (19.5 percentage points) and other serious infrastructure gaps (85% of schools did not have science laboratories), and a gross lack of training in inquiry-based pedagogy (72% did not have such training) are the main analysis outcomes. Moreover, mismanagement in curriculum-assessment is toppling 58% of Student Learning outcomes, as it plays with instructional effectiveness. Interventions such as the Quality Drive Initiative (QDI), in-service training schemes in teachers, and public-private collaborations through Punjab Education Foundation (PEF) are some of the interventions whose impacts are measured with 80 percent of success in case of Quality Drive Initiative and higher gains in rural regions. Nevertheless, institutional constraints such as insufficient state funding (around 2 percent of GDP), chronic access disparities (a quarter of school age children are out of school), and pedagogical disjunctions are still barriers on the way to quality education to all. On this basis, this article will use empirical findings to offer strategic suggestions to policy makers with more emphasis on SLO-professional development of teachers, curriculum-textbook-assessment consistency, specific resource allocation, and evaluating the rigor of the programs. The results play a role in the local discourse concerning the quality of education in South Asia and provide evidence-based opportunities of long-term knowledge improvement in primary learning outcomes.*

Keywords: Primary education, Student Learning Outcomes, Punjab Pakistan, education quality, teacher training, curriculum correspondence, Punjab Examination Commission, Quality Drive Initiative, rural-urban disparities, education policy.

1. Introduction

1.1 The background of primary education in Pakistan is as follows

Primary education is the backbone of any educational framework of any country and the foundation of life-long education and training as well as economic growth. In Pakistan, the sector of primary education system challenges the depth of the country of more than 220 million people which has remained, notwithstanding the provisions stipulated by the constitution and policy assurances. Article 25-A of Pakistan Constitution, which was amended with the help of the 18th Amendment in 2010, makes it a compulsory free education to all children between the ages of 5 and 16 years, taking education up as one of the fundamental rights. Nevertheless, this provision in the constitution into visible educational results has yet to be fully achieved with approximately a quarter of school going children still out of school and quality gaps among those who are in school being high.

The Pakistani education system is run under a complicated federal institution in which after the Amendment of the 18th Constitutional Amendment, the government has scaled down the education to provincial governments. This devolution has led to the opportunity of reforms that are context-specific not to mention that it has also created significant inter-provincial differences in both educational policies, allocation of resources and learning outcomes. The education investment is also terribly low at a percentage of barely 2 in Pakistan, a figure way below the UNESCO suggested figure of 4-6 and much lower than the regional standards [5]. This perpetual underinvestment is observed in poor infrastructure development, inadequate teaching resources, poorly educated teachers and eventually poor learning achievement by millions of children.

1.2 Review of the Punjab Education System.

Punjab is the most populated province of

Pakistan having more than 110 million people and it comprises an approximate 55 percent of the total population of Pakistan and takes home the largest provincial set up of education in Pakistan. The Punjab education environment consists of both the government and the private sector with the government system under the administrative supervision of the School Education Department (SED) and controlled by diverse administrative and evaluation machineries such as the Punjab Examination Commission (PEC) that was set up in 2006. The province runs more than 50,000 primary schools that adhere to millions of students in various geographic, socioeconomic and cultural backgrounds.

Punjab education system has experienced a number of reform efforts in recent 20 years which include the creation of PEC intended to standardize the assessment practices, the Punjab education foundation (PEF) meant to take advantage of the public-private partnerships, and other teacher training institutions including the Provincial Institute of Teacher Education (PITE) and the Quaid-e-Azam Academy of Educational Development (PECTAA). These institutional developments have left the province with the same problems such as access discrepancies, quality cracks and vast differences between the rural and urban regions and also between public and private organizations.

SLOs are valued because they assist teachers in evaluating the level of knowledge students have acquired upon course completion (Todd, 2010, p. 171).<|human|>1.3 Importance of Student Learning Outcomes (SLOs) SLOs are important since they help teachers gauge how much knowledge the students obtained by the end of the course (Todd, 2010, p. 171).

Student Learning Outcomes (SLOs) are statements of what students are supposed to know, what they should be able to demonstrate and what they are able to understand by the end of a learning process. The issue of SLOs in the primary education of Punjab can be seen as key markers of educational quality used to facilitate

the formulation of curriculum and the provision of instructions, as well as making the policy decisions based on the data. The Punjab Examination Commission have also designed broad SLO framework in accordance with the national curriculum requirements, common core curriculum, such as Mathematics, Science, English, Urdu, and Social Studies.

The popularity of SLOs as a trend in education indicates a change away from input based education systems towards outcome based education systems across the globe because of the acknowledgment by the international education system that simple enrolment or completion rates are poor measures of effective education. The quality education has to be evaluated based on the real attainment of knowledge, skills and competencies by students. In Punjab, graded evaluation of SLOs via PEC malpractices at Grade 5 and Grade 8 levels has produced useful longitudinal variations that reported high proficiency gaps, subject-specific frailties and demographic variations that require remedial measures.

1.3 Statement of the Problem

Although there are constitutional commitments, institutional reforms, and other intervention programs, there is still significantly poor quality of the learning outcomes at the primary level in Punjab compared to what is expected. According to empirical results of PEC tests in 2018-2023, the profile of general Grade V science proficiency is 42.7, which demonstrates the inability of over half of fifth-grade students to achieve basic competency in science. This total number hides yet again even more worrying subject-specific weaknesses, with an interest in subjects like Electricity and Magnetism at 32.5, Microorganisms at 38.1 and Forces and Machines at 36.7.

Also, there is a high level of rural-urban inequality where students in the rural areas perform 19.5 points less than urban students in the country [1]. These inequalities mirror more fundamental inequities in resources distribution, the quality of teachers, availability of infrastructure and socioeconomics. These challenges are aggravated by critical

infrastructure gaps, as 85 percent of primary schools do not have science laboratories, which severely limit the opportunities of practical learning, which are the primary science education. Moreover, inquiry-based pedagogy out of which 72% of actual teachers say that they lack training and 58% of SLOs are not covered in the standard textbooks, the basic misalignment between curriculum and assessment and instruction is revealed.

Such shortages have very significant consequences on the personal educational path of individual students, the development of human capital in Punjab and the socioeconomic development of Pakistan in general. Poor quality primary education breeds intergenerational poverty, economic inactivity and violate social solidarity. To undertake these challenges, far-reaching knowledge on causal influencing factors, strict assessment on available interventions, and evidence-based policy proposal are required.

1.4 Research Objectives and Research Questions

Research Objectives are as under:-

- i. To amalgamate empirical research on the prevailing situation of student learning outcomes of primary level in Punjab, Pakistan.
- ii. To determine and examine the major contributors to the quality of learning such as teacher related, institutional, socioeconomic and policy factors.
- iii. To discuss long-term issues and obstacles in quality improvement in primary education.
- iv. To determine the design, implementation and effectiveness of significant government interventions in the context of improving learning outcomes.
- v. To offer evidence-based recommendations to language policy makers, language educators and stakeholders

The following questions are covered in the

research:

- i. What are the existing rates of student performance in the primary schools of Punjab, and how they change in terms of subjects, demographics, and geographical factors?
- ii. At what level, student, teacher, school, and system, are the major factors that affect the quality of learning?
- iii. Which particular obstacles and impediments do not allow achieving the intended learning results?
- iv. What have been the results of government interventions in quality deficits and what could be learnt about how they have resulted?
- v. Which strategic policy and programmatic interventions are required to have a sustainable improvement in the quality of primary education?

2. Literature Review

2.1 Theoretical Framework

The literature review of primary education in Punjab is based on two independent theoretical constructions constructivist learning theory and human capital theory. Constructivism was introduced by Piaget, Vygotsky and Bruner and assumes that learners build knowledge by interacting with the life, past experience and social situations. This is the view which places an emphasis on studies on the significance of student centered teaching and learning, inquiry based teaching and learning and purposeful interaction with contents- exactly the pedagogical practices that research demonstrates are lacking in primary classrooms in Punjab. The constructivist model is partly useful in explaining why rote memorization and teacher-centric method of teaching which has largely dominated in most Punjab schools will not yield deep learning and transferable skills.

The concept of education as an investment on human capital has been made by the economists like Schultz and Becker, and it is based on the theory of human capital that improves the productive capabilities of individuals and yields

returns at both individual and social levels. In this light, the economic productivity, ability to be innovative, and competitiveness of a country are all directly related to the quality of education, which is represented through learning outcomes. The endemic lack of investment in education sector (around 2 percent of GDP) of Pakistan and resultant lack of quality may be constructively interpreted as the inability of country to invest sufficiently in the formation of human capital with future implications on the economic growth. It is important to note that this theoretical perspective highlights the economic necessity to enhance the quality of primary education in Punjab.

2.2 International attitudes to Quality in Primary Education

The comparative studies and international research present a useful background in the study of the education problems facing Punjab. The Education for All (EFA) campaign now the Sustainable Development Goals (SDG 4: Quality Education) have set universal standards and are not concerned with just access to education but its quality and equity. International education tests like TIMSS (Trends in International mathematics and science study) and PIRLS (Progress in International reading literacy study) have reported high levels of learning shortage in third world countries and many students have not even acquired their basic skills in literacy and numeracy after several years at schools.

The studies on various contexts have highlighted typical aspects that are linked with quality primary education as well-trained and motivated teachers, learning materials and infrastructure are sufficient, curriculum and assessment systems are appropriate, leadership in schools is effective, parents and community involvement, and sufficient funding by the population. The successful education sectors in East Asia, Finland, and other top performers have stressed on the paramount importance of teacher quality, and the best teachers have been pinpointed as the most significant school-level factor that determines the achievements of students. These international experiences give the guidelines and teachings that can be used in the context of

Punjab.

2.3 South Asian Education.

South Asia constitutes the home to a population of more than one point eight billion, and unique issues besetting education in the region entail huge populations, scarcity of resources, linguistic variations, gender gap, and socioeconomic imbalance. Empirical research in the region reports chronic learning crisis in countries in South Asia, and evaluation of learning performance has shown that large percentage of primary school students cannot attain grade level proficiency in reading and mathematics. Annual Status of Education Report (ASER), which is carried out in several countries of South Asia has over the years reported low levels of learning although enrollments rates have improved.

In this local regard, the educational issues in Punjab mirror the trends of South Asia at large but are also province-specific. Similar to the rest of South Asian systems, Punjab has several problems related to the quality of teachers, lack of infrastructure and rural urban differences. But, Punjab has also shown relativity strengths such as more developed assessment systems using PEC and more broadening models of public-private in terms of partnership using PEF. When studying and comparing the results with the neighboring Indian Punjab, Bangladesh, and Sri Lanka, it becomes possible to see both the similar issues and the situation-specific issues which influence the results of learning.

2.4 Personal Factors that have an effect on SLOs in Punjab

2.4.1 Socio-economic Factors

The socioeconomic status (SES) is one of the strongest predictors of educational achievements in the whole world and Punjab is no exception. The economically disadvantaged students have various barriers such as poor nutrition, lack of learning facilities at home, illiteracy of their parents, and the opportunity cost of attending school. It is important to note that the 19.5 percentage point gap in performance in rural versus urban populations recorded in the PEC data is not a dissimilarity in

the quality of schools, but also the differences in the socioeconomic characteristics of the rural and urban populations.

Among the rural regions of Punjab, the poverty rates are usually higher, the education level of parents is lower, and the number of educational resources is smaller than in urban areas. Rural children have to cover greater distances to their schools and endure poor facilities and even less experienced teachers. Also there is cultural aspects such as gender norms, early marriage practices which have disproportionately influenced educational participation and performance of girls in rural settings. These socioeconomic factors give rise to cumulative disadvantage which is realized in low learning outcomes.

2.4.2 School and institutional Level Factors

The quality of infrastructure, the presence of learning materials, and school size of a classroom, as well as the school management practices are some examples of factors that affect learning outcomes at the school level. The revelation that 85 percent of the primary schools in Punjab do not have science laboratories signifies a fundamental institutional drawback that imposes a direct constraint on the quality of education in science [1]. Without laboratories, learners would not be able to apply, observe, and ask questions, which are key elements of successful sciences study in correspondence with constructivist ideologies.

Other than the physical infrastructure, institutional influences around the learning aspect include quality of school leadership, teacher attendance, and punctuality, and how well the learning time is used and the school climate. Studies on PEF- based independent schools show that student performance is positively associated with improved infrastructural facilities and management principles with a correlation of $r = 0.435$ and $r = 0.231$ being reported in various studies [4]. These results imply that the issue of institutional quality does matter significantly in terms of learning and that the institutional practice of managing schools that aids in higher performance can be applied in a different higher-

achieving institution in a way that will benefit the learning processes in the chosen institution.

2.4.3 Teacher-related Factors

The most critical human resource in education systems is teachers and teacher quality comes out as the main factor in determining student learning. In Punjab, there are various teacher aspects that limit the quality of learning. It shows a significant lapse in professional preparation because the survey revealed that 72 percent of teachers do not have training on inquiry-based pedagogy [1]. Devoid of proper pedagogical training, teachers revert to the old conventional lecture based and repetitive rote process which does not allow improved higher-order thinking and conceptual proficiency.

The quantitative method of studying determinants depicts that training teachers has a significant statistically important positive influence on the student achievement with a standardized coefficient of $b = 0.31$, $p = 0.001$ [1]. This discovery highlights the advantageous effect of investment in the professional growth of teachers. Nevertheless, the quality problems in teachers do not only cover the initial training period but also cover inadequate in-service development programs, lack of subject matter knowledge (especially in the fields of science and English), and pedagogical content knowledge, as well as assessment literacy. On top of that, teacher motivation and accountability systems have effects on instructional effort and effectiveness.

2.5 The Punjab Examination Commission (PEC) Role.

A major institutional innovation that has been made in 2006 is the Punjab Examination Commission to standardize the assessment practices, and produce reliable data concerning the learning outcomes. PEC is the conducting body of Grade 5 and Grade 8 examinations in all of Punjab, which are competency-based. The 2018-2023 long-term data offered by the commission gives the best longitudinal evidence on learning patterns, subject-specific proficiencies and demographic differences in Punjab.

The task of PEC is more than just assessment and also covers curriculum alignment analysis, identification of learning gaps, as well as the supply of data to inform evidence-based policymaking. The commission analyses have been able to disclose such critical findings as subject-specific SLO gaps, rural-urban performance disparities, and mismatches between the curriculum and texts. Nonetheless, the reviewed literature lacks the necessary evidence on the particular PEC reform action and their causal effects on learning outcome, which presents the necessity to evaluate the PEC interventions as more rigorous interventions rather than its assessment roles.

2.6 Curriculum Alignment and Assessment Weaknesses

Effective education systems have to have the consistency of curriculum requirements, textbooks and educational materials, teaching methods in education, and examination systems. Disagreement between these elements weakens learning because of the resulting confusion of learning objectives, a poor use of teaching hours, and tests that do not provide a reflection of the covered materials. The result where 58% of SLOs in the prescriptive textbooks are not well covered is an essential dislocation in Punjab.

Such a mismatch implies that educators will be put in an unwinnable situation: they will be supposed to train students on the aspects of the SLOs, which were not taught according to the official textbooks. This deficit compels educators to balance out textbooks with other resources (these are frequently not available in schools with limited resources) or to teach what textbooks cover but not to teach SLOs that are not taught. The outcome can be anticipated: low student achievement at tests and frustration by the teachers. To curb this discrepancy between the curriculum and assessment, it is necessary to have a systematic review of the curriculum, revision of the textbook and, this implies there must be co-ordination among curriculum development, textbook production, and assessment agencies.

3. Methodology

3.1 Research Design

A meta-analysis and synthesis method has been used in this research article, as the authors combine various sources of data in order to get a synthesis picture of the quality of primary education in Punjab. The research is mainly founded on the secondary data analysis, which utilizes levels of empirical research results, since the analysis will rely on published studies, government reports, program reviews, and assessment data. This methodological approach allows the synthesis of evidence streams which are diverse to determine their patterns, convergent findings and evidence based all lead to policy suggestions.

The study has included both quantitative and qualitative evidence in its research design. Quantitative data involves student achievement figures/PEC assessments, teacher survey data, infrastructure data, and program data analysis. Qualitative evidence includes results of case study, teacher interviews and descriptive observation of pedagogical practice and implementation of policies. This is a synthesis of mixed methods that offers the scope and depth it needs to capture the statistical trends and at the same time cast some light on the contextual issues and the realities behind its implementation.

3.2 Data Sources

The main sources of data to be used in this analysis are:

Punjab Examination Commission (PEC) Reports (2018 - 2023): Longitudinal evaluation data on the performance of Grade V and Grade VIII students in different subjects that provides province-wide statistics on student proficiency, subject-wise student achievement rates, and also demographic break down.

Teacher Surveys: Numerous survey studies that either utilize a sample sizes of N=350, N=300, or other sample sizes that report teacher training backgrounds, pedagogical practices, resource availability and professional development requirements.

Quality Drive Initiative (QDI) Evaluation Reports: Program evaluation data in the form of baseline literacy levels, intervention programs,

and against targets achievement in early primary grades (Classes 1-3).

Punjab Education Foundation (PEF) Studies: The evaluation research of models on the public-private partnerships, comparative analyses of the schools which were supported by PEF(N=746 schools of cited studies); and correlational analyses of the quality indicators and privatization.

Academic Journal Articles and Research Studies: Peer-reviewed articles that have studied different aspects of the education system of Punjab, such as the effect of teacher professional development, misalignment of the curriculum, and studies of the policy.

Government Policy Documents and Reports: Publications by government School Education Department, the planning documentation, and national education policy frameworks which gives contextual information and policy intentions.

3.3 Analytical Approach

The analysis method is divided into the following steps:

Data Compiling and Organizing: There is systematizing of gathering and sorting of quantitative measurements, qualitative data, and contextual data using some different sources.

Descriptive Analysis: The development and analysis of key statistics such as proficiency rates, performance disparity, infrastructure measures and program measures.

Comparison Analysis: Analysis of differences in the demographics (rural/urban, gender), subject matter and the type of institution (public/private).

Synthesis of Evidence: This involves conclusion of results of various studies on the same topic to arrive at convergent results, patterns that are found everywhere and fruitful conclusions.

Critical Evaluation: Intervention effectiveness, areas in implementation failure, and policy congruence.

4. Analysis of Status of Learning Outcomes in

Punjab

Provincial Performance Trends Find first-level trends from. +- system

4.1 Find system.

Examination of the data of Punjab Examination Commission in 2018-2023 shows alarming tendencies in the area of student learning outcome on the primary level. Although the enrollment rates have seen a slight change within this timeframe, the indicators of learning quality reveal that the shortcomings within this facet remain deficit and need quick action since the same problems have been felt over time. The overall grade V science proficiency of 42.7 percent suggests that less than half of fifth grade students are competent enough to meet basic standards of science, which is a core subject without which students are unable to be scientifically literate or even participate in STEM education in the future.

This collective capability value is an average based on wide ranging school settings, learners, and geography which hides high disparity. The longitudinal data indicates that there have been some gradual gains in certain sectors but the general gains are low and do not correspond with the national education targets or global standards. The fact that the low levels of proficiency remain unchanged in spite of a range of reform efforts do suggest the fact that structural obstacles are still in place to hindrance quality improvement and that deeper and more extensive measures are needed.

4.2 Proficiency Analysis on a subject-by-subject basis

A close analysis of the subject-specific and topic-specific proficiency shows that there is a substantial variation in learning among students in the various fields of the science curriculum. A detailed analysis of the proficiency of Student Learning Outcome in Grade V science, as shown in Table 2 (below), has multiple areas of relative strength and areas of un-mitigated weakness.

The statistics indicate that the performance of students differs drastically when comparing it to science subjects. There are some comparatively higher levels of proficiency in such areas as

Flowering Plants (64.2) and Solar System (61.8) which implies that students score higher on subjects which perhaps they are more familiar with daily engagement or to which they are given higher instructional focus. Subversively, those issues that demand a higher level of abstraction and technical knowledge or practical studies exhibit much less competency. Electricity and Magnetism have a proficiency of only 32.5, Microorganisms 38.1, and Forces and Machines has a proficiency of 36.7.

These trends indicate a number of problems. First, subjects that need lab gear and practical investigation are victims of the infrastructure shortage (85% of schools do not have science laboratories) so that students cannot participate in active education, which imparts fundamental knowledge of abstract science concepts. Second, there is the risk that subjects that demand more advanced thinking abilities and conceptual knowledge will be unsatisfactorily covered according to the common pedagogical rote-learning approaches. Third, the curriculum-textbook mismatch (a 58% coverage of SLOs not in the textbooks) tends to interfere with the learning of certain topics to a greater extent than others, providing an uneven content coverage of the instruction.

This is also the case with Mathematics and English proficiency data that, although not reflected in the provided sources on such a level of detail as the science case, also reflects the data of significant gaps between achievements. Quality Drive Initiative literacy testing of early grade students showed that a high rate of 38 percent of young children were unable to do simple recognition, which included words and objects, which showed underlying poor literacy levels that result into further learning challenges in their later age [2]. Proficiency in the English language is also a unique frighten as many schools use English as the main instructor of sciences and mathematics, and, as such, language barriers take place of learning problems related to subjects, which are otherwise complicated.

4.3 Demographic Disparities

Learning outcomes are highly demographically

uneven in Punjab, the rural-urban location becoming one of the most relevant determinants. The average performance of the rural students is 19.5 percentage points lower than the urban students and this is an indication of several underlying inequities. The rural schools normally lack qualified teachers, infrastructure, learning resources and class size are on the higher side than in urban schools. Also, country students have socioeconomic disadvantages such as poverty, low educational attainment by parents and poor access to ancillary educational facilities.

Regression analysis is used to measure the extent of the rural disadvantage, where locale indicates as the standardized coefficient [?]0.23, $p < 0.01$ to represent an adverse significant impact of the rural location on science achievement. This observation highlights the fact that geographic location is not only correlated with it, but it is an important predictor of learning outcomes, when all other predictors are held constant. The Quality Drive Initiative assessment established that though the program has reached its overall objective of 80 percent, it had higher returns in rural locations, indicating

Table 1: Major Signs of the Quality of Primary Education in Punjab.

Indicator	Value	Implication
Overall Grade V Science Proficiency	42.7%	More than half of students fail to achieve basic science competency
Rural-Urban Performance Gap	19.5 percentage points (rural lower)	Significant geographic inequity in learning outcomes
Teachers Lacking Inquiry-Based Pedagogy Training	72%	Widespread pedagogical capacity deficit among teaching force
SLOs Not Covered in Textbooks	58%	Fundamental curriculum-assessment-instruction misalignment
Schools Without Science Laboratories	85% Critical	infrastructure gap constraining hands-on science learning
School-Age Children Out of School	~25%	Substantial access gap affecting overall education coverage
Education Spending as % of GDP	~2%	Chronic underinvestment relative to international benchmarks
PEC Assessment Period	2018–2023	Longitudinal data enabling trend analysis and monitoring

All these indicators lead to a picture of an education system that is grappling with a number of issues which are linked and continuous. The low achievement scores are also not an individual matter of failure but rather a

that interventions that are specific to address rural disadvantages can alleviate rural disadvantages partially.

Another aspect of inequality in the education system in Punjab is a gender disparity, which cannot be measured as accurately as given in the accessible data. Gender issues such as culture, safety, early marriages and household duties are overbearing on the educational participation and attainment of girls especially in the rural and conservative communities. To solve the gender gap problem the solution not only involves school level actions but also involves changes in the social and cultural levels.

4.4 Main Primary School Education Quality Indicators in Punjab

Table 1 provides an overall review of major indicators which when added together describe the quality of the primary education in Punjab. These personalities cut across many dimensions such as student learning outcomes, teacher capacity, availability of infrastructures, curriculum alignment and context of the system as a whole.

sign of a systemic lack of teacher competencies and ability, instruction and infrastructure, and curriculum and funding disparity. The large proportion of educators who are not receiving the proper training and the omnipresence of the

lack of the science laboratories directly limit the quality of the instruction. The textbook-curriculum mismatch causes teaching and learning confusion and inefficiency. The historical lack of sufficient investment in education (2% of GDP) makes them lack the

resources to compensate these gaps on a large scale.

The fourth student learning outcome (SLO) is in the category of Proficiency in Science (Grade V).

Table 2: shows almost topic-specific proficiency in Grade V science which indicates the uneven surface of student achievement in the science curriculum.

Table 2: Student Learning Outcome (SLO) Science at Grade V Proficiency.

Science Topic	Proficiency Rate	Performance Category
Flowering Plants	64.2%	Relatively High
Solar System	61.8%	Relatively High
Overall Science Proficiency	42.7%	Below Standard
Microorganisms	38.1%	Low
Forces and Machines	36.7%	Low
Electricity and Magnetism	32.5%	Critically Low

The difference in the expertise in different matters gives practical lessons on specific interventions. Teaching units in which their proficiency level is critical low (Electricity and Magnetism, Forces and Machines) will need specific consideration, which probably implies the need to offer teachers more training in the specified content area, create additional learning resources, and even have laboratory equipment to allow students to learn by doing. The fact that the results were relatively higher on Flowering Plants and Solar System would indicate that with the proper support in terms of instruction and materials, students will be able to reach a certain level of decent performance.

4.6 You Resources and structure Planning Kenyas

One of the basic limitation to the quality of learning in the primary schools of Punjab is infrastructure shortage. The fact that 85 percent of schools do not use science laboratories is so dramatic because it means that the huge majority of students do not have the possibility of having a scientific experiment and observation. The research in the field of science education continuously proves the necessity of practical, inquiry-based learning as the particular set of the assumptions that are necessary in the development of scientific thought, the conceptual comprehension, and the interest

appeared to science. In the absence of laboratories, teaching science becomes relegated to textbook-based, theoretical modes of teaching which do not train students to become practical and have deeper conceptual knowledge.

In addition to the science laboratories, primary schools in Punjab experience numerous infrastructure challenges such as a small classroom area, unsuitable furniture, absence of libraries, and no or minimal availability of technology and computers, unreliable supply of electricity and unreliable or lack of sanitation facilities. These shortages are worse in the rural regions or in the state schools than in urban or private schools. Better infrastructure and resource access can be considered one of the factors that contribute to the comparative advantage of PEF-supported private schools that demonstrate positive correlations with quality indicators ($r = 0.435$ and $r = 0.231$ in different analyses).

Priorities and constraints in resource allocation are more systematic. High expenditure on education is estimated at 2 percent of GDP, which means that the resources available to Punjab are tremendously scarce and cannot be used to expand infrastructure, teacher salaries, learning materials and implementation of the programmes. This is where efficient resource allocation is paramount, as the priorities should

be made on high impact investments like training of teachers, curriculum materials and those infrastructures that would be minor but in the most underserved.

4.7 Primary school lack of infrastructure and

Table 3: Missing Infrastructure and Training in the primary schools.

Deficit Category	Indicator	Magnitude	Impact on Learning
Laboratory Infrastructure	Schools Without Science Labs	85%	Severely constrains hands-on science learning and inquiry-based pedagogy
Teacher Professional Development	Teachers Lacking Inquiry-Based Pedagogy Training	72%	Limits implementation of student-centered, constructivist teaching methods
Curriculum Materials	SLOs Not Covered in Textbooks	58%	Creates instruction-assessment misalignment and learning gaps
Teacher Sample Sizes in Studies	Various Teacher Surveys	N=350, N=300	Provides robust evidence base for identifying training needs
Student Sample in PEF Studies	PEF Evaluation Research	N=746	Enables comparative analysis of public-private quality differences

Sources:

Such deficits do not exist alone but they interact with each other to exacerbate their adverse impact. The teachers who are not trained as pedagogues fail to effectively use laboratories, even on those occasions when it is available, and curriculum-textbook mismatches compromises the work of even well-trained teachers. These shortcomings cannot be solved through the use of isolated, piece or meal reforms but through the use of systemic interventions.

5. Difficulties and Obstacles to quality education.

5.1 Teacher Education and Pedagogical Collisions

The most important school based variable that affects student learning is teacher quality but teacher training and pedagogical capacity are found to be critical areas of weakness within the primary school education system in Punjab. The results of the study that 72 percent of teachers are not trained in inquiry-based pedagogy suggest that there is an overarching deficiency in professional preparation. Pre-service teacher education programs would tend to favor teaching theory over teaching practice, inadequacy in teaching subject matter (especially sciences and mathematics), and a deficiency in exposing Teachers to the realities

training.

Table 3 combines these major infrastructure and training deficit indicators, which measured the gap in resources that limit quality improvement.

of working in diverse and resource-limited classroom settings.

Pedagogical gap is observed in classroom where students are subjected to memorization, lecture-based learning and focus on memorization instead of learning. Qualitative research has explained over-reliance to rote instruction and lack of assessment feedback as barriers which are systemic to higher-order learning. In most cases, teachers do not have the pedagogical content knowledge which is the combination of subject mastery and instructional ability that enables them to possible the complicated concepts to young learners. Also, poor assessment literacy does not allow teachers to diagnose the student learning needs well, use formative feedback, and modify instruction according to student knowledge.

5.2 This is referred to as Curriculum Textbook-Assessment Misalignments

Persistent direction between the standard of quality of the curriculum, instructional resources, instructional procedures, and testing systems are vital in the success of education. The situation in Punjab which reveals that 58% of Student Learning Outcomes have not been well addressed in prescribed textbooks is a system failure. This discrepancy leads to several issues: educators are confused about what they should

teach, pupils are tested on the content that has not been covered in instruction, time spent in the classroom is not utilized effectively, and the results of the learning process are low.

The mismatch is seen to be a result of poor coordination between the different agencies that are dealing with curriculum creation (Curriculum Wing), textbook printing (Punjab Textbook Board), as well as evaluation (Punjab Examination Commission). There is a lack of communication and coordination among these agencies thus the curriculum documents, textbooks and assessment are never fully harmonized. Also, curriculum developmental cycles might not offset the textbook creation cycles which leaves a temporal mismatch.

The effects of this miss-fitment are harmful. Due to the fact that the content covered in textbooks does not match that tested, teachers need to either add certain materials (which are not always available or are not always affordable) or rely on textbook material, which can be detected on the cost of not teaching students content they are not supposed to know. Learners also become frustrated and de-motivated when evaluated based on issues that they have not been explained. The entire system is inefficient and effort and funds are focused on components which are not oriented instead of coherent mutually reinforcing components.

5.3 Resources and Instructional and Infrastructure Limitations

The physical infrastructure and learning materials are the necessary inputs needed to attain quality education though the primary schools in Punjab are at dire need in both parameters. The most notable lack one will find in the infrastructure is the lack of science laboratories in 85% of schools, yet there are other resources that are limited on many levels [1]. Most of the schools do not have sufficient classroom space, which results in huge classes or multi classes instruction that erodes quality of instructions. Inadequate furniture implies that students have to sit on the floor or even on desks, which make the learning environments uncomfortable.

In primary schools, libraries are hard to come by,

which restricts student's access to books and other reading resources other than textbooks. The technology infrastructure is low with the majority of schools having no computers, internet connectivity, or everything related to education technology. This digital divide has gained more critical consequences with the growth of integration of technology in the educational sector around the world. Simple amenities such as constant electricity, water and proper sanitation systems are poor in most of the schools, especially in the rural regions, which not only impacts on the environment of learning, but also health of students.

The infrastructure deficit indicates the long-term lack of investment in education as the expenditure is about 2% of GDP and has inadequate material to support capital construction. Also, the mechanism of resource allocation can be not effective to prioritize the most underserved schools and areas, potentially continuing inequities. The positive relationships between the quality of infrastructure and learning outcomes in PEF supporting schools ($r = 0.435$ and $r = 0.231$) prove the fact that infrastructure development could become instrumental in improving quality.

5.4 Socio-political and Economic Obstacles

The education systems exist in the contexts of wider socio-political and economic contexts that influence possibilities and limitations. In Punjab, there are a number of contextual factors that hinder quality improvement. The percentage of poverty and economic insecurity is about a third of the population which creates several obstacles to education, such as the opportunity costs of schooling (sacrifices of child labor income), their inability to afford costs related to schooling, nutrition which influences cognitive development, and parental inability to facilitate learning at home.

Education reform continuity is interfered by political instability and the frequent changes in the policy. Governmental changes tend to cause shifts in the priorities of education, replacement of leadership within the education departments and discarding or adjustment of the already existent programs before they can prove to have

an impact. This policy instability cannot allow the long term commitment that is needed when it comes to the sustained long term education improvement of the system. Moreover, arguments of governance such as bureaucracy inefficiency, corruption, and low accountability system hinder implementation and use of resources.

Education outcomes are also determined by culture. In some societies especially in non urban and conservative societies, education and specially education among the girls may not be greatly appreciated. The availability of early marriage, gender practices that limit the movement of girls, and favoring religious education to secular education are issues that influence enrolment and learning. There is also the issue of language diversity whereby most students go to schools with a regional language or dialect whereas the school is taught in Urdu or English, which poses a language barrier to learning.

The Punjab Education Foundation (PEF) is a major policy experiment of using the public-private partnerships to increase access and quality. PEF offers individual-school subsidies to the privately-operated schools in low-income communities in order to utilize the efficiency and innovativeness of the private sector, but still keeping the financing and control of public funds. The research evidence made through evaluation shows that schools supported by PEF have better infrastructure and is positively related to quality indicators, with reported $r = 0.435$ and $r = 0.231$ values between privatization and student outcomes across various analyses.

Nevertheless, the model of privatization has some questions and concerns. To begin with, the magnitude of the reported correlations, although statistically significant is small indicating that privatization per se is not a magic bullet to quality issues. Second, selection effects could partly clarify why differences are observed because it is possible that PEF schools are attributed to a higher proportion of motivated families or students who have higher performance. Third, the emphasis on low prices in private schools can lead to the pressure to keep the costs low, which can impose certain

pressure on teacher salaries, qualifications, and conditions of work.

Moreover, the spread of the private provision is a matter of concern in terms of equity. PEF may contribute to returning to the stratification of the poor, as the general expansion of private schooling contributes to the reduction of the overall access of better-endowed families to higher-quality private schools and the poor to lower-quality and under-resource public schools. The PEF model is sustainable in the long run relying on the long-term continuous funding of the government as well as public regulation in maintaining the quality level and keen monitoring in excluding the negative influence on the general system. The evidence indicates that a number of the items to be included in the PEF model such as improved infrastructure, increased accountability, and performance incentives can provide insights to be used to improve the conditions in the public schools, nonetheless, privatization should not become a replacement of the investment in and changes in the public education system, that must be undertaken.

6. Government Interventions and their effectiveness

6.1 Quality Drive Initiative (QDI).

Quality Drive Initiative is a specific intervention whereby fundamentals in the literacy and numeracy subjects in the lower primary grades (Classes 1-3) are enhanced. Realizing the fact that the lack of learning in lower grades leads to the subsequent ineducational defeat in higher grades, QDI was concentrating on the minimization of learning deficiencies in the fields of basic reading, writing, and numeracy by means of intense teacher training and supplying them with supplementary learning materials, as well as constant monitoring and evaluation.

The assessment on the initial launched of the initiative indicated that there were drastic needs on the underlying level and only 38 percent of young children could perform simple recognition exercises in the form of a word and object. This early childhood result highlighted the importance of also early-grade intervention. Implementation of QDI entailed training of

teachers in early literacy and numeracy pedagogy, structured lesson plans and learning resources, structured learning assessment procedures and development of accountability mechanisms by conducting monitoring visits.

According to program evaluation reports it suggests that QDI had met its 80% target based on the internal assessments, this is a significant improvement reflecting a significant increase compared to the previous 38% baseline [2]. It is worth noting that the improvement in the initiative was greater in rural settings, which indicates that a focus of intervention can partly address the disadvantages of the rural population, provided it is properly structured and executed. The rural achievement may be due to the fact that because of its lower starting points, rural schools were more likely to gain, or that structured and prescriptive character of QDI materials and procedures proved to be effective in environments where teachers were less trained and endowed.

Nonetheless, there are a number of caveats, which demand consideration. To start with, evaluation was mostly based on the assessment of internal programs, casting doubt on the issue of independence and bias. External, strict assessment would enhance trust in the findings given. Second, the continued nature of QDI gains requires ongoing support, professional development of the teachers, and incorporation of effective practices into normal operations of schools. Third, although foundational literacy and numeracy are necessary, they do not form the sole element of good primary education; gains in early grades need to be accompanied by quality gains in later years of primary, as well as in all areas of the curriculum.

6.2 In-service Teacher Training

In-service teacher development is an important approach to teacher professional development as the current numbers of teachers are very large, and it is not possible to remove all the insufficiently trained teachers. In a number of in-service training centers are also in operation in Punjab that most significantly include the Provincial Institute of Teacher Education (PITE) and the Punjab Education Curriculum, Training

and Assessment Authority (PECTAA) which offer several professional development programs to practicing teachers.

More focused professional development has been reported to have an effect of enhancing teaching practices, enhancing the utilization of technology and the use of inquiry based and student centered instruction with the resultant classroom based learning outcomes reported qualitatively. Instructors who went through effective training programs showed better pedagogical capacities, confidence in their subject material, plus better classroom management, and increased the effectiveness of assessment in informing the teaching practice.

Nonetheless, the size and coverage of in-service training is not adequate in comparison with requirement. The fact that only 72 percent of teachers have been trained on how to be based on inquiry-based pedagogy clearly demonstrates that most of the teaching body is not covered by the existing professional development initiatives. Various issues limit training effectiveness and scale: lack of funds limit the number of teachers who need to be trained; training programs tend to be brief workshops as opposed to longer-term learning and practice; support and mentoring is weak; training content might not match well requiring of the curriculum; and accountability mechanisms of making teachers act on what they learned are meager.

The required improvements in improving in-service training are reflected in the following aspects: capacity of the training should be increased to cover more teachers; training has to be increased; it is necessary to introduce practice based and classroom integrated learning; training should be accompanied with mentoring and support; corrections in training content, SLOs, and identified gaps in learning have to be introduced; training has to be covered with the use of technologies and distance learning so that to reach more teachers than before.

6.3 Reform of PEC and Data-Based Decision Making

The Punjab Examination Commission has been useful in standardizing assessment practices and

creating systematized data of learning outcomes. PEC annual Grade 5 and Grade 8 exams are the province-wide data that allow discovering the learning gaps, tracing the trends through the years, and comparing the results among the different districts, schools, and demographic groups. The 2018-2023 PEC data has been available to make the presented analyses possible; it has a significant role in the evidence-based discussions of the policy.

PEC also analyzed and established certain areas of weakness like deficiencies in subject-specific SLO, misalignments of curriculum-textbook and demographic differences. Such analyses will give useful diagnostic data which can be used to inform specific interventions. Also, the transparent nature of school-level results disclosed by PEC puts pressure on quality improvement and, probably, accountability, to a certain extent.

Nonetheless, the literature in question does not give an adequate evidence on particular measures of PEC reforms other than assessment and their cause-effect effects on learning outcomes. Whilst PEC produces useful data, it is not clear how the data may be translated into effective interventions and quantifiable learning gains. There are a number of questions which may be the focus of the additional research: How well does PEC data inform policy decisions and resource allocation? Are there any mechanisms available to make sure that the learning gaps identified give rise to corrective measures? What is the role of PEC results in enhancing instruction in schools and by teachers? How do the effects of public reporting and accountability pressure on schools and student performance?

To maximize the role of PEC in enhancing the quality, it is important to enhance the linkage of data to action: that is, ensuring PEC findings systematically guide the design of policies and programs to improve education; developing capacity among education officials, school leaders, and teachers to interpret and use assessment data; and providing stringent assessment of the changes brought about by PEC in order to determine its causal effect.

6.4 Public- Private Partnerships (Punjab

Education Foundation)

The Punjab Education Foundation is seen as a new strategy of adding access to education and possibly enhancing quality with help of public-private collaboration. PEF offers per-students repayments to privately-run schools in communities with low income, has voucher schemes that allow poor families to attend private schools, and assists in the creation of new schools in underserved regions. According to the recent statistics, PEF finances thousands of schools educating hundreds of thousands of students.

According to a study, PEF-supported schools tend to have improved infrastructure and exhibit positive correlations with the quality indicators, as this is a type of evaluation research. The reported correlations between privatization and student outcomes ($r = 0.435$ and $r = 0.231$ in various analyses) are small positive correlations, although they are not causal and could be a result of selection. Qualitative studies indicate that PEF schools can enjoy more freedom, increased responsibility with the help of enrollment-based funding, more management, and improved infrastructure in relation to the normal schools.

Nevertheless, there are problems and limitations also within the PEF model. The small scale of the published correlations suggests that privatization is not a witch-cult. The difference between quality between PEF supported schools is quite high, as some are performing well and others are performing with minimum improvement. The priorities of cost-effectiveness can pose the pressure to reduce the costs, which can influence the teacher qualification, pay, and the working conditions. There should be increased regulatory control and quality assurance bodies in place which will make sure that subsidized private schools are of minimum quality.

More so, the growth of the private provision leads to systemic concerns regarding the role of the state education. On the one hand, PEF can offer an alternative to low-income families, but this should not be used to replace the investment in and change of the existing system, which accommodates the majority of students, and will

be the primary provider in the predictable future. The greatest contribution that the PEF model provides could be the insights that are proven by the school sector regarding how to improve their schools that may be the benefits of school independence, performance accountability, investing in infrastructural development, and effective management techniques.

7. Discussion

7.1 Synthesis of Findings

The detailed study offered in this article shows that the quality of primary education in Punjab is a complicated image with major deficiencies, continuous discrepancies, and gradual improvement with the help of the specific intervention. Many of the most important conclusions can be made based on the evidence synthesis:

To begin with, the learning outcomes are still significantly lower than of desired standards wherein the overall Grade V science proficiency is currently at 42.7 percent meaning over half of the student population is under the basic levels of competency. This overall percentage conceals further worse shortfalls in individual subjects of Electricity and Magnetism (32.5%), Microorganisms (38.1%), and Forces and Machines (36.7%). These dismal achievement levels are not indicators of isolated breakdown but portray what are deficits in the education system in many different aspects.

Second, there are still great differences in rural versus urban areas, with the rural students having an average score of 19.5 percentage points lower than the urban students. This disparity portrays greater injustices in allocation of resources, teacher qualifications, infrastructure and socioeconomic factors. The statistical significance of locale as an achievement predictor ($b = [?] 0.23, p < 0.01$) underlines the purpose of geographic location as a factor that has a significant impact on learning outcomes.

Third, the quality of teachers becomes a determining factor of learning, and 72 per cent of the teachers had no training in inquiry-based pedagogy. The positive significant effect of

teacher training on student achievement ($b = 0.31, p < 0.001$) proves the possible effect of the investment in teacher professional development. Nonetheless, existing training interventions expose too few teachers and are commonly not sustained and practice-based to produce any significant change in pedagogy.

Fourth, in misalignment of the fundamental systems, the most striking data is that 58 percent of SLOs are not sufficiently discussed in the textbooks, which are recommended. The given curriculum-textbook-assessment mismatch causes confusion, ineffectiveness, and the imminent learning gaps. In the same manner, the lack of science laboratories in 85% of the schools is a serious shortage of infrastructure that directly limits practical learning, which is a key to science studies.

Fifth, specific interventions are characterized by significant changes, so it is possible that the developed programs can be effective. The Quality Drive Initiative succeeded in meeting its target of 80% with significant improvements especially in the rural regions. The qualitative evidence of improved teaching practices and involvement of students is indicated in in-service teacher training programs. PEF schools have small positive relations with quality indicators. These achievements point to the fact that improvement can be made in case interventions are evidence-based, well-resourced, and implemented successfully.

Nevertheless, the continued lack of overall proficiency with the use of such interventions points to the inadequacy of the isolated programs. It will take a systemic, comprehensive reform of the quality of sustainable work, which is based on the preparation and ongoing training of teachers, compliance between the curriculum and textbooks and testing, investments in infrastructure, the distribution of resources equally, and the sufficient financial support of education by the state.

7.2 Regional Standards Verification

By putting the concerns of education in Punjab into the context of other states, one will be able to identify certain similarities as well as unique

aspects. In South Asia, the crisis in learning is extensively recorded, and a significant percentage of students enrolling in primary schools does not reach grade level competency, despite the improvement in enrollment. Low levels of learning in reading and mathematics are constantly reported in Annual Status of Education Report (ASER) and other regional reports in India, Pakistan, and Bangladesh (as well as other South Asian states).

The general science performance of Punjab of 42.7 percent is in line with the regional trends in low learning achievement. In the same manner, education systems in South Asia are characterized by rural-urban inequalities as well as gender inequalities and shortage of infrastructure. The issue of teacher quality, lack of training, poor pedagogical ability and poor knowledge of specific subject is almost universal in the region.

Still, there are certain relative advantages in Punjab in contrast to the regional counterparts. The introduction of PEC offers more normalized assessment information as compared to most South Asian settings and provided more organized, standardized assessment data, which is helpful in tracking and implementing policy. PEF model is a more advanced model of public to private partnership as compared to most of the regional systems. The education expenditure though low at about 2% of the GDP of Punjab is comparable to some of its neighbors in the region or rather slightly higher.

The difference in quality is demonstrated by comparison with more successful education systems in the world. In East Asian systems with high performances, the level of primary school proficiency is usually above 80-90, teacher training is severe and long-lasting and infrastructure is satisfactory and education spending is between 4-6 percent GDP. Although the local contextual factors do not allow making a strict comparison, these standards suggest how significant the areas of improvement in Punjab should be to match the international level.

Which aspects of policy and practice would you consider to be most important in addressing the challenges of participation?

The results of the analysis have a number of valuable implications on education policy and practice in Punjab:

There is a Necessity to Investigative Teacher Professional Development: As 72% of teachers have never undergone training in inquiry-based pedagogy and as big effects have been demonstrated to be present on average ($b = 0.31$, $p < 0.001$) deep, sustained teacher professional development will be a high-payoff intervention. This involves increasing a training capacity, lengthening of programs, integrating learning through practice, continuous mentoring, and also harmonizing training with curriculum and SLOs.

Curriculum -Textbook-Assessment Alignment Should be ensured: The fact that 58% of SLOs are not represented by textbooks is the basic system failure that should be tackled as developmentally urgent. This will involve introduction of coordination mechanisms between curriculum, textbook, and assessment agencies, systemic review of alignment, revision of textbooks to provide full coverage on the SLO, and to match cycles of revision.

The infrastructural Investment Should be focused on addressing the most crucial gaps: The lack of science laboratories in 85% of school buildings directly limits the learning process and has to be mitigated with the help of focused infrastructure spending. The first line should be the setting up of basic science labs, supplying them with the necessary equipment and materials, adequate classroom area and furniture, and library, technology, and basic utility shortages.

Inequality Should Inform the Distribution of Resources: The rural urban imbalance of 19.5 percentage points and locale as a significant predictor of achievement ($b = [?] 0.23$, $p = 0.01$) requires the use of equity to redistribute resources. Rural schools, which accommodate the most deprived groups of people, need an added support in the form of more qualified teachers, improvement of the facilities, provision of learning resources and special programs to curtail the socioeconomic conditions.

Preservation of Early Grade Interventions is needed: Success of Quality Drive Initiative on enhancing basic literacy and numeracy, especially in rural setting, has shown the importance of early-grade intervention. These initiatives have to be maintained and extended to all schools and accompanied by quality enhancements in subsequent primary classes and subjects.

Public Education Investment Should Be Raised: The current expenditure of about 2% on education is not enough to play a role in systemic deficits on the large scale. Quality education on a global scale can be attained by investing more resources on global quality of 4-6 percent GDP with the funds concentrating on the high impact interventions, such as; teacher training, infrastructure, instructional resources, and program provisions.

Evidence-Based Decision Making should be further sharpened: PEC data is a rich source of diagnostic data and the transfer of the data into productive action is weak. To improve the data-to-action pipeline, it is necessary to develop analytical capacity, develop robust accountability processes, forcefully apply evidence in policy and programs design, and rigorously evaluate the interventions in order to establish causal effects.

98 Conclusions and Recommendations

8.1 Findings

This is a thorough research paper that has addressed the level of student learning outcome at primary level in Punjab, Pakistan and it has summarized empirical data about the prevailing condition, determining factors, and challenges, and intervention effectiveness. The analysis demonstrates a complicated terrain with serious quality gaps, structural inequalities, and gradual development with special initiatives.

The main results are as follows: total Grade V science performance of 42.7, with low scores especially in subject areas that demand abstract thinking and direct practical work; a rural-urban performance gap of 19.5 percentage points that has deeper roots of systemic inequities; two aspects of critical teacher training, including the

inability of 72% to train inquiry-based pedagogy and 58% require the training of fundamental curriculum-textbook-assessment misalignment; severe infrastructure shortfalls with 85% of schools lacking science labs and the inability to invest in

Irrespective of these difficulties, it can be seen that intervention-based measures record positive gains. The Quality Drive Initiative had its 80% target with good rural gains. There is qualitative evidence of the improvement of the practices provided in in-service teacher training. PEF schools that have a positive association with indicators of quality show low positive relationships. These accomplishments point to the fact that properly planned interventions which are resource-intensive may yield some results, though individual programs cannot change the system.

The fact that low learning outcomes have been persisting even with numerous reforms efforts reveals the need to have comprehensive, prolonged, systemic change. Sustainable quality improvement requires a concerted effort on various fronts: teacher preparation and professional growth, coherence of curriculum-textbook-assessments, infusion of infrastructure, even distribution of resources and sufficient public financing and enhanced accountability systems.

8.2 Policy advice to the policymakers

In light of the evidence untangled in this paper, the following strategy recommendations can be offered to policymakers, education officials and stakeholders:-

- Provide an Intensive Teaching Professional Development System.
- Increase in-service training to cover every teacher in a specified period (e.g., 3-5 years)
- Prolong trainings and include practice based, in-class learning.
- Offer continued mentoring and guidance by provision of master teachers or instructional coaches.
- Correlate training materials with training curriculum, SLOs, and learning weaknesses.

- Give more priority to inquiry-based pedagogy, pedagogical content knowledge and assessment literacy.
- Put in place accountability systems such as observation in classroom and monitoring of the outcome of the students.
- Use technology and distance learning in reaching more and more people at minimal cost.
- Enhance Curriculum-Textbook-Assessment Fit.
- Develop a top-end co-ordination system between curriculum, textbook and assessment agencies.
- Conduct systematic alignment reviews finding out gaps and inconsistencies
- Amend textbooks so that all SLOs are covered.
- Align the curriculum change, development of textbooks and evaluation.
- There are gaps that should be filled with additional resources.
- Give teachers effective direction on SLO coverage and instructional focus.
- Practice Focused Infrastructure Investment.
- Improve priorities with the creation of basic science laboratories in primary school starting with most needy localities.
- Making necessary laboratory gear, resources, and safety supplies.
- Provide proper classroom space, furniture and utility.
- The building school libraries containing age appropriate reading materials.
- Increase technology infrastructure such as computer and the internet connectivity where possible.
- Embraced cost effective scalable infrastructure designs suited to resource limited environments.
- Implement Asset-Based Wise Distribution.
- Specifically redistribute resources to underserved populations Donate more resources to rural schools to reduce geographic disparity.
- Encourage and retain capable teachers to work in the rural and remote schools.
- Enforce special initiatives to deal with the socioeconomic problems in learning.
- Provide gender equity in access and resources and learning outcomes.
- Systematic equity monitor and evidence-based policy change.
- Sustain and Roll Out Intervention at the Early Grade.
- Enact effective bits of the Quality Drive Initiative in every school.
- Offer long term provisions of foundational literacy and numeracy at the Classes 1-3.
- Integrate early grade assessment systems that would allow earlier detection and correction of learning deficits.
- Imparticular teaching of early literacy and numeracy.
- Provide transition and further quality improvement in subsequent primary classes.
- Make more investment on Education.
- Pledge to allocate more towards education levels of 4-6% of GDP internationally
- As certain resources, make sure that more funds are allocated to high-impact interventions that have proven to be effective.
- Enhance budget implementation and minimize leakages via enhanced financial management.
- Look at alternative financing models such as education bonds and a partnership with the government and corporations.
- Create effective connections between resources allocation and targets of the learning outcomes.
- Enhance Statistically-Informed Decision

making and responsibility.

- Develop capability in education officials, school heads, and educators to read and apply data on PEC.
- Institute systemic procedures that account on policy and program design using the findings of assessment.
- In the version of developing school-level accountability strategies of support and pressure to improve.
- Carry out serious, external assessments of significant interventions in order to determine causal effects.
- Establish feedback programs that allow constant learning and program improvement.
- Acquire through and Emulate Effective Patterns.
- Examine effective aspects of schools assisted by PEF such as independence and responsibility and school management practices.
- Pilot implementation of effective practices of the private schools in the public schools.
- Publish best practices in other districts, schools that are performing well.
- Promote inter-school, inter-teacher, and inter-education official learning.
- Get regional and international partners to adapt the success in education reform in other regions.

8.3 Future Research Directions

Although such article summarizes important evidence on the quality of primary education in Punjab, there are several inquiries that would be critical to study further:

Causal Impact Evaluation: Experimental or quasi-experimental studies with rigorous design should be conducted to develop causal effects of such major interventions as PEC reforms, in-service training programs, and other infrastructure investments. The existing evidence is mostly correlational evidence or

internal program assessment, which does not allow reliance on causal arguments.

Implementation Research: It will be necessary to know precisely how policies and programs are practically applied in different situations in schools so as to enhance effectiveness. The qualitative study that explores the implementation processes, barriers and facilitators would be of great value to the program designing and improvement.

Cost-Effectiveness Analysis: In the severe cases of lack of sufficient resources, it is important to understand the relative cost-effectiveness of various interventions to be able to allocate resources optimally. Priorities would be informed by comparative cost-effectiveness research of teacher training, infrastructure investment and curriculum reform and other interventions.

Longitudinal Student Tracking: Tracking cohorts of students longitudinally would allow learning more about the ways in which early-acquired learning deficits influence subsequent educational outcomes, how intervention effects persist, and the long-term effect of interventions.

Teacher Motivation and Retention: Knowledge of motivation and effort and retention of teachers, especially in rural and underserved communities, is vital to mobilizing the issue of teacher quality. Teacher policy would be informed by research on the incentive structure, working conditions, and career pathways.

Private Sector Role: Tighter research on the effects of privatization and public-private partnerships, on equity and sustainability in the long-term, is required to help guide policy regarding the role that should be played by the private.

Technology Integration: The integration of technology into the education sector is taking center stage around the world, and therefore study into efficient and cost-effective ways through which technology can be integrated within resource-limited settings such as that in Punjab would be highly beneficial.

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