

# Faculty Professional Development and Use of ICT as Moderators between Quality of Education and SLO's of Primary School Students

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**Abstract:** The study was aimed to analyse the impact of quality education on students' learning outcomes with moderating effect of teachers' professional development and use of ICT as instructional tool in the primary schools of Lahore. The parameters of quality education observed in this study were context, inputs, process, and outputs. Survey was conducted among 357 teachers from primary schools of Lahore with the help of close-ended questionnaire. Collected data was analysed on Smart PLS, using various statistical approaches including construct validity, discriminant validity, and path coefficients. Findings of this research study revealed that the quality of education has significant and positive impact on student learning and this relationship is successfully moderated by faculty professional development and communication technological advancement in the primary schools of Lahore. This result also indicated that by employing new courses to improve teaching and equipping teachers with professional development programs, moderates the students' learning outcomes.

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## Introduction

### 1.1 Background of the study

#### 1.1.1 *Quality education: concept and significance.*

Sustainable Development Goals (SDGs), and Millennium Development Goals (MDGs) assessment indicators' analysis revealed that despite of increased enrolment in schools (about 90% of

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primary school-age children in low- and middle-income countries), the students of middle and low-income countries were not learning. Even Pakistan stood 122 in ranking out of 156 countries and even below Bangladesh (World Bank, 2018). It means that only school enrolment is not the sign of learning outcomes. Rather the other parameters such as learning by age-groups, subject-matter proficiency levels, out-of-school proportions, school environments, teacher's qualifications, and class-room grading are also measured to assess learning effectiveness or quality of education (Brigitte Baptiste, 2015; Donoghue et al., 2015; Osborn et al., 2015; United Nations, 2015; Working Group SDGs, 2015). It means that to have pace with the educational system of the developed countries and to meet the criteria set by SDGs, and MDGs, a country needs to impart quality education.

Different facets of quality education have been explained in literature e.g., it was characterized input-output model in which students' test scores were measure of output, while, input factors include their family backgrounds, school infrastructures that ensures classroom healthy environment (i.e., class size, toilet facilities, proper and clean water supply and protective atmosphere), teacher and students' intrinsic abilities (i.e., their motivational level, and willingness to participate in teaching-learning process), (Rehman et al., 2013; Vlašić et al., 2013). On the other hand, gender equality, children wellbeing, and achieving international standards was declared by United Nations (2021). But 'international standards of education' was the term that needed further elaboration. Thus, various other reports were incorporated to understand quality of education such as: world bank report added students' attendance in schools, curricula, classroom environments, assessment system and teachers' qualifications as well (World Bank, 2018); it was declared as a triangular process which involves teachers, parents, and students in addition to having a good school curriculum (Chishti et al., 2011; Stronge et al., 2007).

The curricular factors in quality education were explained by (M. Dilshad & Iqbal, 2010; R. M. Dilshad, 2010) as content, teaching and learning processes, and classroom environment. Quality of content was signified by (Kaldi et al., 2011) as the sign of reliable knowledge and declared that it should be standard of current world order and system. According to him the content that focuses students and provides active learning facilities to the students. Other researchers asserted that student-centred curriculum provides basis of life-long learning and ultimately quality education (Aminbeidokhti et al., 2016; Awwad & Mashagba, 2014; Gustafsson & Nilsen, 2016; Haque et al., 2013).

Moreover, since the last couple of years, after the surge of pandemic COVID-19, and school closures, the responsibility of schools to keep children on right track was increased. A paradigm shift from physical to online classes, demanded the frequent use of ICT to keep up the pace with international standards. This situation was also challenging for the teachers as well who were not skilled or lacking ICT proficiency. Thus, the quality parameters in the current decades added the use of ICT and increased the importance of teacher's qualification and professional development (Espino-Díaz et al., 2020; OECD, 2020).

Thus, quality education can be summarised as a process that includes quality of teachers, backgrounds of learners, school infrastructures, and curricular elements such as classroom environment, and content delivery to students (i.e., teaching methods, teaching techniques, and educational technology).

In terms of aforementioned quality parameters for primary schools, a glimpse of Pakistani education system over Global Comparative Index (GCI) indicated some dissatisfying facts i.e., instead of taking pace with the developed countries, the number of qualified teachers and technology awareness Pakistan is yet far behind the other developing countries like including Sri Lanka, Bangladesh, Malaysia

and India (UNICEF, 2020). According to the data of 2018, 78% percent of primary school teachers are professionally trained while the global average of such teachers are 89.1% which a wide difference (PBS, 2019). That is why, Pakistan has failed to achieve the targets of second goal of MDGs by 2015 (Government of Pakistan, 2019).

Thus, there is a dire need to reconsider and review Pakistani education system on the international standards of quality education parameters especially on the teachers' professional development and technology-based and students centred curricula to develop healthy learning environment (Klaus Schwab, 2020).

### ***1.1.2 Teachers' professional development: an important part of quality of teachers.***

Quality of teachers as described earlier, is meant for the subject mastery and armed with necessary pedagogical skills to impart the subject matter effectively at all levels of education (Annetta et al., 2010; Gustafsson & Nilsen, 2016; Lumpe et al., 2012; Petrie & McGee, 2012). Although teachers have to master the necessary qualifications which are pre-requisite for that post, still to have pace with the changing demands of time, and technology, it is becomes essential for them to update their knowledge and skills (Sirait, 2016; Walker et al., 2013). As for example under current wave of pandemic, and transformation of educational system from traditional to online, it became very difficult for the teachers to manage online classes. Only those teachers could play an effective role who had acquaintance with the computer technology. This states importance of the continuous professional development.

Goldsmith et al. (2014) asserted teachers' professional development as part of quality indicators of teachers. According to them, teachers' educational background, personal characteristics, professional experiences, and uplifting their experiences by continuous professional development cumulatively take part in the quality indicators of teachers. They further elaborated the activities that might be included in the professional development of teachers and that range from the short training sessions to huge comprehensive programs. Cassim and Obono (2011) asserted that if teachers spend 30 to 1000 hours in activities and programs of quality professional development then it makes a very positive impact on overall education system in terms of students' achievement, as well as teachers' own career as well. Further literature indicated it as key component of successful school organization, and fruitful learning outcomes thus playing key role in enhancement of quality education (Elmore, 2004; Li et al., 2019; Lumpe et al., 2012; Robert, 2015).

Desimone and Long (2010) further elaborated teachers' professional development and aligned it with students' needs in their five-component model. They proposed that teachers' professional development should comprise enhanced design for students' learning; teachers' active participation during the session; aligning those activities with students' requirements; assimilation of life-long learning experiences, and collaborative work of teacher educators and trainers during the process. According to them, these key components or features are essential for inoculation of professional skills, knowledge, and attitudes among teachers that eventually lead to the desired outcomes of student learning.

The teachers' professional development was interpreted as a program integrated to the modern technology in SDGs. Thus, SDG-4 specifically addresses the importance of professional development programs for teachers such as ICT integration in teaching so a positive change can be brought to educational quality which will lead to student centred enhance student learning across the globe (Fullan, 2013; Li et al., 2019; Petrie & McGee, 2012). The study made by Joseph (2011) pointed out that the skilled teachers can be a major agent of technological change in the class. Therefore, teachers

are needed to be equipped with important assets of new era such as competency to integrate technology in lessons to facilitate new era pedagogies and thus learning.

### **1.1.3 Use of ICT: a vital ingredient of modern concept of Quality Education.**

As described under previous sections, ICT is repeatedly considered as a sign of increased productivity and quality in education (Noor-Ul-Amin, 2013; Working Group SDGs, 2015). Annetta et al. (2010) asserted that it could enhance educational quality by engaging students in learning process, imitating real-life experiences, and thus creating a viable and economic experiential learning environment. Voogt, Joke, and Mc Keeney (2008) described ICT as key element of transforming curricula from teacher-centred to student-centred. Ali et al. (2016) explained that the ICT engaged students in personalized learning environment according to their interests and experiences.

Researches indicated that student-centred approaches such as project-based learning incorporates process of finding solutions of problems, designing and conducting research processes, collecting information by observations and drawing conclusions based on those observations (Çakici & TÜRKMEN, 2013; Deignan, 2009; Kybartaitė, 2010; Prince & Felder, 2006; Wang & Duan, 2014). Thus they transform theoretical learning process to practical life-long outcomes (Masino & Niño-Zarazúa, 2015).

Education Audio-visual and Culture Executive Agency emphasized ICT integration in classrooms to promote innovative methods of teaching and project-based learning (Education Audio-visual and Culture Executive Agency, 2011). Further under critical stage of pandemic COVID-19, the repetition of lockdown during recurring waves of pandemic, has forced world education systems to adopt virtual alternatives of physical instruction. Thus, online teaching-learning and use of technology has become an unprecedented requirement of today (OECD, 2020).

Student centred is a teaching approach that is taken with an outcome-based perspective and is implemented as indicator of quality education, as well as new approach to learning and teaching process. In this new process effective support is provided to students along with guidance structures and curriculum that is more focused on learners and their perspectives.

Quality of outcomes is among major indicators of quality education and is primarily concerned with teachers' efficiency in using their teaching pedagogy and skills so they can bring out desired outcomes in students. These outcomes entail students' numeracy and literacy achievements, good physical and mental health, life skills, confidence level, community participation along with the outcomes that are expected from appropriate use of A.V. Aids and particular environment created by certain teaching method (Akram & Malik, 2012; Arslan & Zaman, 2014; Khan, 2012).

Primary education boosts up student's confidence, reading and communication skills, and it offers the skills to the students that are required to compete with the rest of the world. Skilled and educated human capital is needed for increased productivity, eradication of poverty and unemployment that leads to sustainable economic growth.

### **1.1.4 SLOs as measure of Quality Education.**

The student learning outcomes (SLOs) are the statements that set standards for the measurement of extent of learning objectives (i.e., cognitive, effective or psychomotor) at the end of educational program or learning experiences (Gilchrist et al., 2011).

They are considered as very helpful for the administration, students and other stakeholders to identify the effectiveness of a specific program under set quality criteria. Thus, are vital to better facilitate their students through continuous quality improvement program. The SLOs are used to set

appropriate benchmarks or standards for adequate, exemplary, and inadequate performance (Gilchrist et al., 2011; Michigan Department of Education, 2018).

Slotnik et al. (2013); and Donaldson (2012) declared SLOs as mark of teachers' effectiveness that enable teachers to become more focused and to prepare evidence-based reflective practices. Finally, positive correlations have been found between the quality of SLOs and student achievement.

Alluhaidan and Abu-Taieh (2020) quoted different researches and asserted that it is necessary for the SLOs are context-specific and for their effective generalizability and adaptability, they need to be amended according to the given situation (classrooms, schools, and regions).

Gilchrist et al. (2011) and Alluhaidan & Abu-Taieh (2020) further classified SLOs into two types i.e., course SLOs which are used to identify individual progress of a student with respect to his/her course contents, and program SLOs which are used to identify progress level of class as a result of entire learning experiences. In present study the program SLOs were focus of the quality measurement indicators. They further elaborated the means of assessment of SLOs into two categories. Direct assessment of students which may be made by their results, or other type of observation tools such as, tests, presentations, experiments, performance, projects, assignments, or portfolios etc. This is usually made for the assessment of content SLOs. While, the other type of assessment was indicated as indirect assessment, which is made by observations from other means such as interviews from either of stakeholders i.e., teachers or parents or students themselves e.g., quality measurement systems, surveys (faculty satisfaction surveys i.e., how much they are satisfied with their experiences -self reported), interviews. This is usually used to assess program SLOs. On the other hand, Michigan Department of Education (2018) elaborated four types of SLOs i.e., class-level SLOs that include all students in a particular class; course-level SLOs that include all students in a particular course; targeted SLOs that include a specific group or groups of students in a class or course, usually for the purpose of targeted skill development; and multi-course SLOs that include specific students throughout classes or grade levels. In the present study, program and multi-course SLOs were identified.

Standards to measure SLOs were presented as internal standards which are meant for the students' success to meet criteria set by teachers or at classroom level; external standards, which are meant for the students' success under the criteria set by university level; internal peer benchmarks, which are meant for the comparison among the students within a class; external peer benchmark, which are used to make comparison of students with others of same level, but from different institutes (Gilchrist et al., 2011). In the present study, external standards, and external benchmarks were used to identify the quality education.

## **1.2 Significance**

The study can be considered as significant for the literature, policy as well as practice i.e.,

### **1.2.1 For literature**

For literature, it is considered as useful because in Pakistani elementary schools, concept of quality education is rarely used and the SLOs are considered as important indicators of quality education. Further the SLOs observed in present study are program SLOs, for which it is not relied upon traditional method of measurement i.e., students' academic performance, rather the teachers' perception with the help of interviews was used to have in-depth and precise study of SLOs from their expert opinions.

The moderators used in the present study i.e., ICT use and teachers' professional development, expand the quality framework with the demands of current situations and paradigm shift from traditional classrooms to online classrooms, as well as towards the personalized learning environments.

### **1.2.2 For policies**

The study may provide new pedagogies to incorporate technology in classrooms and to ensure professional development among teachers as key element of quality education to meet SDG-4 i.e., "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all; substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries".

### **1.2.3 For practice**

For practice, the study may help the stakeholders to understand the effects of quality education on students learning and how the quality of education can more greatly impact on learning effectiveness through appropriate provision of communication technological advancement and effective teaching strategies and efficient teachers in class. Considering this, the current study is significant as it focuses on the importance of effective educational system in primary school of Pakistan.

## **1.3 Study objectives**

The objectives of the study were:

1. To find out the relationship between quality education and students' learning.
2. To investigate the moderating role of teachers' professional development in the relationship of quality education and students' learning.
3. To explore the moderating role of ICT in the relationship of quality education and students' learning.

## **1.4 Research questions**

The study will cater the following questions

1. What is the relationship between quality education and students' learning?
2. Does the teachers' professional development moderate the relationship of quality education and students' learning?
3. Does ICT moderate the relationship of quality education and students' learning?

## **1.5 Research Hypotheses**

Based on the above empirical evidences, following hypotheses were formulated:

- H 1 There is positive relationship between quality education and students' learning outcomes.
- H 2 The teachers' professional development significantly moderates the relationship of quality education and students' learning outcomes.
- H 3 Use of ICT significantly moderates the relationship of quality education and students' learning outcomes.

## **1.6 Conceptual Framework**

The conceptual framework of the study was taken from quality indicators set by Dakar framework for Action (Peters et al., 2016), and from significant model of quality education given by UNICEF (Benson, 2000), which state five dimensions i.e., quality of instructors, quality learning environments, quality content, quality processes, and quality outcomes (SLOs).

From their framework, quality of learning environment was meant for project-based learning as effective teaching method, quality content was meant for school curricula, quality process was meant for way of class organization, and use of ICT. While, the quality outcomes were the SLOs.

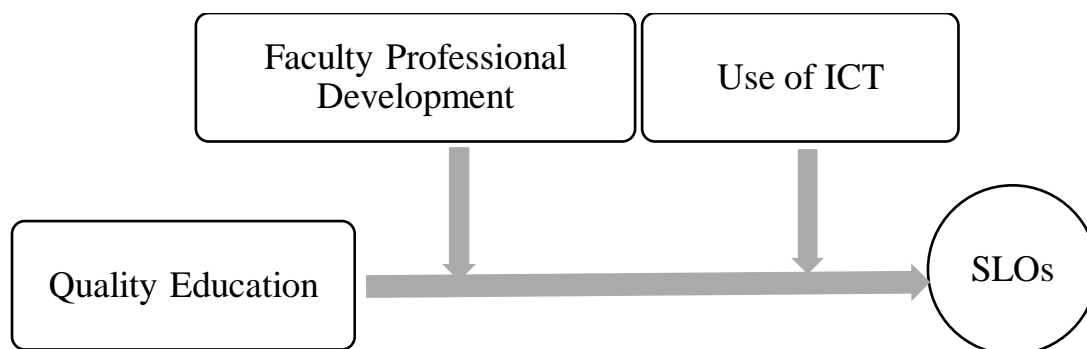


Figure 1: Conceptual Framework of the Study Showing Independent, Dependent, and Moderator Variables

## 2. Material and Methods

### 2.1. Study Design

The study was descriptive in nature. Where the effect of educational quality on students' learning under an existing theory was explored. The study was cross-sectional in which quantitative method was used for the data analysis, where relationship between faculty professional development and Students' Learning Outcomes was determined. While, the effect of ICT was used as the mediator between the relationship of aforementioned variables. Survey method was used for data collection.

### 2.2. Research Instrument

Questionnaire was used as research instrument. It comprised five different sections. First section included demographic factors used to determine instructors' quality were their age, income level, length of service experience, and the school where they were teaching. The second section was meant for measuring quality education. It included questions to measure three quality aspects i.e., quality of learning environment, quality of content, and quality of processes. The third section comprised of the questions to measure quality of outcomes by process SLOs. Four items in the questionnaire were determinant of process SLOs. The fourth section included questions for measuring level of faculty professional development. This section included four items to determine type and span of professional development. The fifth section included four items to determine the frequency and use of ICT in the instructional process.

All of the indicators of the quality education were adopted from Dakar framework for Action (Peters et al., 2016), and from significant model of quality education by UNICEF (Benson, 2000).

### 2.3. Population and Sampling

The study population comprised of all primary school students, the school principals, head teachers, and other teaching staff of Lahore. As, there was no source to explore total population estimates, so population of the study was considered as unknown. Sampling estimate for unknown population was made by following formula.

$$n = \frac{z^2 p (1 - p)}{e^2}$$

Where, the standard normal deviation set at 95% confidence level ( $z = 1.96$ ), a sample proportion of 50% ( $p = 0.5$ ) a margin of errors 5% ( $e = \pm 0.05$ ) (Mensah, 201). Thus, according to the formula it requires a sample of 384 or above for generalizability.

### 2.4. Data Analysis

Data analysis process included three steps i.e., determination of validity and reliability of the research instrument; and the use of Partial Least Squares (smart-PLS) approach to obtain Structure

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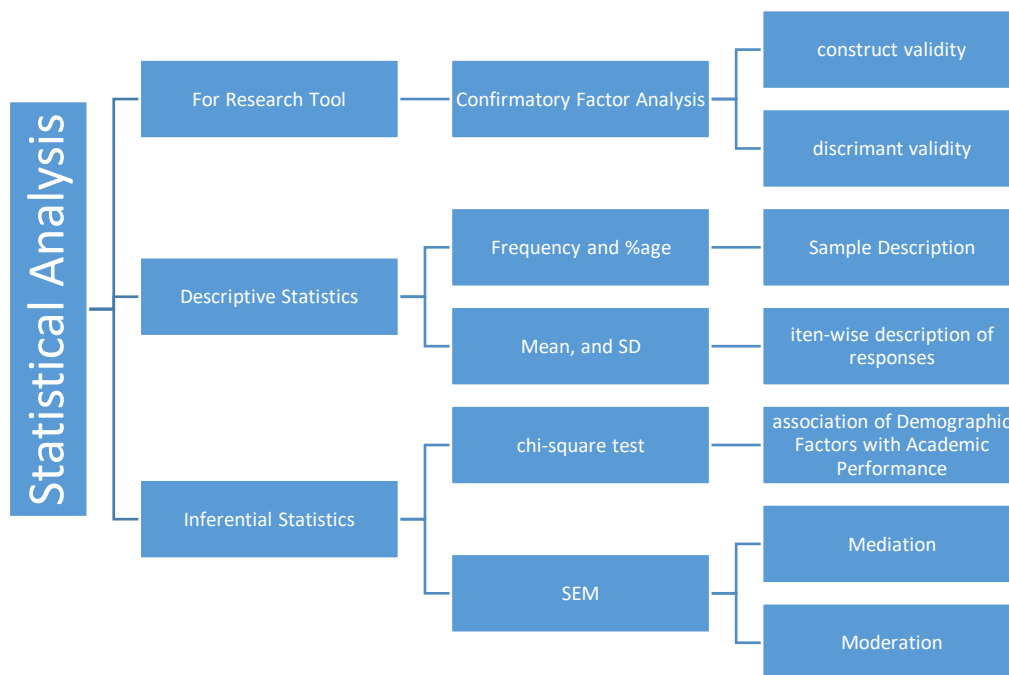
Equation Model (SEM) for hypotheses testing. The method is more sophisticated bilinear factor model than the other relationship packages as it bears relationships to principle components regressions in the form of linear regression model by projecting the predicted and observable variable to a new space.

Construct validity in current study was verified by factor loading scores. Factor loading values must be greater than 0.5 or significant at 95 percent confidence level. This ensures the validity by showing that whether the measures are highly correlated with each other. It was to check that the items included in the given research tool for one variable do not overlap with the other, and are highly correlated with each other. The items of educational quality, ICT use and professional development of teachers are unique in nature and do not overlap with each other.

Reliability was checked through Cronbach's alpha. Criteria was adopted from Hair et al. (2018) that acceptable reliability value should be greater than 0.60 (cut-off value).

PLS-SEM is a second-generational analytic technique, which is considered more efficient than conventional methods, where principal component analysis and regression analysis were run simultaneously, making it a preferred choice. The regression equation was generated to analyse the cause-and-effect relationship between educational quality and students' learning outcomes and with the moderating effects of ICT use and professional development of teachers in the relationship.

Path coefficients for the study were determined to examine the cause-and-effect relation between quality of education and students' learning outcomes with moderating roles on different paths.



**3. Results**

The analysis conducted and results extracted accordingly based on survey carried among the primary school teachers from Lahore, Punjab, Pakistan. Results of the study are described in incremental steps from analysis of tool to the complex determination of study model and hypotheses testing i.e., first three tables describe analysis regarding research tool (convergent and discriminant) validity and reliability of the research tool; the next three tables describe the demographic characteristics of the sample, moderation analysis of the data to describe relationships among the study variables. Here is given description of each.



**Table 1:** *Convergent Validity of the Research Tool*

Variables	Items	Factor Loading	T-value	p- value
Education Quality	H-1	0.616	26.142	0.000
	H-2	0.519	15.276	0.000
	H-3	0.639	10.659	0.000
	PBL-1	0.443	18.580	0.000
	PBL-2	0.581	8.548	0.000
	PBL-3	0.505	12.671	0.000
	QO-1	0.586	10.719	0.000
	QO-2	0.590	14.012	0.000
	QO-3	0.605	15.868	0.000
	SC-1	0.644	13.064	0.000
	SC-2	0.612	17.450	0.000
	SC-3	0.579	19.029	0.000
	TQ-1	0.675	19.514	0.000
TQ-2	0.641	18.711	0.000	
TQ-3	0.598	9.627	0.000	
Use of ICT	TI-1	0.729	21.240	0.000
	TI-2	0.698	18.408	0.000
	TI-3	0.755	22.235	0.000
	TI-4	0.620	11.565	0.000
Faculty Professional Development	TPD-1	0.685	14.068	0.000
	TPD-2	0.768	24.206	0.000
	TPD-1	0.596	11.591	0.000
	TPD-2	0.566	8.048	0.000
SLOs	SL-1	0.803	13.667	0.000
	SL-2	0.630	13.574	0.000
	SL-3	0.683	17.387	0.000
	SL-4	0.708	13.667	0.000

Under construct validity factor loading scores posit the relationships among the items of different constructs. It was found that absolute majority of items have validity score greater than 0.50. Items below than 0.40 should be removed if accounts for increase in AVE or Reliability. Results posits that all fifteen items of independent variable (education quality) are loaded significantly i.e., the scores range from 0.505 to 0.675 with t values > 1.96 and P value < 0.05. All four items of dependent variable (student learning) are loaded significantly, its scores range from 0.630 to 0.803 with t values > 1.96 and P value < 0.05.

On the other hand, four items of moderator (use of ICT) are loaded significantly, its scores range from 0.620 to 0.755 with t values > 1.96 and P value < 0.05. Similarly, four items of moderator (Teachers Professional Development) are loaded significantly, its scores range from 0.566 to 0.768 with t values > 1.96 and P value < 0.05.

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**Table 2: Discriminant Validity of the Research Tool**

	Education Quality	SLOs	Faculty Professional Development	Use of ICT
Education Quality	0.763			
Student Learning	0.586	0.709		
Faculty Professional Development	0.583	0.545	0.658	
Use of ICT	0.659	0.615	0.664	0.702

Discriminant validity refers to the degree to which items/questions of a construct are strongly correlated to its related items/questions. The table indicates that the discrimination all construct items is strong except that of Faculty Professional Development according to the criteria given by Hair et al. (2009).

**Table 3: Reliability of the Research Tool**

Variables	Items	$\alpha$	CR (Composite Reliability)
Education Quality	H-1	0.862	0.886
	H-2		
	H-3		
	PBL-1		
	PBL-2		
	PBL-3		
	QO-1		
	QO-2		
	QO-3		
	SC-1		
	SC-2		
	SC-3		
	TQ-1		
TQ-2			
TQ-3			
Use of ICT	TI-1	0.659	0.795
	TI-2		
	TI-3		
	TI-4		
Faculty Professional Development	TPD-1	0.675	0.751
	TPD-2		
	TPD-1		
	TPD-2		
SLOs (Student Learning Outcomes)	SL-1	0.669	0.800
	SL-2		
	SL-3		
	SL-4		

Reliability was found by Cronbach's alpha for all variables separately. It was found that independent variables education quality has Cronbach's alpha reliability value  $0.862 > 0.60$  with composite reliability

value 0.886. Dependent variables SLOs has Cronbach's alpha reliability value  $0.69 > 0.60$  with composite reliability value 0.800.

First moderator i.e., Faculty Professional Development has Cronbach's alpha reliability value  $0.675 > 0.60$  with composite reliability value 0.751. While, the second moderator i.e., use of ICT has Cronbach's alpha reliability value  $0.659 > 0.60$  with composite reliability value 0.795.

**Table 4:** Demographic Profile of Respondents

Variables	Characteristics	Frequency	Percentage
Gender	Male	237	(66.3%)
	Female	120	(33.6%)
Qualification	Graduation	54	(15.1%)
	Master/MS/M.Phil.	206	(57.7%)
	Ph.D.	13	(3.6%)
	Professional Certification	84	(23.5%)
Age	Below 30	67	(18.7%)
	31-45	177	(49.5%)
	46-60	99	(27.7%)
	Above 60	14	(3.9%)
Income level	Below Rs. 50,000	74	(20.7%)
	Rs. 50,001-Rs.80,000	169	(47.3%)
	Rs. 80,001-Rs.120,000	87	(24.3%)
	Above Rs. 120,000	27	(7.5%)
Length of experience	1-3 Years	61	(17.08%)
	4-6 Years	104	(29.1%)
	7-10 Years	101	(28.2%)
	11-15 Years	57	(15.9 %)
	16-20 Years	25	(7.0%)
	20+ Years	9	(2.52%)
School	Public	201	(56.3%)
	Private	156	(43.6%)

The table depicts the population segregated into the demographics of gender, income level, experience, qualification, age and organizational attachment in terms of public or private sector. The demographic variables included in the present study were considered to determine teachers' professional profile and the sector in which they were working.

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**Table 5: Descriptive Statistics**

Variables	Items	Mean (M)	Standard Deviation (SD)
Education Quality	Healthy environment-1	3.075	0.040
	H-2	2.580	0.049
	H-3	3.195	0.034
	Project Based Learning-1	2.215	0.052
	PBL-2	2.885	0.046
	PBL-3	2.530	0.047
	Quality Outcomes-1	2.915	0.042
	QO-2	2.955	0.037
	QO-3	3.005	0.046
	Student Centered-1	3.210	0.037
	SC-2	3.060	0.032
	SC-3	2.880	0.045
	Teaching Quality-1	3.365	0.035
	TQ-2	3.195	0.034
TQ-3	2.470	0.052	
SLOs	SL-1	4.010	0.020
	SL-2	3.155	0.046
	SL-3	3.400	0.050
	SL-4	3.520	0.041
Use of ICT	TI-1	3.635	0.034
	TI-2	3.480	0.038
	TI-3	3.770	0.034
	TI-4	3.090	0.054
Faculty Professional Development	TPD-1	3.420	0.049
	TPD-2	3.830	0.032
	TPD-3	2.970	0.051
	TPD-4	2.800	0.070

Mean values report mixed results but most of the mean values are greater than average value. Regarding quality education, it was found that PBL-1 has least mean score 2.215 and SC-1 had highest mean value 3. While, it was found that SL-1 had least mean score 3.155 and SL-4 had highest mean value 4.010 to the dependent variable student Learning.

To the moderator teacher's Professional Development, it was found that TPD-1 had least mean score 2.800 and TPD-4 had highest mean value 3.830 to the teacher's Professional Development.

Similarly, to the moderator use of ICT, it was found that TI-4 had least mean score 3.090 and TI-3 had highest mean value 3.770 to the ICT use.

**Table 6: Path Coefficients**

Structural Path	$\beta$	t	p	Hypotheses	$R^2$	Adj. $R^2$
Education Quality	0.588	13.232	0.000	Supported		
Moderating Effect 1	0.196	5.052	0.000	Supported	0.630	0.624
Moderating Effect 2	0.139	3.377	0.001	Supported		

The table indicates that education quality has significant impact on students learning outcomes with coefficient value = (0.588), t value 13.232 > 1.96 and p value 0.000 < 0.05. It is therefore, H1 is supported that posits “There is positive relationship between quality education and students’ learning outcomes”.

On the other hand, moderator 1 (Teachers Professional Development) significantly positively moderates relationship between education quality and student learning with coefficient value = (0.196), t value 5.052 > 1.96 and p value 0.000 < 0.05 however, H2 is supported that posits “Teacher’s Professional Development significantly moderates relationship between Quality of Education and Students Learning outcomes”.

While, the moderator 2 (use of ICT) significantly positively moderates relationship between education quality and student learning with coefficient value = (0.139), t value 3.377 > 1.96 and p value 0.001 < 0.05 however, H3 is supported that posits “Use of ICT significantly moderates the relationship of quality education and students’ learning”.

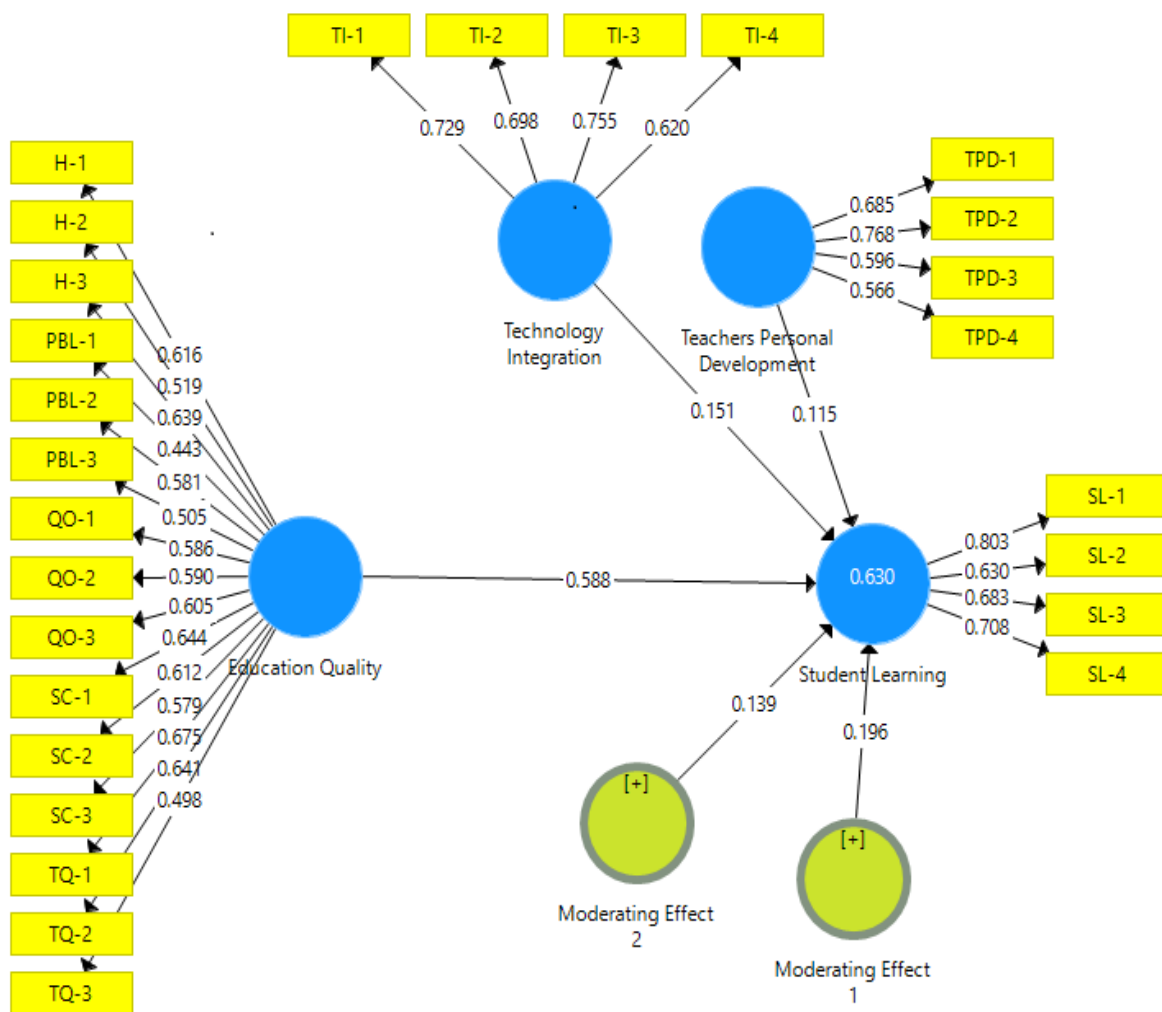


Figure 2: SEM-Model-Path Coefficients

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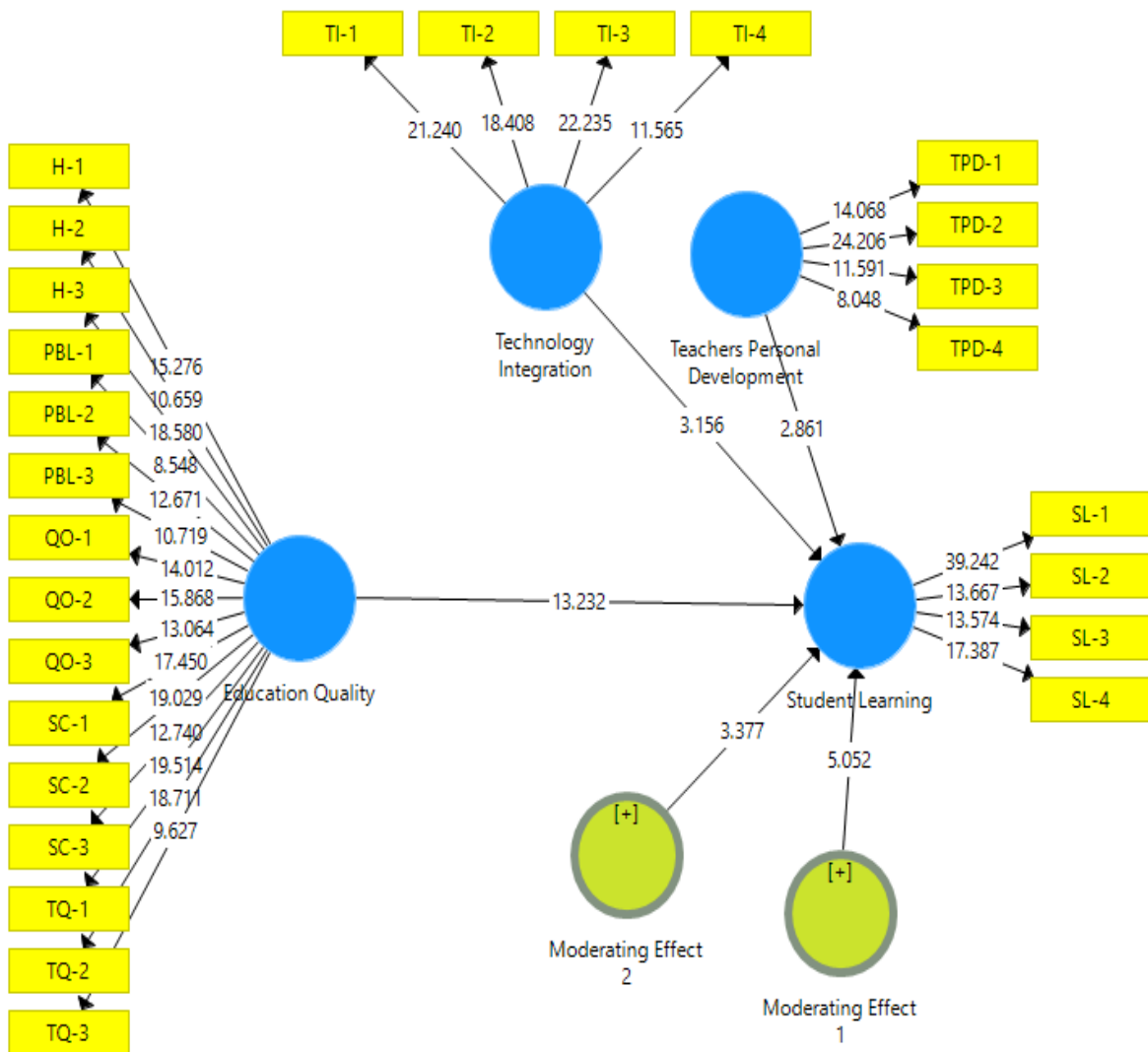


Figure 3:SEM-Model-Path Bootstrapping

4. Discussion

4.1. Relationship of Quality of Education and Student Learning Outcomes (SLOs)

Results of the study revealed that quality of education has significant and positive impact on the student learning in the primary schools of Lahore. This implies that all the determinants of quality of education i.e., project-based learning, child centered, quality outcomes, health and safe environment, and quality teaching, have significant and positive impact on the student learning.

4.2 Moderating Role of Faculty Professional Development in Relationship of Quality of Education and Student Learning Outcomes (SLOs)

From the results of the study, it has been deduced that the Professional Development of a teacher successfully and significantly moderates the relationship between quality of education and student learning. Research participants of the study pertaining to the constructs of teacher's Professional Development agreed to that; new courses improve teaching, in-service training is provided to the teachers, and teachers of primary schools are professionally equipped. As a result of teacher's

professional development, the quality of education and student learning is further improved. This result implies that the professional development of teachers significantly influences the project-based learning, child centered, quality outcomes, health and safe environment, and quality teaching which further influences student learning in the primary schools of Lahore.

#### **4.3 Moderating Role of use of ICT in Relationship of Quality of Education and Student Learning (SLOs)**

Findings of the study related to the moderating role of use of ICT indicated that it is significantly moderates the relationship of quality education and students' learning outcomes.

This result implies that participants of the research study agreed to that; audio and visual aids are available in the primary schools and teachers of the primary schools in Lahore are well-trained to use audio and visual aids. Such agreeableness of research participants proves that provision of communication technological advancement in the school and the ability of teachers to use technology significantly affects project-based learning, child centered, quality outcomes, health and safe environment, and quality teaching which further leads towards better student learning. The major problem of using information communication technology is to establish choices on prospects of technologies instead of educational needs. As the effectiveness of educational information communication technologies relies on their purpose of use and how they are used. Moreover, the use of information communication technology is different depending on its affordability, availability, and access.

#### **5. Conclusion**

From the results of the study, it is concluded that quality of education has significant and positive impact on SLOs, while, the faculty professional development as well as ICT successfully moderate the relationship of quality of education and SLOs. Moreover, out of various determinants of quality education i.e., quality of learning environment, quality of content, and quality of processes, it was observed that current study analysed various determinants of quality of educations i.e., project-based learning, student centred, quality outcomes, healthy and safe environment, and quality teaching.

The first objective of the study was to find out the relationship between quality education and students' learning outcomes. The results indicated significant association between quality education and SLOs.

The second objective of the study was to investigate the moderating role of teachers' professional development in the relationship of quality education and students' learning. The results indicated that teacher's professional development significantly moderates between the quality education and SLOs.

The third objective of the study was to explore the moderating role of ICT in the relationship of quality education and students' learning. It was found that ICT significantly moderates the relationship of quality education and SLOs.

Thus, conclusively it can be stated that:

1. Quality of education has significant positive impact on students' learning,
2. The faculty professional development has significant moderating role over the quality education and students' learning.
3. Use of ICT by teachers at school level increases significantly the impact of quality education and students learning.

#### **4. Policy Implications**

The policy makers since the independence of Pakistan have tried their best to provide quality education to its masses but there is need for more to be done, as quality of education is not concrete

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overall in the country and as the study suggest is dependent on various factors such as student centred, project-based learning, healthy and safe environment, quality outcomes, and quality teaching. Therefore, this is realized that if one of these factors is missing the quality of education cannot be achieved. Policy makers should make sure to make the training and development programs for faculty compulsory which is investment in teachers. As professional training and development programs for teachers will help them in; delivering lecture according to the standards, fair evaluation of students, how to interact with students, and how to advise students. The second most important factor to be considered by policy makers is the infrastructure of the primary schools. It must be made compulsory for primary schools to have reasonable class sizes, hygienic food, clean and sufficient water supply, good toilet facility. These factors could affect the student learning depending on the scenario, for instance if classroom size is not sufficient to accommodate students it will affect the whole performance of class negatively.

Policy makers should also consider the inclusion of project-based activity in the curriculum as the study has shown that project-based activities in the primary schools have increase their motivation for learning, academic achievements, collaborative skills, communication skills, problem solving skills, and creative skills. Moreover, policy makers should not miss out the inclusion of information communication technology as it has been proved that the availability and use of information communication technology i.e., audio, and visual aids in the classrooms is helping students to learn more efficiently and effectively. Therefore, applying technology to the curriculum to improve both the teaching process and learning process compulsory. Again, for the use of such technology faculty should be trained enough to make their students learn. The affordability and use of information technology communication is not an easy task in the primary education level, although it plays important role in education by evolving the process of teaching and learning. Various significant challenges such as environmental challenges, cultural challenges, and educational challenges that emerges while integrating the use of information technology communication in education which are faced by policy makers, students, and administrators. Therefore, primary education sector is always in need of the support from government and policy makers to make the integration of information communication technology a successful process.

Moreover, policy makers should keep all these grey areas in mind and give full attention and concentration while working on curriculum, preparing textbooks for the primary education sector. And the purpose of policy should not only focus on increasing literacy but primarily to focus on maintaining quality as well.

### 5. Limitations and Future Directions

This research study is carried out in the context of primary schools in Lahore; therefore, results of the study can only be generalized to the population of Lahore. This implies that results based on the population of Lahore cannot be applied to other cities and other educational sectors i.e., secondary education and tertiary education. First, research studies in future can broaden the scope of this research study by analysing the impact of quality of education on student learning in primary schools of rural areas in Pakistan or various other cities, or the entire country, considering the financial and time constrains. Second, various education sectors i.e., secondary, higher, or all three educational levels can also be studied to widen the scope of the study and to get results on a higher level. The current research study is limited to one dependent and one independent variable. Therefore, research scholars in future can incorporate other variables such as government and foreign aids, political instability, among other to observe a different side regarding the learning of students in the country.



## References

- Akram, S., & Malik, K. (2012). *Use of audio visual aids for effective teaching of biology at secondary schools level*. 50, 10597-10605.
- Ali, F., Yuan, Z., Husnain, K., Nair, P. K., & Ragavan, N. A. (2016). Does Higher Education Service Quality Effect Student Satisfaction, Image and Loyalty? A Study of International Students in Malaysian Public Universities. *Quality Assurance in Education: An International Perspective*, 24(1), 70-94. <https://eric.ed.gov/?id=EJ1087392>
- Alluhaidan, A., & Abu-Taieh, E. M. (2020). Student Learning Outcomes (SLOs) and Assessment of Cybersecurity Body of Knowledge (BOK): Evaluation & Challenges. *International Education Studies*, 13(5), 13. <https://doi.org/10.5539/ies.v13n5p13>
- Aminbeidokhti, A., Jamshidi, L., & Mohammadi Hoseini, A. (2016). The effect of the total quality management on organizational innovation in higher education mediated by organizational learning. *Studies in Higher Education*, 41(7), 1153-1166. <https://doi.org/10.1080/03075079.2014.966667>
- Annetta, L. A., Cheng, M., & Holmes, S. (2010). Assessing twenty-first century skills through a teacher created video game for high school biology students. *Research in Science & Technological Education*, 28(2), 101-114. <https://doi.org/10.1080/02635141003748358>
- Arslan, M., & Zaman, R. (2014). *Impact of TQM on Teacher's Motivation: Evidence from Pakistan*. 4(11), 113-121. <http://ssrn.com/abstract=2532273>
- Awwad, I., & Mashagba, S. (2014). The Impact Of Total Quality Management ( TQM ) On The Efficiency Of Academic Performance - Empirical Study - The Higher Education Sector - The University Of Jordan. *International Journal of Scientific & Technology Research*, 3(4), 358-364. <http://www.ijstr.org/final-print/apr2014/The-Impact-Of-Total-Quality-Management-tqm-On-The-Efficiency-Of-Academic-Performance-Empirical-Study-The-Higher-Education-Sector-The-University-Of-Jordan.pdf>
- Benson, R. E. (2000). Defining Equality in Education. In *Educational Studies* (Education Working Paper Series). [https://doi.org/10.1207/s15326993es0802\\_3](https://doi.org/10.1207/s15326993es0802_3)
- Brigitte Baptiste, B. M.-L. (2015). *Review of Targets for the Sustainable Development Goals: The Science Perspective*. <https://doi.org/978-0-930357-97-9>
- Çakici, Y., & TÜRKMEN, N. (2013). An Investigation of the Effect of Project-Based Learning Approach on Children's Achievement and Attitude in Science. *The Online Journal of Science and Technology*, 3(2), 9-17.
- Cassim, K. M., & Obono, S. D. E. (2011). On the Factors Affecting the Adoption of ICT for the Teaching of Word Problems. *Lecture Notes in Engineering and Computer Science*, 2193(1), 269-276.
- Chishti, S., Tahirkheli, S. A., Raja, S. A., & Khan, S. B. (2011). Quality School Education in Pakistan : Challenges, Success and Strategies. *International Journal of Academic Research*, 3(2), 972-977. [https://www.researchgate.net/publication/258047276\\_QUALITY\\_SCHOOL\\_EDUCATION\\_IN\\_PAKISTAN\\_CHALLENGES\\_SUCCESSES\\_AND\\_STRATEGIES/link/02e7e526bf1705424600000/download](https://www.researchgate.net/publication/258047276_QUALITY_SCHOOL_EDUCATION_IN_PAKISTAN_CHALLENGES_SUCCESSES_AND_STRATEGIES/link/02e7e526bf1705424600000/download)
- Deignan, T. (2009). Enquiry-Based Learning: perspectives on practice. *Teaching in Higher Education*, 14(1), 13-28. <https://doi.org/10.1080/13562510802602467>
- Desimone, L. M., & Long, D. (2010). Teacher Effects and the Achievement Gap : Do Teacher and Teaching Quality Influence the Achievement Gap Between Black and White and High- and Low-SES Students in the Early Grades? *Teachers College Record*, 112(12), 3024-3073. [https://www.gse.upenn.edu/pdf/desimone/ECLS\\_TCR.pdf](https://www.gse.upenn.edu/pdf/desimone/ECLS_TCR.pdf)
- Dilshad, M., & Iqbal, H. M. (2010). Quality Indicators in Teacher Education Programmes. *Pakistan Journal of Social Sciences*, 30(2), 401-411. [http://www.bzu.edu.pk/PJSS/Vol30No22010/Final\\_PJSS-30-2-16.pdf](http://www.bzu.edu.pk/PJSS/Vol30No22010/Final_PJSS-30-2-16.pdf)
- Dilshad, R. M. (2010). Assessing Quality of Teacher Education : A Student Perspective. *Pakistan Journal of Social Sciences*, 30(1), 85-97.
- Donaldson, M. L. (2012). *Teachers' Perspectives on Evaluation Reform*. <https://doi.org/10.1080/08878730.2017.1391362>
- Donoghue, H. E. D., States, M., & Representatives, A. P. (2015). *2030 Sustainable Development Agenda*. August. <https://doi.org/10.1017/CBO9781107415324.004>

## Faculty Professional Development and Use of ICT as Moderators between Quality of Education and SLO's of Primary School Students

- Elmore, R. F. (2004). School Reform from the Inside Out: Policy, Practice, and Performance. *Laws, Policies, & Programs: No Child Left Behind Act 2001*, 284. <https://eric.ed.gov/?id=ED568807>
- Espino-Díaz, L., Fernandez-Caminero, G., Hernandez-Lloret, C. M., Gonzalez-Gonzalez, H., & Alvarez-Castillo, J. L. (2020). Analyzing the impact of COVID-19 on education professionals. Toward a paradigm shift: ICT and neuroeducation as a binomial of action. *Sustainability (Switzerland)*, 12(14), 1-10. <https://doi.org/10.3390/su12145646>
- Fullan, M. (2013). *Stratisphere: Integrating Technology, Pedagogy, and Change Knowledge* (1st ed.). PEARSON.
- Gilchrist, Goldstein, P. J., & Bays. (2011). *Student Learning Outcomes: Integrated Assessment of Student Learning* (4.0; pp. 1-5). <https://doi.org/10.4324/9781315043272-15>
- Goldsmith, L., Lewis, C., Goldsmith, L. T., Doerr, H. M., & Lewis, C. C. (2014). Mathematics teachers' learning: A conceptual framework and synthesis of research. *Journal of Mathematics Teacher Education*, 17(1), 5-36. <https://doi.org/10.1007/s10857-013-9245-4>
- Government of Pakistan. (2019). *Pakistan's Implementation of the 2030 Agenda for Sustainable Development: Voluntary National Review*.
- Gustafsson, J.-E., & Nilsen, T. (2016). The Impact of School Climate and Teacher Quality on Mathematics Achievement: A Difference-in-Differences Approach. In *Teacher Quality, Instructional Quality and Student Outcomes* (pp. 81-95). Pearson Education, Inc. 308338799\_The\_Impact\_of\_School\_Climate\_and\_Teacher\_Quality\_on\_Mathematics\_Achievement\_A\_Difference
- Hair, J. F., Babin, B. J., Anderson, R. E., & Black, W. C. (2018). *Multivariate Data Analysis* (8th ed.). Pearson.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate Data Analysis* (7th ed.). Pearson.
- Haque, A., Sarwar, A., & Yasmin, F. (2013). Teachers' Perception towards Total Quality Management Practices in Malaysian Higher Learning Institutions. *Creative Education*, 4(9), 35-40. <https://doi.org/10.4236/ce.2013.49B008>
- Joseph, B. (2011). Resources for Teaching Secondary School Biology In Bayelsa State of Nigeria. *Information and Knowledge Management*, 1(2), 28-36.
- Kaldi, S., Filippatou, D., & Govaris, C. (2011). Project-based learning in primary schools: effects on pupils' learning and attitudes. *International Journal of Primary, Elementary and Early Years Education*, 39(1), 3-13. <https://www.tandfonline.com/doi/abs/10.1080/03004270903179538?journalCode=rett20>
- Khan, Z. (2012). The Factors Affecting the Students' Academic Performance: A Case Study of University of Malakand, Pakistan. *City University Research Journal*, 03(1), 11-14.
- Klaus Schwab. (2020). The Global Competitiveness Report 2019. In *World Economic Forum*. [http://www3.weforum.org/docs/WEF\\_TheGlobalCompetitivenessReport2019.pdf](http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf)
- Kybartaitė, A. (2010). *Faculty of Science and Environmental Engineering Impact of Modern Educational Technologies on Learning Outcomes: Application for E-Learning in Biomedical* (Issue June). <http://www.evica.eu/outcomes/kybartai/thesis-1.pdf>
- Li, S., Yamaguchi, S., Sukhbaatar, J., & Takada, J. (2019). The Influence of Teachers' Professional Development Activities on the Factors Promoting ICT Integration in Primary Schools in Mongolia. *Education Sciences*, 9(1), 1-18. <https://files.eric.ed.gov/fulltext/EJ1220372.pdf>
- Lumpe, A., Czerniak, C., Haney, J., & Beltyukova, S. (2012). Beliefs about Teaching Science: The relationship between elementary teachers' participation in professional development and student achievement. *International Journal of Science Education*, 34(2), 153-166. <https://doi.org/10.1080/09500693.2010.551222>
- Masino, S., & Niño-Zarazúa, M. (2015). *What Works to Improve the Quality of Student Learning in Developing Countries?* (No. 033; UNU-WIDER Project).
- Michigan Department of Education. (2018). *Measuring Student Growth: An Introduction to Student Learning Objectives* (Issue August, pp. 1-3). Michigan Department of Education.
- Noor-Ul-Amin, S. (2013). An Effective use of ICT for Education and Learning by Drawing on Worldwide Knowledge, Research, and Experience: ICT as a Change Agent for Education. *Department Of Education*

*University of Kashmir*, 1(1), 1–13.

- OECD. (2020). *Strengthening online learning when schools are closed - The role of families and teachers in supporting students during the COVID-19 crisis*. [https://read.oecd-ilibrary.org/view/?ref=136\\_136615-o13x4bkowa&title=Strengthening-online-learning-when-schools-are-closed](https://read.oecd-ilibrary.org/view/?ref=136_136615-o13x4bkowa&title=Strengthening-online-learning-when-schools-are-closed)
- Osborn, D., Cutter, A., & Ullah, F. (2015). Universal Sustainable Development Goals: Understanding the transformational challenge for developed countries. *Universal Sustainable Development Goals*, May, 1–24. <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=1684&menu=35>
- PBS. (2019). *Pakistan Statistical Year Book 2018*. Government of Pakistan, Ministry of Planning Development & Special Initiatives, Pakistan Bureau of Statistics. <https://www.pbs.gov.pk/>
- Peters, J., Wills, G., Peters, J., Wills, G., Owlia, M. S., Aspinwall, E. M., Coffman, J., Iqbal, M. Z., Irfan, M., Scholar, A. P., Clark, M., Moreland, N., Da Dalt, L., Callegaro, S., Mazzi, A., Scipioni, A., Lago, P., Chiozza, M. L., Zacchello, F., ... Crawford, L. E. D. (2016). Educational accreditation through ISO 9000. *Quality Assurance in Education*, 4(2), 1–15. <https://doi.org/10.3109/01421590903199734>
- Petrie, K., & McGee, C. (2012). Teacher professional development: Who is the learner? *Australian Journal of Teacher Education*, 37(2), 58–72. <https://doi.org/10.14221/ajte.2012v37n2.7>
- Prince, M., & Felder, R. (2006). Inductive teaching and learning methods: definitions, comparisons, and research bases. *Journal of Engineering Education*, 95(2), 123–138. <https://doi.org/10.1002/j.2168-9830.2006.tb00884.x>
- Rehman, S., Sayyed, G., Shah, F., & Ullah, I. (2013). Status of Quality Indicators in Boys and Girls Primary Schools of Khyber Pakhtunkhwa, Pakistan. *Journal of Elementary Education*, 24(2), 51–63.
- Robert, B. (2015). Differences? Similarities? Male teacher, female teacher: An instrumental case study of teaching in a Head Start classroom. *Teaching and Teacher Education*, 47. [https://www.researchgate.net/publication/269936855\\_Differences\\_Similarities\\_Male\\_teacher\\_female\\_teacher\\_An\\_instrumental\\_case\\_study\\_of\\_teaching\\_in\\_a\\_Head\\_Start\\_classroom](https://www.researchgate.net/publication/269936855_Differences_Similarities_Male_teacher_female_teacher_An_instrumental_case_study_of_teaching_in_a_Head_Start_classroom)
- Sirait, S. (2016). Does Teacher Quality Affect Student Achievement? An Empirical Study in Indonesia. *Journal of Education and Practice*, 7(27), 34–41. [www.iiste.org](http://www.iiste.org)
- Slotnik, W. J., Smith, M. D., & Liang, G. (2013). *Focus on Rhode Island: Student Learning Objectives and Evaluation*. <http://www.ctacusa.com/wp-content/uploads/2013/11/FocusOnRhodeIsland.pdf>
- Stronge, J. H., Ward, T. J., Tucker, P. D., & Hindman, J. L. (2007). What is the Relationship Between Teacher Quality and Student Achievement? An Exploratory Study. *Journal of Personnel Evaluation in Education*, 20(1), 165–184. <https://link.springer.com/article/10.1007/s11092-008-9053-z>
- UNICEF. (2020). *Pakistan Annual Report 2020*.
- United Nations. (2015). Transforming our world: The 2030 agenda for sustainable development. In <https://sustainabledevelopment.un.org/content/documents/7891Transforming%20Our%20World.pdf>. <https://doi.org/10.1007/s13398-014-0173-7.2>
- United Nations. (2021). *Sustainable Development Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*. <https://sdgs.un.org/goals/goal4>
- Vlašić, S., Vale, S., & Križman, D. (2013). Quality Management in Education. *Interdisciplinary Management Research* V, 565–573.
- Voogt, Joke; Mc Keeney, S. (2008). Using ICT to foster pre reading and writing skills in young children. *Computers in the Schools*, 23(February 2015), 440–452. <https://doi.org/10.1300/J025v24n03>
- Walker, R., Voce, J., & Jenkins, M. (2013). Charting the development of technology-enhanced learning developments across the UK higher education sector: a longitudinal perspective (2001–2012). *Interactive Learning Environments*, 0(0), 1–18. <https://doi.org/10.1080/10494820.2013.867888>
- Wang, J., & Duan, Y. (2014). Conducting Web-based Formative Assessment Reform for ODL Students: A Case Study. *Journal of Language Teaching and Research*, 5(3), 654–662. <https://doi.org/10.4304/jltr.5.3.654-662>
- Working Group SDGs. (2015). Sustainable Development Goals and targets. In *United Nations*.
- World Bank. (2018). *Ending Learning Poverty: What Will It Take?* <https://doi.org/10.1089/pho.2018.4550>