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Policy Brief

MODERNIZING DIGITAL INCLUSIVE EDUCATION FOR HEARING-IMPAIRED LEARNERS: EMPOWERING STUDENTS WITH ENTREPRENEURIAL AND FUTURE READY SKILLS IN PAKISTAN

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INTRODUCTION

In Pakistan, the "socio-economic challenges faced by hearing-impaired individuals are enormous. Educated individuals are often not employed due to an inability to communicate. The education of hearing-impaired students is a challenge, especially in underprivileged areas such as Southern Punjab. These areas lack resources and innovative teaching techniques. Using PBS district total, Southern Punjab with a population of around 34.7 million, increasing to 40.38 million in represents a substantial portion of the province. In Pakistan special education sector enrolled students consists of different disabilities that is slow learners (8%), mentally challenged (20%), physically disabled (6%), blind (8%) and major figure 58% to deaf & hearing impaired. To serve this population, there are a total of 56 Special Education schools available in different districts in this region and their distribution is as follows: Multan (31) and Bahawalpur (25). Despite these services, where the largest population of special education students are enrolled, improving the performance of HI schools is not only an educational challenge but also a governance, equity, and human development issue.

To tackle these problems, this research is going to study on how Entrepreneurial Education and Total Quality Management could contribute in improving school performance of hearing-impaired students. Entrepreneurial education can help by developing entrepreneurial mindset with skills and knowledge, independency, critical thinking, creativity, problem solving and other skills base traits of successful entrepreneur, so that they can become the job creator not the job seeker while TQM provides a management philosophy for achieving continuous improvement along with quality assurance system through QEC-Lite Model, digital assistive Labs, digital curriculum, entrepreneurial learning index, DISC index, supportive leadership commitment, KPIs, PDCI audits, device maintenance protocols, sign language certificates, dashboards linking outcome to KPI) that enhance teaching and administrative processes that lead to better performance in learning.

Internationally, quality assurance in education has often relied on formal models such as ISO standards, EFQM, or Baldrige frameworks. Although these models emphasize efficiency, accountability, and continuous improvement, they are largely designed for well-resourced systems

and may not fully capture the human and contextual realities of special education in developing countries. In Pakistan, particularly in HI schools, school quality is shaped not only by management systems but also by teacher satisfaction, digital inclusive school climate, family support, assistive infrastructure, and broader socio-economic conditions. Ignoring these contextual factors limits the effectiveness of policy interventions and weakens implementation at the school level.

Therefore, this study needs to be explored how entrepreneurial education, total quality management, digital inclusive school climate and teacher job satisfaction interact with contextual factors such as socio-economic status, government assistance, assistive technology infrastructure, and family support to influence overall school quality. Rather than viewing quality as a single outcome, this approach treats it as a system shaped by governance structure, human behavior, and resource environments.

This research is beyond the education sector. Hearing Impaired students who leave school without adequate skill, more likely face exclusion from labour market and places additional pressure on social protection system and undermines provincial efforts toward inclusive economic growth. Institutions such as TEVTA, PVTC, and PSDF, which are responsible for skills development and workforce readiness in Punjab, therefore have a direct stake in the quality of schooling received by hearing-impaired learners. This policy brief aims to advise decision-makers on how to reinforce existing policies through evidence-based, people-centered changes by tying school performance to public policy targets such as access, quality, and governance. The results seek to promote a change from symbolic inclusion to measurable and sustainable in the scholastic and life outcomes of Punjab's hearing-impaired students.

RESEARCH METHODOLOGY

This research utilized a mixed-methods approach combining quantitative (survey methodology) and qualitative research techniques to provide a comprehensive understanding of how Entrepreneurial education and Total Quality Management (TQM) influence school performance for hearing-impaired students. The design was chosen to capture the relationships between key variables, including the mediating roles of digital inclusive school climate and teachers job satisfaction. A cross-sectional study approach was used to record participants' perception at one moment.

Primary data were collected through structured questionnaire was developed to collect data on entrepreneurial education practices, TQM implementation, digital inclusive school climate, teachers job satisfaction, and quality school assesment. Standardized scales, such as the Total Quality Management Scale (TQM), Digital Inclusive School Climate Survey (DISC adapted) and Job Satisfaction Survey (JSS) and Quality School assesment was adapted globally from World Bank for this study. To test this instrument first Pilot Test was conducted. For qualitative analysis, semi-structured interviews with school administrators was conducted to explore their perspectives on

the impact of entrepreneurial education and Total Quality Management (TQM) on school performance.

Data was collected through proportional stratified random sampling approach to select the participant recommended to ensure representation of both male and female teachers across the selected schools. There are three ways to determine sample size using Krejcie & Morgan table, Slovins formula, Yamane formula and one is Cochrans sample size but it is used when population is greater than 10,000. Data from the questionnaires was analyzed using SPSS to measure demographic part and Structural Equation Modeling (SEM) to assess the relationships between entrepreneurial education, TQM, digital inclusive school climate, job satisfaction, and quality school assesment. Mediation analysis was conducted to test the indirect effects of digital inclusive school climate and teachers job satisfaction on quality school assesment. Data from interviews was analysed using thematic analysis (ATLAS. ti) to identify recurring themes related to entrepreneurial education, TQM practices, and their perceived impact on school performance.

FINDINGS AND DISCUSSION

Structural Model Analysis"

This study examines the "relationships between hypotheses by exploring the links between exogenous (independent) and endogenous (dependent) variables within the structural model. Through analysis and testing, researchers can determine whether the proposed hypotheses hold or need to be rejected based on the identified relationships".

Figure 2. Structure Model

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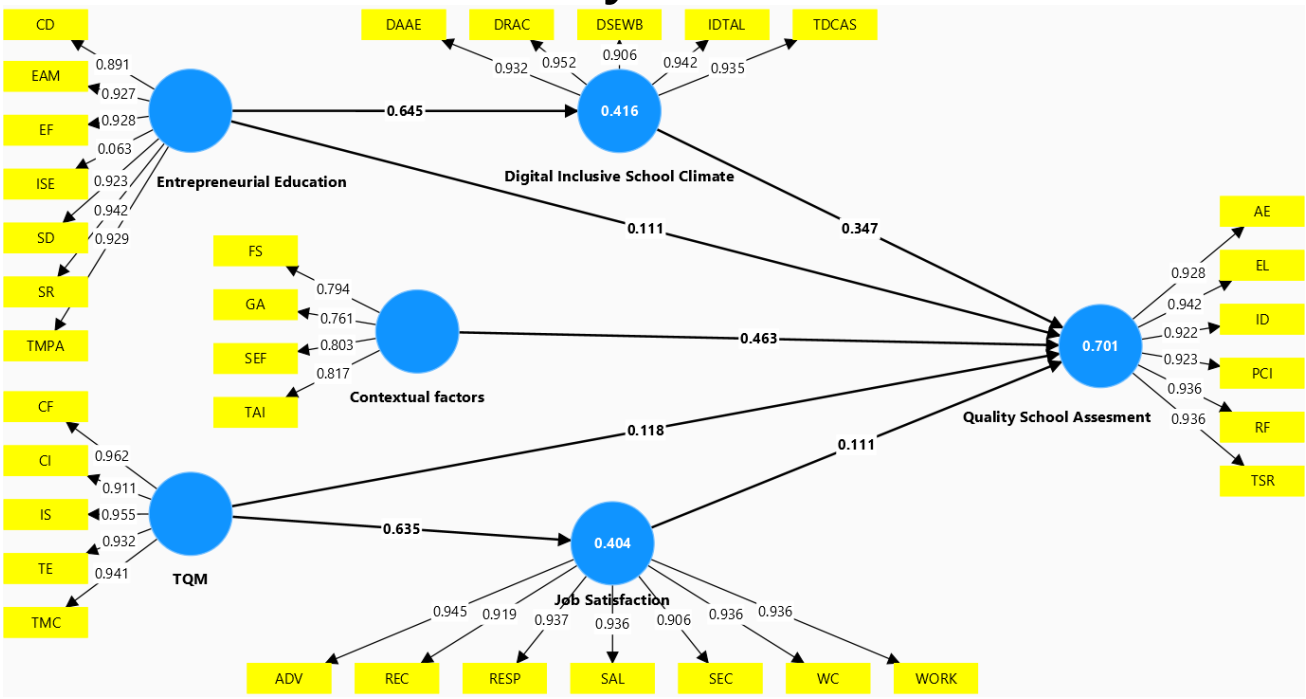

Source: Authors' compilations using SmartPLS.

Table 1. Results of Bootstrapping Test

Hypothesis	Original sample (O)	SE	"T-statistics t = (O/SE)"	p- value	Decision
CF →QSA	0.463	0.0473	9.781	0.000	Accepted
DISC →QSA	0.347	0.0473	7.332	0.000	Accepted
EE →DICS	0.645	0.0379	17.037	0.000	Accepted
EE →QSA	0.111	0.0554	2.005	0.045	Accepted
JS →QSA	0.111	0.0507	2.191	0.029	Accepted
TQM →JS	0.635	0.0440	14.418	0.000	Accepted
TQM →QSA	0.118	0.0488	2.419	0.016	Accepted

Note: DISC = digital inclusive school climate; QSA = quality school assesment; CF = contextual factors; EE = entrepreneurial education; TQM = total quality management; JS = job satisfaction.
Source: Authors' compilations.

Table 2. Specific Indirect Effect Test

Hypothesis	"Original sample"	M	"T-statistics (O/SE)"	P	"Decision"
EE →DISC →QSA	0.224	0.222	6.440	0.000	Accepted
TQM →JS →QSA	0.070	0.069	2.157	0.031	Accepted

Note: EE = entrepreneurial education; TQM = total quality management; DISC = digital inclusive school climate; QSA = quality school assessment; JS = job satisfaction.
Source: Authors' compilations.

Entrepreneurial education had a significant positive impact on school quality (β = 0.111, T = 2.005, p = 0.045), that suggesting supportive effectiveness by developing problem solving ability, and adaptability while Digital Inclusive School Climate as a mediator between Entrepreneurial

education and quality school assesment from Table 18 (EE →DISC →QSA, (β = 0.224, T = 6.440, p < 0.001) showed a positive strong result. This indicated that entrepreneurial education improves school quality mainly by improving the inclusive school's climate internally. When entrepreneurial education is strong, it encourages innovations, relevance, knowledge with skills, creativity, initiative, teamwork, and problem-solving skills. These qualities ensure to improve the digitalized equity and access, inclusive digitalized instruction and learning, digitalized safety and well-being, collaboration, discipline, equal access & inclusive policies, supportive learning space, and trust inside the school. As a result, overall school quality improves.

Nevertheless, Total Quality Management also showed a direct positive but small influence on dependent variable that is quality schools' assessment which is measured through student academic performance, school environment & safety, student teacher relationship, student student relationship, inclusive & diversity, and parents & community. This effect is statistically significant (β = 0.118, T = 2.419, p = 0.016). The mediating result showed that TQM has a strong positive but indirect influence on dependent variable (quality school assesment) through teacher job satisfaction (mediator) showed in table 18 (TQM →JS →QSA, (β = 0.070, T = 2.157, p < 0.031). The results showed that total quality management improves school quality mainly through enhancing by teacher's job satisfaction. When total quality management practices are strong, it encourages continuous professional development (sign language trained teachers, standardize and digital curriculum, clear procedures, fair evaluation, training, and leadership support, save and inclusive school climate, acceptable workload, involvement of staff, teachers feel more secure and valued. Satisfied teachers perform better, which leads to better school quality. In simple terms, quality systems work through motivated teachers.

POLICY RECOMMENDATION

1. Integrate Digitalized curriculum including Entrepreneurial Education: Integrate Entrepreneurial Education with at least review and customization of Digital National Curriculum from Six (6) to tenth (10) Class to provide accessible learning material to HI special students.

2. Disability Sensitive Financing reforms (NFC Funding): Province cannot spend more than what they receive that's why special education budget depends heavily on NFC share. Protect non-salary budget for assistive devices, purpose buildings, transport, ICT and captioning tools, visual aids. If still it's a provisional responsibility, then each and every department gives their contributions through departmental and industrial linkages and collaboration.

3. Global quality models (ISO, EFQM, Baldrige) must be adapted, not copied. Adopt a QEC- Lite model for special education that has been suggested for this research by integrating EE, TQM, DISC, Job satisfaction and contextual factors (SEF, GA, TAI, FS). Quality assurance must reflect local realities.

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4. Governance Reform through Decentralization

From 41 districts only 17 DEO posted, which is not sufficient for monitoring & evaluation.

5. Teacher Centric policy approach

Link TQM practices with Job security, recognition and career progression. There should be mandatory Continuous professional development in sign language and inclusive pedagogy, address work load and emotional stress.

6. Integrate Entrepreneurial Education as a Learning KPI

7. Promote Digital Inclusive School Climate as a Policy Tool

8. Rural and Gender-Inclusive Expansion Strategy

9. Policy Alignment for Digital and Assistive Technologies

10. Alignment with the SDGs and Modern Public Administration

11. Align with International Development Partners (World Bank, UNICEF, UNESCO)

12. The Development of Professional Certificate Module for Special Education Teachers

13. Unmet Social Needs of Hearing-Impaired (HI) Students and Required Protections