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

Waqas Mahmood[1] and Muzammila Akram[2]

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[1] Assistant Professor, Department of Educational Training, School of Education, The Islamia University of Bahawalpur.
[2] Associate Professor, Department of Educational Training, School of Education, The Islamia University of Bahawalpur.

ABSTRACT

This study aims to explored how entrepreneurial education, total quality management, digital inclusive school climate, teacher job satisfaction and contextual factors such as socio-economic status, government assistance, family support and assistive technology infrastructure to influence overall school quality of hearing-impaired students in southern Punjab, Pakistan. Rather than viewing quality as a single outcome, this approach treats it as a system shaped by governance structure, human behaviour, and resource environments. The study employed a sequential explanatory design. First, a quantitative survey of employees was analysed using SPSS version 27 to measure descriptive statistic analysis, initial screening while Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied to test hypothesized direct and mediating relationships. Subsequently, qualitative data from semi-structured interviews with a purposefully selected group of participants was analysed using Atlas.ti. Thematic investigation found complex mechanisms that support the statistical model. Findings showed that entrepreneurial education, total quality management, job satisfaction, and contextual factors significantly contribute to quality school assessment. Among these, contextual factors showed a strong direct effect (β = 0.463), highlighting the importance of family support, government assistance, and socioeconomic conditions. Digital inclusive school climate (β = 0.347) and job satisfaction (β = 0.111) also positively influenced assessment quality. Additionally, entrepreneurial education and total quality management indirectly enhanced assessment outcomes by strengthening the digital inclusive school climate and job satisfaction. Overall, the model explained 70.1% of the variance in quality school assessment, indicating strong explanatory power.

Keywords: Entrepreneur Education, TQM, Digital Inclusive School Climate, Job Satisfaction, Quality School Assessment, SDG 3,4,5,8,9,10,16,17.

PREFACE

This research project, entitled Modernizing Digital Inclusive Education for Hearing-Impaired Learners: Empowering Students with Entrepreneurial and Future Ready Skills in Pakistan, was conducted to deal with an essential issue related to improving the learning process and outcomes for hearing-impaired students, especially in the region of Southern Punjab. This issue is solved by applying two effective methods: Entrepreneurial Education, which concentrates on the development of creativity and problem-solving skills, and Total Quality Management (TQM) that aims to create a better learning environment for enhanced productivity and success for the teachers and students.

Additionally, the project examines the role of the Digital Inclusive School Climate and job satisfaction of teachers in determining performance outcomes. By bringing attention to these elements, this paper is able to provide advice on how policymakers and educators can help create more inclusive and effective education environments.

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ABBREVIATIONS

DAAE	Digital Access & Equity:
DISC	Digital Inclusive School Climate
DRAB(C)	Digital Relationship & Belonging
DSEWB	Digital Safety, Ethics & Well-Being
EE	Entrepreneurial Education
EFQM	European Foundation of Quality Management
GA	Government Assistance
HI	Hearing Impaired
IDTAL	Inclusive Digital Teaching & Learning
ISO	International Organization for Standardization
KPI	Key Performance Indicators
PDCA	Plan, Do, Check, Act
PDCI	Plan, Do, Check, Improve
PSDF	Punjab Skills Development Fund
PVTC	Punjab Vocational Training Council
QAS	Quality Assurance System
QSA	Quality School Assessment
SEF	Socio-Economic Factors
TDCAS	Teacher Digital Capacity & Support:
TEVTA	Technical Education and Vocational Training Authority (Punjab)
TAI	Technological Assistive Infrastructure
TQM	Total Quality Management
UNICEF	United Nations Children's Fund
UNESCO	United Nations Educational, Scientific and Cultural Organization

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 (GOP, 2017), increasing to 40.38 million in (GOP, 2023) 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 (Government of Punjab, 2020). 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.

1.1. Research Objectives

1. To explore the influence of Entrepreneurial Education, TQM Practices, Contextual factors on quality school assessment of hearing impairment students.
2. To examine the mediating role of Digital Inclusive School Climate on the relationship between entrepreneurial education, and quality school assessment of hearing-impaired students.
3. To examine the mediating effect of teacher job satisfaction on the relationship between total quality management, and quality school assessment of hearing-impaired students.
4. To identify and analyze stakeholders' perceptions of the key enablers and barriers in implementing Entrepreneurial Education and Total Quality Management practices in schools serving hearing-impaired learners.

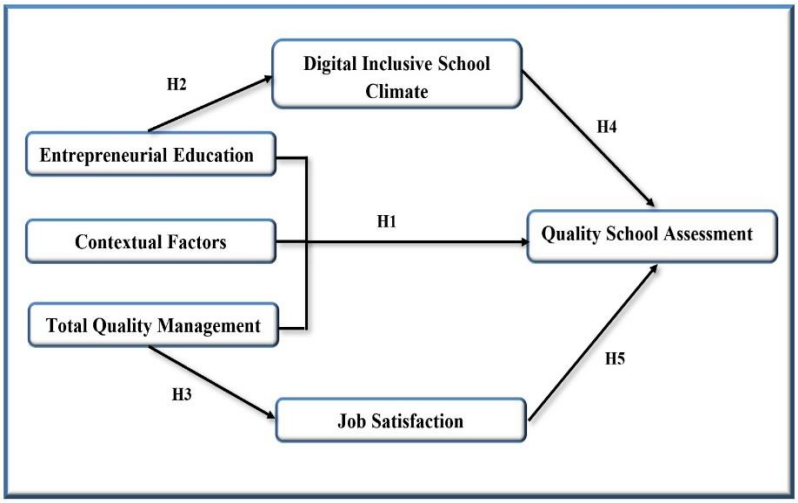
1.2. Research Questions

1. How does entrepreneurial education, TQM Practices, Contextual factors influence the quality school assessment of hearing impairments students?
2. How does Digital Inclusive school climate mediate the relationship between entrepreneurial education and quality school performance for hearing-impaired students?
3. In what ways does teacher job satisfaction mediate the impact of total quality management and quality school performance?
4. How do stakeholders perceive the key enablers and barriers to implementing Entrepreneurial Education and TQM practices in schools serving hearing-impaired learners?

1.3. *Theoretical Framework*

This study has the following theoretical framework.

Figure 1: Theoretical Framework of Study

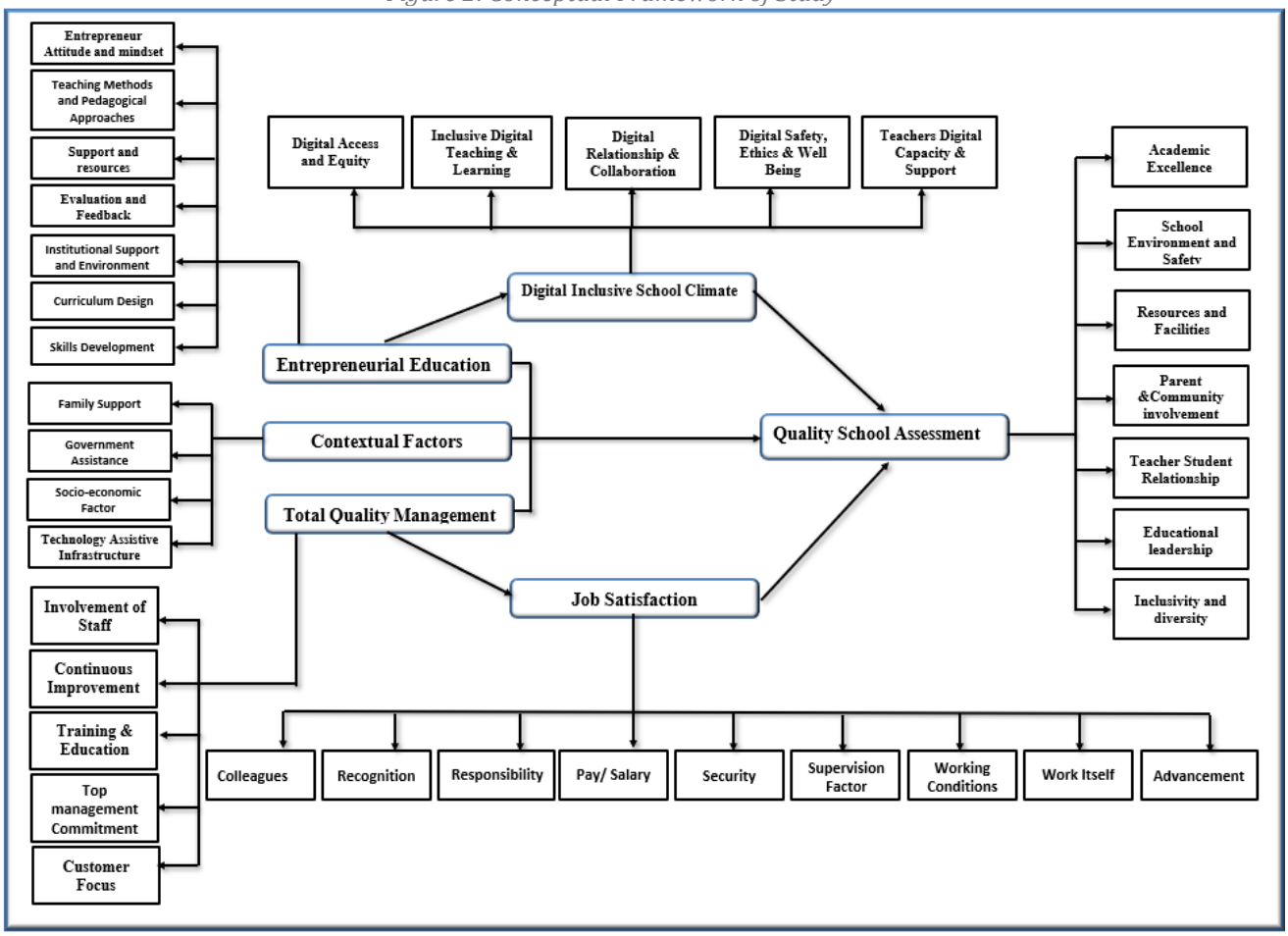


Source: Mahmood (2020) and Mahmood et al. (2024).

1.4 Conceptual Framework

The conceptual framework of the study is as followed.

Figure 2: Conceptual Framework of Study



Source: Authors' compilations.

1.5. Significance of the Study

This study is important because it helps improve School quality of hearing-impaired students by integrating Entrepreneurial Education that supports (entrepreneurial attitude & mindset, Innovation, initiatives, Relevance, Knowledge with Skills, creativity, problem solving skills) and Total Quality Management (ensure Quality, Continuous improvement, sustainability), Digital Inclusive School Climate (equal access & inclusive policies, supportive learning space), Cultural Context and Teachers Job satisfaction.

Role of Entrepreneurial Education: It includes

- Entrepreneurial education can help hearing-impaired students by developing entrepreneurial mindset (knowledge with skills), independence, creativity, and problem-solving skills for their future. When we provide entrepreneurial education to the students, they will be job creators not the job seekers. It will contribute to economic growth and sustainability.
- HEC has initiated mandatory entrepreneurial education at the university level, emphasizing the importance of cultivating a business mindset among students. It is crucial to implement entrepreneurial education starting from the school level.

Role of Total Quality Management: Total Quality Management ensures better teaching quality through professional development, improved proper implementation of resources, and a structured digital learning environment, making education more effective for these students by reducing inequalities.

The Impact of Teaching Quality: It includes

- *Reduces Learning Poverty* – Ensures students gain essential knowledge and skills.
- *Improves Human Development Index (HDI)* – Enhances education, health, and overall well-being.
- *Utilizes Human Capital* – Prepares students for future careers and economic growth.
- *Prevents School Deprivation* – Provides equal learning opportunities for all students.
- *Reduces Learning Depression* – Creates a positive and engaging learning environment.
- *Supports Generation Z* – Uses modern teaching methods and pedagogical techniques to meet their learning needs.

OECD School Level+ E3RS System Model = Global Quality Outcomes: This research is also very important because OECD tells what quality look like at different levels while this research explains how quality is enable/create (proper teachers, Assistive devices, Govt. support, family support, inclusive school climate) without these quality education cannot possible, practice (good teaching methods, student participation, entrepreneurial activities, feedback and improvement, quality happens through daily actions, not policies only) and sustained (TQM & CI, Training teachers again & again, maintaining technology with supportive leadership) achieved in special education. OECD distinguishes between the system and the school-based conception of educational quality.

Table 1: Contextual Enablers → School-Level Quality → OECD System-Level Quality

OECD + E^3RS	Contextual Dimensions	Logic

Effectiveness	TAI, Digital Inclusive School Climate, Job Satisfaction	Better tools + happy teachers = better learning
Efficiency	Government Assistance, TAI, TQM	Funds & systems reduce waste
Equity	Family Support, Government Assistance, Digital Inclusive Climate	Fair access for all students
Relevance	Entrepreneurial Education, Family Support, Innovation, Knowledge & Skill	Skills must match real life, community & economic needs
Sustainability	TQM, Government Assistance, Job Satisfaction, Digital Inclusive School Climate	CI & long-term quality need system and stable support

Source: OECD 2013 and UNESCO 2015.

Policy and Practical Impact: It includes

- Policymakers can develop better education plans for hearing-impaired students because it is highly significant in advancing Pakistan National priorities like human capital development, Inclusive growth and evidence based public sector reforms.
- Schools can integrate entrepreneurial skills into the curriculum to prepare students for jobs or self-employment.
- The study provides a practical model that under-served schools in Southern Punjab can follow to improve performance by incorporating contextual factors that offers a realistic model for inclusive service delivery in developing countries.

Alignment with Sustainable Development Goals (SDGs): This study directly supports Pakistan commitment under the 2030 Agenda for sustainable Development particularly *SDG 4 (Quality Education), SDG 5 (Gender Equality)* through gender-sensitive facilities and participation and *SDG 8 (Decent Work & Economic Growth)* by promoting TQM inclusive education and entrepreneurial skills towards employment. It also advances *SDG 3 (Good Health & Well-being)* by enhancing digital inclusive school climate (reduce stress, anxiety) and teacher satisfaction, *SDG 9 (Innovation & Infrastructure)* digital and assistive- tech integration and *SDG 10 (Reduced Inequalities)* by ensuring equal learning opportunities for hearing-impaired students, SDG 17(Partnerships between Govt. schools, Communities, NGOs, Private sectors and collaboration with International communities like China) and SDG 16 (Strong Institutions) through contextual factors, digital curriculum, QEC-Lite, sign language development digital tools because without systematic investment in sign language development tools, entrepreneurial and vocational education for hearing impaired students cannot achieve quality, equity and sustainability.

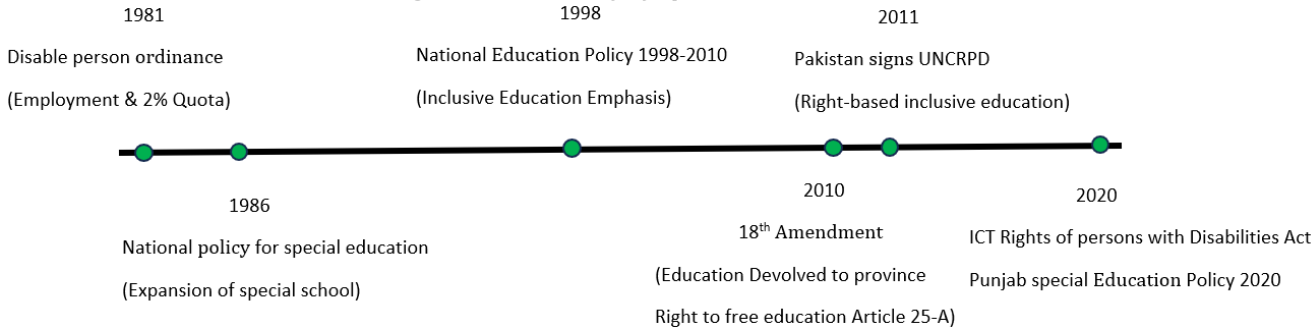
Align with International Development Partners (World Bank, UNICEF, UNESCO): This research is aligned with World Bank's Human Capital Index emphasizes education quality, skills acquisition, and future productivity as drivers of long-term economic growth.

LITERATURE REVIEW

2.1. Introduction to Special Education and Hearing-Impaired Schooling in Pakistan

In Pakistan, special education formally began in the 1960s with charity-based initiatives later on establishment of the **Directorate of Special Education (1975-81).** The early model was segregated special schools; however, after Pakistan signed the **UNCRPD in 2011**, policy emphasis shifted toward integration and inclusive practices in mainstream schools. To meet that inclusive challenges Govt. took initiative by combining the Punjab Curriculum & Textbook Board (PCTB), the Quaid-i-Azam Academy for Educational Development (QAED), and the Punjab Examination Commission (PEC) all came together to form PECTAA. The new authority has three parts that work together: (1) the Academics Wing, which is in charge of developing the curriculum, approving textbooks, training teachers, and testing students; (2) the Monitoring & Evaluation Wing, which is in charge of school KPIs, classroom observations, and quality audits; and (3) the Operations Wing, which is in charge of managing administration and providing resources. Punjab can now connect curriculum, teaching methods, and assessments under a single quality framework thanks to this unified structure. This makes sure that learning results are more in line with state education requirements. Over time, the sector has expanded in structure, yet challenges related to quality, equity, resources and effectiveness remain significant.

Figure 3: The History of Special Education



Source: Authors' compilations.

2.2 Categories of Disabilities with Focus on Hearing Impairment

Disabilities are generally categorized as sensory, physical, intellectual, developmental, multiple, and learning disabilities. Among sensory disabilities, **hearing impairment (HI)** is significant due to its strong association with delays in communication, speech, literacy, and socio-emotional skills.

Table 2: Levels of Hearing Impairment and Educational Implications

Level of Hearing Loss	Audiological Range (dB)	Functional Impact	Educational Implication	Percentages
Grade 0: None	25 dB or less	No/Slight Problems Hears whispers	Speech clearly support	n (%)
Grade 1: Slight/Mild	26-40 dB	Hears/repeats words in normal voice at 1 metre.	Consistent use of H. Aids/ FM system	54 (32%)

Grade 2: Moderate	Child 31-60 dB Adult 41-60 dB	Hears/repeats words in raised voice at 1 metre.	Intensive auditory training, sign support speech, small group instruction	76 (45%)
Grade 3: Severe	61-80 dB	Hears words shouted into better ear	Bilingual bicultural approach, sign language instruction, Captioned material	28 (17%)
Grade 4: Profound	81 dB or more	Cannot hear/understand shouted voice	Full sign language environment, Individual curriculum	10 (6%)

Note. dB HL = decibels Hearing Level; WHO = World Health Organization. WHO Grades of Hearing Impairment (Better Ear Average: 0.5, 1, 2, 4 KHz)
Source: WHO (1991).

2.3. Quality Challenges in Hearing-Impaired Schools

Despite efforts to increase access to special education for the hearing-impaired community in Pakistan, there have still been challenges faced by schools for the hearing-impaired regarding quality. Many institutions operate with limited financial resources, outdated infrastructure, a shortage of trained sign language teachers, limited professional development in inclusive pedagogies, Weak monitoring and evaluation, overcrowded classrooms in urban schools, inconsistent implementation of inclusive policies in mainstream schools. Governance mechanisms remain weak, as monitoring systems tend to focus on enrolment and compliance rather than learning outcomes and school performance. These gaps align with priorities in the Punjab Special Education Policy 2020, which emphasizes digital curricula and pedagogies, teacher capacity building, quality improvement formalizing quality-assurance processes (TQM-style monitoring and KPIs), (resource constraints, staffing shortages, and variable capacity across districts) and vocational or livelihood pathways for learners with disabilities (Government of Punjab, 2020).

Therefore, Integrating EE into HI schools can expand "post-school opportunities" and reduce economic marginalization for youth with disabilities who face higher unemployment while TQM is a tool that enhance service quality of education trough curriculum adaptation, device management, and teacher training, monitoring outcomes, where needed (Bibi et al., 2021). Most of the researches demonstrated that digital inclusive climate (DISC) where devices and broad band access, accessibility of learning materials and high JS linked with successful implementation and reduce staff turnover – both are very important for sustained EE and TQM initiative (Abbes, 2024). This study is important because such organizational factors often determine whether new initiatives succeed or fail.

2.4. Entrepreneurial Education (EE)

Entrepreneurial education is an innovative teaching and learning strategy that equipped students with the skills, attitude, behaviour and knowledge of opportunity recognition, self-employed, innovation, critical thinking, creativity, problem solving and take initiatives. EE is a tool that focus on economic and social empowerment for students with disabilities. In theoretical framework EE is

based on number of different theories such as Human Capital theory (Becker, 1964), suggested that investment in education enhances skills, productivity and economic growth. On the other hand, constructive and experimental learning theory that focused on learning by doing, construct new knowledge, represented by (Dewey, 1997; Kolb, 2015).

21st Century Skills and Innovative learning approaches, EE to empower HI students: In the modern 21st-century classroom, pedagogical approaches for residual hearing students are digital curriculum with standardizing of sign language with national curriculum focusing universal design for learning (UDL), assistive technology, including digital hearing aids, cochlear implants, FM/DM systems, auditory trainings, blended learning (Avatar mobile Apps with translator facilities with standard picture, Dictionary for HI), computers labs and speech-to-text software with visual-centric methodologies such as visual language with captioned, and visual aids. EE helps students with disabilities who are physically unable to get formal employment by giving them useful business skills, small enterprise choices, and the capacity to stand out for themselves. These business (technical) skills includes such digital services, stitching, crafts, beautician courses, social media marketing, graphic designing (poster, Logo, brouchers etc) and home-based micro business. EE doesn't automatically give people more power. Students require effective inclusive instructional techniques, useful technology, mentorship, market links, and legislative assistance to transform their talents into sustainable income.

2.5. Total Quality Management Principles (Deming, Crosby, Juran, Mahmood)

Total Quality Management (TQM) developed from mid-20th century which has been supported by numerous researchers mainly Crosby (1979, 1984) and Deming (1986). TQM focuses on continuous improvement, efficiency, and effectiveness in educational institutions. W. Edwards Deming, (1986), emphasised that TQM is a management approach which focus on continuous improvement. Juran & Gryna (1988) talked about "quality planning, quality control, and quality improvement". Philip Crosby came up with the idea that "quality is conformance to requirements".

Total Quality Management Application in Education: According to Mahmood (2020), TQM in education consists of top management commitment, continuous improvement, involvement of staff, training & education and customer focus. Total Quality Management (TQM) is an all-encompassing style of management approach focus on continuously improving organizational processes to achieve better performance through administration efficiency (supportive leadership), trainings, documentation, stake holder satisfaction including students learning outcomes. TQM focus on clear quality goals (learning outcomes), mapping out important processes (curriculum delivery, assessment, resource maintenance), *setting performance* indicators, doing regular audits and feedback cycles, professional development as a way to build capacity, and encouraging teamwork to solve problems.

Problems Implementing TQM in Underdeveloped Countries: TQM implementation in low and middle-income countries is plagued by issues: Insufficient funds for training, monitoring, and maintaining assistive devices, Principals have lack of knowledge for proper implementation of QEC-Lite model in schools, teacher's turnover and

workload effect the quality. In special education, the lack of professionals (such as sign-language teachers) and the necessity to update assistive technologies worsen these issues.

2.6. Concept and Theories of School Climate

A positive school climate is a multidimensional concept that supports learning, well-being, and inclusion. Relevant theories include:

Ecological Systems Theory: Highlights how external environments (teachers, administration, policies) shape students' experiences. Strong school climate enhances student engagement and learning outcomes (Bronfenbrenner, 1994).

School Climate Theory: Defines school climate as relationships, safety, and learning environment (Cohen et al., 2009).

Digital Inclusive School Climate: A digital inclusive school climate improves student learning, well-being, and overall education quality by ensuring fair access to affordable devices, reliable internet (broadband), and assistive technologies. It also supports teachers and students through digital skills, accessible content such as sign-language videos and screen readers, and modern teaching methods (digital pedagogical techniques). Most importantly, it promotes active participation in learning, not just access to technology (Fauzee et al., 2026.

2.7. Job Satisfaction

Theories of Job Satisfaction: Teacher job satisfaction affects performance and student outcomes.

Maslow's hierarchy of needs (employees require physiological, safety, social, esteem and self-actualization support) (Frager, 1987).

Herzberg's Two-Factor Theory identifies **hygiene factors** (salary, policies, working conditions) and **motivators** (achievement, recognition, Growth) as key to satisfaction. Schools can enhance **teacher motivation** for hearing-impaired students by improving **TQM-driven** working conditions (Herzberg, 1979).

Factors Influencing JS in Special Education Context: Insufficient resources (e.g., hearing aids, FM systems), heavy workload, unclear role expectations, and lack of career growth cause special-education staff fatigue and turnover, according to research. Instead, leadership support, meaningful professional growth, peer collaboration, and recognition boost happiness and retention. Local studies in Punjab and elsewhere attribute special-education teacher dissatisfaction to resource and training deficiencies (Alexander, 2020).

2.8. Mediating Role of Digital Inclusive School Climate and Job Satisfaction

School climate plays a crucial role in shaping the behaviour of the student, engagement, inclusion as well as characterized by collaboration, mutual respect, teaching innovation, level of safety, & support, teachers decision making, and school resources, On the other hand, job satisfaction is better for achieving high-quality education results. Studies showed that positive school climate and job satisfaction is a powerful predictor of mediating influence of school management techniques like

TQM on student performance for the simple fact that satisfied teachers are more supportive of their students' engagement.

Given the policy intent of Punjab Special Education Policy 2020 and the mixed international evidence, a **localized QAS model** that integrates EE and TQM while measuring DISC and JS—and that explicitly accounts for contextual moderators (SEF, GA, TAI, FS)—is necessary to produce actionable, scalable improvements in HI school performance.

2.9. Quality Assurance System Framework

Table 3: Studies Related to Quality Assurance System

Framework / Standard	Focus Areas	Where Used	Pakistan's Practice	Gap / Relevance for research
ISO 9001 (QMS)	Documentation, processes, audits, continuous improvement	Widely in universities & private schools globally	Some Pakistani private universities/schools (e.g., LUMS, NUST programs, Beaconhouse) hold ISO 9001 certification	Not applied in govt. school or SpED → weak documentation & audits, ignore inclusion
ISO 21001 (EOMS – 2018)	Specifically, for educational institutions: learner centered, inclusive access, curriculum design, teacher support	Europe, Malaysia, Singapore, UAE adopting for schools & universities	Not applied in Pakistan	Not localized, weak governance
EFQM Excellence Model	Leadership, people, processes, partnerships, results	Europe, Middle East, some Asian universities	Not formally used in Pakistan's schools; HEC QA has similarities	Costly, documentation heavy
Malcolm Baldrige Model (USA)	Leadership, strategy, customer focus, results-based performance	Higher education institutions in USA, Asia	Not used in Pakistan	Ignore inclusion & poverty
HEC – Quality Enhancement Cells (QECs)	Program self-assessment, accreditation, faculty evaluation	Public & private universities in Pakistan	Well-structured in universities, but absent in schools, self-assessment culture	School sector needs similar QECs (or "QEC-Lite") for accountability
Punjab Govt. KPIs	Monitoring, Student enrolment, teacher attendance building infrastructure	Public schools, monitored by PMIU	Applied widely in Punjab regular schools, scalable, Only Quantitative	Too narrow: ignores teacher motivation, school climate, and entrepreneurship
Proposed QAS	Inclusive performance System EE + TQM + DISC +JS + Contextual factors		Comprehensive contextual, Inclusive, future ready,	All Three Pillar

Source: ISO (2015 and 2018), EFQM (2013), UNESCO (2017), OECD (2018), and Deming (1986).

2.10. Building a 21st-Century Quality Model: The QAS Framework

Table 4: The QAS Framework

Dimension	Innovation under QAS	Linked Policy Pillar	Global Benchmark
Governance & Institutional Capacity	QEC-Lite for Schools, PDCI audits, leadership dashboards	Governance	ISO 9001 / EFQM
Access & Inclusion	Sign-language certification, gender-safe transport, digital assistive labs, digital curriculum, assistive tech management	Access & Quality	ISO 21001 / UNCRPD
Quality & Relevance	Entrepreneurial learning index (result based), teacher recognition, innovation rate, data dashboards linking outcome to KPI	Quality	Baldrige / HEC-QEC
Job Satisfaction (JS)	Salary security, recognition incentives, CPD wallets	Governance & Quality	EFQM "People" Criterion
School Climate (SC)	Collaboration index, inclusion score, peer-learning communities	Governance + Quality	UNESCO Inclusive Framework
Continuous Improvement (TQM)	PDCI cycles, feedback loops, stakeholder surveys	Governance	Deming Award Logic
Contextual Factors (SEF, GA, TAI, FS)	Adaptive policy levers and local equity metrics	Access + Quality	OECD Equity Framework

Source: Author's compilations.

2.11. Contextual Factors: The Missing Moderators

The QAS integrates four contextual levers that convert barriers into enablers:

Table 5: The Contextual Factor

Contextual Factor	Barrier if Ignored	Enabler if Addressed
SEF – Socio-Economic Factors	Poverty reduces device use and retention	Targeted stipends, community-based support centers
GA – Government Assistance	Budget delays stall inclusive reforms	Non-salary block grants and PPPs for assistive devices (Public, Pvt.)
TAI – Technology & Assistive Infrastructure	Device breakdown leads to learning loss	Local repair hubs, real-time monitoring dashboards
FS – Family Support	Weak parental engagement	Parent-teacher mentorship, digital guidance apps
Contextual Factor	Barrier if Ignored	Enabler if Addressed

Source: Author's compilations.

The findings show that government support strengthens assistive technology by providing funding, maintenance, and quality control, while assistive infrastructure helps reduce the effects of low socioeconomic conditions by improving access to learning. Socioeconomic factors influence enrolment and family involvement, whereas family support sustains learning at school and home. Overall, the model turns the Punjab Special Education Policy's pillars of governance, access, and quality into practical school-level actions.

Table 6: Literature Review of the Dimension of Research

Dimension of Research	Studies	Description
Entrepreneurial Education and School Performance	(European Commission, 2016; Roza et al., 2019)	Entrepreneurial education is increasing as an innovative teaching strategy, especially in equipping students with the skills of critical thinking, creativity and problem solving. Entrepreneurial education enables students with a wide range of disabilities, such as hearing impairment, to acquire essential independence and adaptability skills in an educational and life context especially when experimental methods (PBL, Internships) and mentorship was used.
	(Bukola et al., 2023; Mujtaba et al., 2025)	Literature indicated that entrepreneurial education creates an inclusive learning environment that improved engagement and acquisition of better academic grades.
	(Nwineh et al., 2024).	Additionally, for students with hearing impairment, being equipped with entrepreneurial education will equip them with skills to defeat communication barriers and better participate in the society.
Total Quality Management (TQM) in Education	((Khurniawan et al., 2021)	Total Quality Management (TQM) focus on continuous processes to achieve better performance. In TQM, the organization works to develop the culture which focuses on meeting the needs of students, faculty, and staff and utilizes the strategies that strive for improvement on an ongoing basis
	(Laurett & Mendes, 2019; Taraza et al., 2024)	The EFQM model has been applied across various educational levels, and institutions has reported improvements in educational process, stakeholder engagement and organizational development (EFQM).
	(Balbastre-Benavent & Canet-Giner, 2011; Tahira et al., 2020)	TQM involves creating a culture of excellence by focusing on the needs of students, faculty, and staff, and implementing continuous improvement strategies. For special education, TQM can lead to more structured and effective learning environments that are responsive to the needs of students with disabilities.
	(Efendi, 2022).	Studies have shown that applying TQM to schools is effective in managing schools as organizations, as it improves TQM processes and enriches teaching in a way that enhances students with special needs' educational achievements.
Digital Inclusive School Climate as a Mediator	(Nachman & Pryor, 2024; Nuzuliana et al., 2024).	Student outcomes have also been found to be influenced by the positive school climate. Digital inclusive school climate is defined as the accessibility of broadband, digital computer labs with knowledge of CANVA, AI tool, quality of interaction of students, teachers and other school staff as well as the level of safety, support, collaboration and inclusiveness of a given environment.

	(Hoy & Miskel, 2013). (Fallon et al., 2023).	For students with hearing impairments, a positive school climate can reduce feelings of isolation and improve engagement, which in turn enhances their academic performance. Moreover, research suggests that school climate mediates the impact of pedagogical innovations like entrepreneurial education and TQM by fostering an environment conducive to learning and collaboration.
Job Satisfaction as a Mediator	(Mahmood et al., 2024).	Research shows that the teacher with high job satisfaction is better for achieving high-quality education results. Satisfied teachers are more likely to be motivated, committed, and effective in their roles, which transform into better student performance.
	(Aftab et al., 2023)	Local studies have examined job satisfaction among special-education teachers in Punjab. Evidence from Pakistan indicates implementation constraints—staff shortages, resource gaps, and weak monitoring—that moderate program effects. These studies support the need for locally adapted models combining pedagogy and quality systems.
	(Strydom et al., 2012)	With regard to special education, teacher job satisfaction is equally needed as different others do because teachers usually have to face many difficulties or barrier's while taking care of children with disabilities.
	(Parveen et al., 2024)	Studies show that job satisfaction is a powerful predictor of mediating influence of school management techniques like TQM on student performance for the simple fact that satisfied teachers are more supportive of their students engagement.
The Role of Entrepreneurial Education and TQM in Special Education	(Miço & Cungu, 2023)	Integration of entrepreneurial education and TQM within special education can offer a vast improvement in academic performance, especially among hearing-impaired students. Entrepreneurial education helps students achieve self-reliance and critical thinking, while TQM helps improve academic processes for students with special needs.
	(Bahaw et al., 2024)	When these tactics are used together, with a pleasant school atmosphere and high teacher job satisfaction, they can lead to better school performance, more student involvement, and better academic results.
Quality Assurance Framework	(Rodríguez et al., 2025; Marnnoi et al., 2024)	In developed countries, there are often well-established QA agencies, like the National Accreditation Commission in Chile, which makes sure that higher education institutions meet strict standards and keep getting better. Countries such as South Korea and Malaysia exhibit greater institutional autonomy, allowing customized QA processes that correspond with national development plans.

	(Rodríguez et al., 2025)	On the other hand, even if El Salvador's QA policies are improving, they still need to be strengthened in order to promote a strong quality culture inside institutions.
	(Lim, 1999, Billing, 2004)	Indeed, developing countries could have something to learn from these integrated models to further their QA frameworks for better educational outcomes. Whereas QA frameworks have often been showcased as advanced in developed countries, developing nations are at an evolving phase to improve their respective systems. This disparity again, therefore, calls for tailored strategies that consider local contexts and challenges.
Contextual Factors	(Mumtaz & Saqulain, 2022)	The paper stresses that Pakistan needs to take long-term steps to make things better for people with disabilities, such as improving the SEF, culture, health care, laws, and training for people with disabilities. This is different from developed countries, which have more supportive environments.
	(Bashir, 2023; Carvalho et al., 2025)	It highlights that implementing assistive technology is faced with difficulties in regard to funding and the indispensable need for teacher training. It states that an increased amount of Govt. support is required for ensuring inclusion and independence of disabled students.
	(Hadiloo, 2023; Sehgal & Kaur, 2024)	The study highlights how a digital supportive environment and family support greatly empower children with impairments, boosting their academic perseverance, psychological growth, and self-esteem. Conversely, negative attitudes and stigma can hinder social participation and reduce independence in these children.
	(Salma & Chaudhry, 2024)	The research conducted in Bahawalpur district showed that there is a positive relationship associated with parental involvement and education, while larger household sizes and certain family system negatively affect performance.

Source: Authors' compilations based on studies cited in the table.

RESEARCH METHODOLOGY

3.1. Research Design

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.

3.2. Population and Sampling Plan

The population to which the survey is conducted includes special education teachers for hearing-impaired schools in Southern Punjab. According to SpED (2020), there are a total of 56 special education schools out of which 41 HI special education schools selected (Bahawalpur: 18 (8 secondary schools and 10 center schools) and Multan: 23 (6 secondary schools and 17 center schools). A 95% confidence level and 5% margin of error are standard in social science research. For 41 schools, a statistically significant sample ranges from 30-35 schools but researcher visited almost 40 schools due to lack of number of teachers. Selecting 50% (30 schools) ensures feasibility without compromising representativeness.

A commonly used formula for sample size calculation is:

$$S = \frac{N}{1 + N\ (e^2)}$$

Where:

S = Sample Size

N = Population Size (66)

e = Margin of Error (0.05 for 95% confidence level)

$$S = \frac{41}{1 + 41\ (0.05^2)}$$

$$S = \frac{41}{1 + 41\ (0.0025)}$$

$$S = \frac{41}{1.1025} \approx 37$$

To maintain proportionality Stratified random sampling, the sample size can be calculated as follows:

Table 7: Sample School from Region

Region	Total Schools	Proportion	Selected Schools
Bahawalpur	18	$\frac{18}{41} \approx 45\%$	$37\ x\ 0.45\ \approx 16$
Multan	23	$\frac{23}{41} \approx 55\%$	$37\ x\ 0.55\ \approx 20$

Source: Krejcie & Morgan (1970).

Sample Schools from Each Region = $\left(\frac{Total\ Schools\ in\ Region}{Total\ Schools\ in\ All\ regions}\right) x\ Total\ \ Sample\ Size$

Number of Teachers in Bahawalpur and Multan:

Total Number of Schools:

. Bahawalpur Region: 18 special education schools

. Multan Region: 23 special education schools

Teacher Distribution:

According to a study on gender-responsive financing of education in Punjab, in the 2016- 2017 period, Punjab had 343,458 public school teachers, with 55% being female and 45% male (Government of Punjab, 2020).

Sampling Strategy: On the base of collected data, stratified random sampling approach recommended to ensure representation of both male and female teachers across the selected schools. To determine the number of teachers to sample from Bahawalpur and Multan. There was 3 main way to determine sample size Using Krejcie & Morgan Table and other was Using Slovin's formula, Yamane formula popular in social sciences for proportional allocation and 3rd one was Cochran's Sample size but it is when population is greater than 10,000.

Teachers Sampling Strategy:

The Number of Teachers from each region:

Bahawalpur **Region:** 74 teachers

Multan **Region:** 276 teachers

Total**:** 350 teachers

Methods 2: Using Slovin's Formula*:*

$$n = \frac{N}{1 + N\ (e^2)}$$

Where:

n = Sample Size

N = Population Size

e = Margin of Error (0.05 for 95% confidence level)

$$S = \frac{350}{1 + 350\ (0.05^2)}$$

$$S = \frac{350}{1 + 350\ (0.0025)}$$

$$S = \frac{350}{1 + 0.875} \approx 186$$

For this study Sample n = 186 is selected, but it could be (15-20%) approximately of population is common in social sciences with 20% which become 38 Sample size. Total Teachers in each region on the behalf of this study is Bahawalpur 74 and Multan are 276.

$$n_i = \left(\frac{N_i}{N}\right) x\, n$$

Where:

- n_i = Sample size from each region
- N_i = Population size (total teachers in that region)
- N = Total population (total teachers across all selected schools)
- n Desired total sample size

The total sample size of 186 teachers was determined using Krejcie and Morgan's (1970) table for population N = 350. To ensure proportional allocational, the sample was allocated between Bahawalpur and Multan based on their respective subpopulation sizes. The calculation was as follows:

1. **Bahawalpur**

$$n_1 = \left(\frac{74}{350}\right) x\ 186 = 39 \approx 39\ \ teachers$$

2. **Multan:**

$$n_2 = \left(\frac{276}{350}\right) x\ 186 = 147 \approx 147\ \ teachers$$

Punjab has **55% female** and **45% male** teachers:

- **Bahawalpur** (39 teachers):
  - Female: 39 × 0.55 = 22
  - Male: 39 × 0.45 = 17
- **Multan** (176 teachers):
  - Female: 147 × 0.55 = 81
  - Male: 147 × 0.45 = 66

Table 8: The Number of Samples from Government Secondary Schools in the Bahawalpur and Multan

Region	Stratum	Filled Teachers	Sample Size	Female (55%)	Male (45%)
Bahawalpur	Schools (8)	30	16	9	7
	Centers(10)	44	23	13	10

Region	Stratum	Filled Teachers	Sample Size	Female (55%)	Male (45%)
BWP Total	**18 Institutes**	**74**	**39**	**22**	**17**
Multan	Schools (6)	96	51	28	23
	Centers (17)	180	96	53	43
Multan Total	**23 Institutes**	**276**	**147**	**81**	**66**
Grand Total	**All Regions**	**350**	**186**	**103**	**83**

Source: Authors' computations.

This proportional stratified sampling method ensured fair representation from each region based on the estimated number of teachers.

3.3. Research Instruments

A structured questionnaire was developed to collect data on entrepreneurial education practices, TQM implementation, digital inclusive school climate, teachers job satisfaction, and school performance. Standardized scales, such as the Total Quality Management Scale (TQM) (Mahmood, 2020), Digital Inclusive School Climate Survey (DISC adapted) (Fauzee et al., 2026; Wang & Degol, 2015) and Job Satisfaction Survey (JSS) (Lester, 1987) and Quality School Assesment was adapted globally from (OECD, 2013). In this research, 5 Likert scale was used.

3.4. Procedure to Collect Data

The data was collected through the use of structured questionnaires, where the individual teacher acted as the unit of analysis. The study followed the guidelines of the ethics of research by ensuring the use of voluntary participation and confidentiality of the participants and institutions. The researcher personally undertook the task of distributing the questionnaires in the selected institutions of learning and the administrative offices, in collaboration with the school heads. The majority of the questionnaires were collected on the spot, while the rest took a week given the schedules of the teaching fraternity. A total of 300 questionnaires had been given out, yielding a 200-response rate, which was sufficient for analysis.

3.5. Data Screening

Collected data were then carefully screened for accuracy and suitability for analysis. That included checking data entry errors, missing values, outliers, and normality. Besides, assumptions like linearity and multicollinearity were checked, which were among the key statistical assumptions necessary for multivariate analysis. These steps helped in improving data quality and ensured the reliability of subsequent analyses in line with standard data screening procedures recommended in the literature.

3.6. Data Analysis

Quantitative Analysis: Data from the questionnaires was analyzed using SPSS (version 27) to measure descriptive statistics analysis and initial data screening while (PLS-SEM) was applied for Structural Equation Modeling. Before conducting the actual research, pilot test was conducted to check the measurement model reliability and validity.

Qualitative Analysis: 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.

3.7. Reliability and Validity Results

Reliability was assessed using Cronbach's alpha and composite reliability to ensure internal consistency. Convergent validity was evaluated through factor loadings and average variance extracted, while discriminant validity was confirmed to ensure construct distinctiveness.

Table 9: Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho-a)	Composite reliability (rho-c)	Average Variance extracted (AVE)
EE	0.984	0.985	0.987	0.927
JS	0.913	0.987	0.960	0.817
QSA	0.886	0.942	0.924	0.722
SC	0.867	0.898	0.911	0.721
TQM	0.982	0.983	0.987	0.949

Source: Authors' computations.

Table 10: Discriminant Validity – Fornell – Larcker Criterion

	EE	JS	QSA	SC	TQM
EE	0.809				
JS	0.714	0.781			
QSA	0.710	0.769	0.852		
SC	0.758	0.515	0.459	0.826	
TQM	0.696	0.513	0.476	0.672	0.838

Source: Authors' computations.

Further results related to evaluation of the framework has been measured in findings.

FINDINGS AND DISCUSSION

The findings of the study displayed in two stages based on the research objectives and hypotheses. The first stage briefly discussed the descriptive data covering the demographic factors and second stage briefly describes the relationship between the variables.

4.1. Demographic Profile of Respondents

The demographic profile of respondents was examined with respect to their qualification, age, gender, teaching experience, school type, and region.

4.2. Qualification, Age, and Gender

Among respondents with a B.Ed. qualification, the majority (90.5%) were females below 30 years of age, while only 9.5% were males in the same category. In the 30–40 years age group, the distribution was almost balanced, with males representing 53.1% and females 46.9%. No respondents with a B.Ed. were found in the above 40 years category. For those with an M.Ed. qualification, one male respondent (100%) fell below 30 years of age, while the 30–40 years group consisted of 43.2% males and 56.8% females. Again, no respondents were above 40 years of age. Respondents with an M.Phil. qualification were largely concentrated in the 30–40 years age group, where 60% were males and 40% were females. Interestingly, in the above 40 years category, all respondents (100%) were females. No participants with an M.Phil. were recorded below 30 years of age. There were no respondents with a Ph.D. qualification in any age or gender category, reflecting a lack of representation of doctoral-level teachers in the sample.

Table 11: Demographic Profile of Respondents w.r.t Qualification, Age and Gender

Qualification	Age	Gender	N	%
B.Ed.	Below 30 Years	Male	2	9.5%
		Female	19	90.5%
		Total	21	100.0%
	30 - 40 Years	Male	52	53.1%
		Female	46	46.9%
		Total	98	100.0%
	Above 40 Years	Male	0	0.0%
		Female	0	0.0%
		Total	0	0.0%
M.Ed.	Below 30 Years	Male	1	100.0%
		Female	0	0.0%
		Total	1	100.0%
	30 - 40 Years	Male	19	43.2%
		Female	25	56.8%
		Total	44	100.0%
	Above 40 Years	Male	0	0.0%
		Female	0	0.0%
		Total	0	0.0%
M.Phil.	Below 30 Years	Male	0	0.0%
		Female	0	0.0%
		Total	0	0.0%
	30 - 40 Years	Male	9	60.0%
		Female	6	40.0%

		Total	15	100.0%
	Above 40 Years	Male	0	0.0%
		Female	7	100.0%
		Total	7	100.0%
Ph.D.	Below 30 Years	Male	0	0.0%
		Female	0	0.0%
		Total	0	0.0%
	30 - 40 Years	Male	0	0.0%
		Female	0	0.0%
		Total	0	0.0%
	Above 40 Years	Male	0	0.0%
		Female	0	0.0%
		Total	0	0.0%

Source: Authors' computations.

4.3. Experience, School Type, and Region

In terms of professional experience, teachers with 5–10 years of experience were more common. In urban schools, 72.1% of these respondents were from Multan and 27.9% from Bahawalpur. In rural schools, Multan again dominated with 78.9% compared to 21.1% in Bahawalpur. Teachers with less than 5 years of experience also showed a similar trend. In urban areas, 76.5% were from Multan and 23.5% from Bahawalpur, while in rural areas 82.1% were from Multan and only 17.9% from Bahawalpur. Respondents with more than 10 years of experience were fewer in number but followed the same pattern. In urban areas, all (100%) were from Multan. In rural areas, 86.7% were from Multan and only 13.3% from Bahawalpur.

Overall, the demographic results suggest that Multan had a larger share of respondents across all categories compared to Bahawalpur, and the teaching force was dominated by female teachers, particularly at younger ages and lower qualification levels.

Table 12: Demographic Profile of Respondents w.r.t Experience, School type and Region

Experience	School	Region	Count	Column N %
5 - 10 Years	Urban	Bahawalpur	12	27.9%
		Multan	31	72.1%
		Total	43	100.0%
	Rural	Bahawalpur	16	21.1%
		Multan	60	78.9%
		Total	76	100.0%
Below 5 Years	Urban	Bahawalpur	4	23.5%
		Multan	13	76.5%
		Total	17	100.0%
	Rural	Bahawalpur	5	17.9%
		Multan	23	82.1%
		Total	28	100.0%
Above 10 Years	Urban	Bahawalpur	0	0.0%
		Multan	7	100.0%
		Total	7	100.0%
	Rural	Bahawalpur	2	13.3%
		Multan	13	86.7%
		Total	15	100.0%

Source: Authors' computations.

This study examined the relationship among six key latent variables, Entrepreneurial education, Total Quality Management, Digital Inclusive School Climate, Job Satisfaction, Cultural Context and Quality School Assessment using Structural Equation Modeling (SEM).

4.4. Findings of Quantitative Analysis

Table 13: Measured Variables with Dimensions

Variables	Dimensions
Entrepreneurial Education (IV)	Curriculum design, teaching methods and pedagogical approaches, Skill development, Entrepreneurial attitude and mindset, Support and Resources, Evaluation and Feedback, Institutional Support and Environment
Total Quality Management (IV)	Top Management Commitment, Continuous Improvement, Training & Education, Involvement of Staff and Customer Focus
Cultural Factors (IV)	Family Support, Government Assistance, Socio-economic Factor and Technological assistance infrastructure
Digital Inclusive School Climate (Mediator)	Digital Access & Equity, Inclusive digital teaching & learning, digital Relationship & Collaboration, digital Safety, Ethics & well-being and teachers Digital Capacity and support
Job Satisfaction (Mediator)	supervision, colleagues, working conditions, salary and incentives, responsibility, the nature of the work itself, advancement opportunities, job security, recognition
School Quality Assessment (DV)	Educational Leadership, Academic Excellence, School Environment and Safety, Teacher-Student Relationships, Resources and Facilities, Parent and Community Involvement, and Inclusivity and Diversity

Source: Authors' computations.

All indicators showed excellent internal validity and reliability, with strong factor loadings above 0.91 for Entrepreneurial education and over 0.80 for the other constructs like TQM, digital Inclusive school climate, job satisfaction and others (Hair et al., 2019). These strong loadings suggest that the selected indicators are both statistically sound and highly reflective of the latent variables in the setting of Pakistan's southern Punjab special public secondary schools. The findings of the structural model shed more insight on the connections among entrepreneurial education, TQM, digital inclusive school climate, job satisfaction, Contextual factors and quality school assessment.

There was a substantial and statistically significant direct strong moderate correlation between contextual factors and quality school assesment, as indicated by the path coefficient ($\beta = 0.463$, $T = 22.763$, $p < 0.001$). This strong relationship highlights that how important contextual factors (GA, SEF, FS, TAI) is to raising academic standards, promoting inclusivity, and developing schools. Government assistance activates the entire system refers to non-salary public support that enables schools to function beyond basic staffing like as teaching material, assistive devices, Teachers training and professional development funding, Digital & assistive technology support, Transport, health and rehabilitation service linkages, Administrative & governance support at district level, what happens without GA (schools rely on teachers personal effort, assistive devices are unavailable or outdated, teachers are overburdened & demotivated, Inclusive policy remains policy statement only, Skills and employability outcomes remains weak) model collapses and school quality interventions cannot functions. TAI operationalizes through digital tools & learning material that allow HI students to participate in lesson, communicate effectively and develop skills, SEF

differentiates through poverty, rural isolation and gender constraints may produce stronger results for some student and weaker results for others, and FS ensure continuity, sustainability (This ongoing support helps maintain motivation, retention and skills development even when school resources are limited). Contextual factors such as (SEF, GA, TAI, FS) strengthen or weaken the influence of TQM, Digital Inclusion School Climate, Job Satisfaction and Entrepreneurial Education by shaping institutional capacity and access (Hallinger, 2003).

Entrepreneurial education had a significant positive impact on school quality ($\beta = 0.111$, $T = 2.005$, $p = 0.045$), 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, ($\beta = 0.224$, $T = 6.440$, $p < 0.001$) 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 (Fayolle & Gailly, 2015; Gibb, 2002).

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 ($\beta = 0.118$, $T = 2.419$, $p = 0.016$). 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, ($\beta = 0.070$, $T = 2.157$, $p < 0.031$). 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.

These findings are consistent with research conducted in other developing and South Asian environments. The relationship between entrepreneurship, inclusive school climate, and school quality is multifaceted, highlighting the importance of fostering an environment that nurtures both entrepreneurial skills and inclusivity. A positive school climate is essential for implementing inclusive education, which in turn can enhance the quality of education and promote entrepreneurial values among students (European Commission, 2016; Roza et al., 2019). Entrepreneurship education significantly influences students' interest in becoming entrepreneurs, as evidenced by a study showing that 41.2% of entrepreneurial interest can be attributed to both entrepreneurship education and the school environment (Nurhayati et al., 2025).

The research emphasizes that integrating entrepreneurship education fosters an inclusive school climate and enhances school quality by developing essential skills and competencies in students, ultimately contributing to reduced dropout rates, improved self-esteem, and a holistic educational experience Echeverri, et al., 2024). This study explores the integration of entrepreneurial values in inclusive early childhood education, highlighting its potential to foster creativity, social skills, and holistic child development, and the role of teachers in creating supportive learning environments (Fitria et al., 2025). Total Quality Management (TQM) plays a significant role in mediating job satisfaction and enhancing quality in educational settings. The integration of TQM practices can lead to improved job satisfaction among educators, which in turn positively influences the overall quality of schools (Gunawan et al., 2024; Lagrosen, 1999) .

4.4.1. Convergent Validity

Convergent validity assesses the extent to which the items effectively explain the construct. In this study, the Average Variance Extracted (AVE) for each variable exceeded the threshold of 0.5, confirming that all latent or construct variables demonstrated satisfactory convergent validity (Fornell & Larcker, 1981). Table 12. Showed the AVE values for each variable. Contextual factors measured 0.631, Digital Inclusive school climate measures 0.874, entrepreneurial education has 0.732, Job satisfaction has 0.866 and Quality school assessment has 0.867 has strong convergent validity, in addition to TQM has AVE 0.884 while contextual factors (0.631) and entrepreneurial education (0.732) is slightly above the threshold indicting a moderate portion of variance. The construct demonstrates good reliability and validity because all AVE values are above 0.5, the model meets the validity requirement.

Table 14: Construct AVE Values

Construct	Cronbach's Alpha (CA)	Composite Reliability (rho_A)	Composite Reliability (rho_C)	Average Variance Extracted (AVE)
Contextual Factor	0.852	1.082	0.872	0.631
Digital Inclusive School climate	0.963	0.966	0.971	0.874
Entrepreneurial Education	0.912	0.983	0.944	0.732
Job Satisfaction	0.974	0.974	0.978	0.866
Quality School Assessment	0.969	0.970	0.975	0.867
TQM	0.967	0.970	0.974	0.884

Note. CA > 0.852; CR > 0.96; AVE > 0.5. CR denoted Composite reliability.
Source: Authors' computations.

The values of collinearity statistics for this study was below 5, which indicate that there is no problem of multicollinearity among the variables. "A Variance Inflation Factor (VIF) value below 5 means there is no collinearity; values above 5 indicate moderate collinearity. Although some indicators exhibited VIF values slightly above 5, they remained below the critical threshold of 10, indicating no severe multicollinearity concern (Hair et al., 2021). Hair et al. (2021) suggested that VIF values below 10 do not pose serious multicollinearity issues in PLS-SEM.

4.4.2. Discriminant Validity (HTMT) and (Fornell-Larcker criterion)

Discriminant validity was further confirmed by using (Heterotrait-Monotrait HTMT) criterion, indicated that each construct is distinct from the others, therefore reducing concerns related to

multicollinearity. HTMT is a modern and more reliable method than the older Fornell-Larcker criterion. HTMT < 0.85 showed strong discriminant validity, HTMT < 0.90 showed acceptable discriminant validity and HTMT greater than 0.90 shows constructs are not distinct. Table 15 showed that all the values are below 0.85, which confirms discriminant validity.

Table 15: Discriminant Validity HTMT

Construct	Contextual factors	Digital Inclusive School Climate	Entrepreneurial Education	Job Satisfaction	Quality School Assessment	TQM
Contextual factors	-	-	-	-	-	-
Digital Inclusive School Climate	0.496	-	-	-	-	-
Entrepreneurial Education	0.633	0.651	-	-	-	-
Job Satisfaction	0.107	0.050	0.169	-	-	-
Quality School Assessment	0.624	0.692	0.668	0.211	-	-
TQM	0.145	0.033	0.207	0.653	0.251	-

HTMT < 0.85. (Conservation Criterion).

Source: Authors' computations.

Moreover, the Fornell-Larcker criterion was used to assess discriminant validity by comparing the square root of the AVE with the correlation values of other variables. The correlation values for each latent variable are presented in Table 14. The findings indicated that for all latent variables Entrepreneurial Education, Digital Inclusive School Climate, Total Quality Management, Job Satisfaction, Contextual factors and Quality School Assessment that the square root of the AVE exceeded the correlation values with other latent variables. This validates that the study met the criteria for discriminant validity.

Table 16: Fornell- Larcker

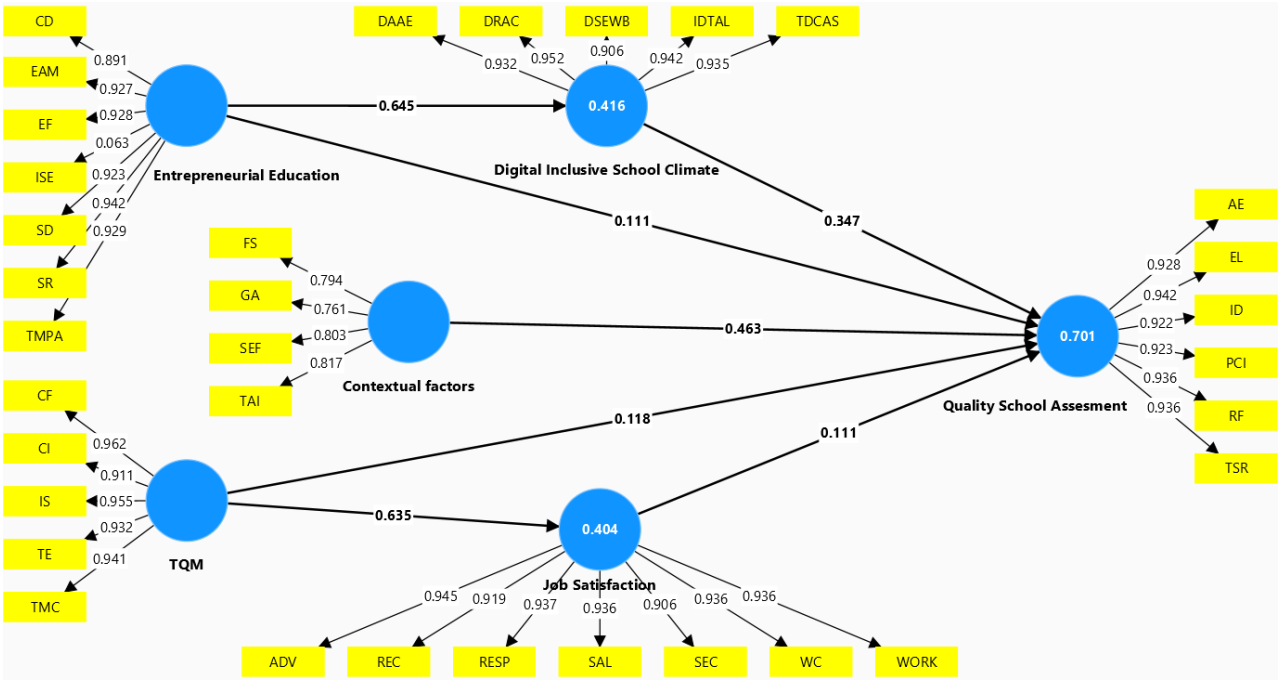
Construct	Contextual factors	Digital Inclusive School Climate	Entrepreneurial Education	Job Satisfaction	Quality School Assesment	TQM
Contextual factors	**0.794**	-	-	-		
Digital Inclusive School Climate	0.562	**0.934**	-	-		
Entrepreneurial Education	0.619	0.645	**0.855**	-		
Job Satisfaction	0.080	-0.044	-0.025	**0.931**		
Quality School Assessment	0.750	0.671	0.623	0.205	**0.931**	
TQM	0.123	-0.018	0.038	0.635	0.244	**0.940**

Source: Authors' computations.

4.4.3. 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 4: Structure Model-Path Coefficient Testing from different Dimensions



Source: Authors' computations.

4.4.4. Variants of Endogenous Variables

R^2 was calculated to test the explanatory power of the structural model by showing the proportion of variance in endogenous variables explained by exogenous variables. Following conventional guidelines, R^2 of 0.75 or above is considered to be substantial, 0.50 as moderate, and 0.25 as weak. The estimated R^2 values for the endogenous constructs are presented in Table15. The R^2 for the quality school assessment was 0.701, which explained that Entrepreneurial Education, Total Quality Management, Contextual Factors, Digital Inclusive School Climate, and Job Satisfaction jointly accounted for 70.1% of the variance in school quality, hence a very strong explanatory power of the model. The R^2 value for Digital Inclusive School Climate was 0.416, indicating that Entrepreneurial Education explained 41.6% of the total variance in digital inclusive school climate, depicting a medium level of explanation. Finally, the R^2 value for Job Satisfaction was 0.404, hence TQM explained 40.4% of the total variance in job satisfaction and, therefore, was also at a moderate explanatory strength level.

Table 17: Results of R2 Test

Variable	R^2	%	Criteria
Digital Inclusive School Climate	0.416	41.6%	Moderate
Job Satisfaction	0.404	40.4%	Moderate
Quality School	0.701	70.1%	Strong

Source: Authors' computations.

4.4.5. The Goodness-of-Fit Evaluation

Q^2 (Q-squared) measures how well this model predicts new data. A high Q^2 (close to 1 or 100%) means that the model is very strong predictive relevance, this means the model has excellent capabilities to predict the dependent. The value of this model represents, Q^2 = 89.2% showed strong predictive model.

$$Q^2 = 1 - (1 - R_1^2)\,(1 - R_2^2) \ldots (1 - R_p^2)$$

$$= 1 - (1 - 0.454)\,(1 - 0.803)$$

$$= 1 - 0.108$$

$$= 0.892$$

Table 18: Results of Path Coefficient Test

Hypothesis	Original sample (O)	SD	"T-statistics t = (O/SE)"	SE = (O/T)
CF →QSA	0.463	0.047	9.781	0.0473
DISC →QSA	0.347	0.047	7.332	0.0473
EE →DICS	0.645	0.038	17.037	0.0379
EE →QSA	0.111	0.055	2.005	0.0554
JS →QSA	0.111	0.051	2.191	0.0507
TQM →JS	0.635	0.044	14.418	0.0440
TQM →QSA	0.118	0.049	2.419	0.0488

Source: Authors' computations.

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

"SE is the standard error, to check how reliable the numbers are and to compare studies later. For current study results confirm they match closely.

Table 19: 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' computations.

Table 20: 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' computations.

4.4.6. Significance of the Structural Model and Hypothesis Testing

To validate the structural model, bootstrapping was utilized using 5,000 subsamples to examine the validity of the postulated relationships. Table 16 and 17 presents the results of the route coefficient analysis, including the values for the original sample (O), the standard deviation (SD), the t-statistics (O/SE), and the judgments concerning the hypothesis. The important outcomes are as follows:

Impact of Entrepreneurial Education (EE) → Digital Inclusive School Climate (DISC): EE → DICS ($\beta = 0.645$, $p < 0.05$) showed a strong positive influence with a value of 0.645, meaning an increase in EE raises DICS significantly. This indicates that Entrepreneurial education enhance the school climate improves substantially. Specifically, a one-unit increase in EE leads to a 0.64 unit increase in SC. This large coefficient showed Entrepreneurial Education is a key driver of a positive school environment.

Impact of Entrepreneurial Education (EE) → Quality School Assesment (QSA): EE → QSA ($\beta = 0.111$, $p < 0.05$) has a smaller influence (0.111), indicating a slight positive effect of EE on QSA. This means well-implemented Entrepreneurial Education significantly boosts the performance of school.

Impact of Digital Inclusive School Climate (DISC) → Quality School Assesment (QSA): DISC → QSA ($\beta = 0.347$, $p < 0.05$) showed a positive influence with a value of 0.347. This indicated that an increase in DISC increases QSA by 0.347.

Impact of Total Quality Management (TQM) → Job Satisfaction (JS): TQM → JS ($\beta = 0.635$, $p < 0.05$) showed a strong influence 0.635 means well implementation of TQM significantly boosts employee satisfaction.

Impact of Job Satisfaction (JS) → Quality School Assesment (QSA): JS → QSA ($\beta = 0.111$, $p < 0.05$) also showed a minor positive influence (0.111). QSA is positively but marginally impacted by Job Satisfaction (JS). QSA increases by 0.111 units for each unit rise in JS. This suggests that although contented workers do have an impact on service quality, it is not as great as that of other factors like entrepreneurial education.

Impact of Total Quality Management (TQM) → Quality School Assessment (QSA): TQM → QSA ($\beta = 0.118$, $p < 0.05$) showed a slight positive influence (0.118). This effect is statistically significant.

Impact of Contextual factor (CF) → Quality School Assessment (QSA): CF → QSA shows a positive influence with a value of **0.463**. This indicates that an increase in the CF variable increases QSA by 0.463.

4.4.7. Hypothesis Testing (Bootstrapping)

A 5% significance level was used. If the T-statistic > **1.90** or the p-value < **0.05**, the hypothesis is accepted.

From Table 5:

1. **EE → DICS** has T-statistic **17.037** (p < .05) → **Hypothesis accepted**.
2. **EE → QSA** has T-statistic **2.005** (p < .05) → **Hypothesis accepted**.
3. **DISC → QSA** has T-statistic **7.332** (p < .05) → **Hypothesis accepted**.
4. **TQM → JS** has T-statistic **14.418** (p < .05) → **Hypothesis accepted**
5. **JS → QSA** has T-statistic **2.191** (p < .05) → **Hypothesis accepted**.
6. **TQM → QSA** has T-statistic **2.419** (p < .05) → **Hypothesis accepted**.
7. **CF → QSA** has T-statistic **9.781** (p < .05) → **Hypothesis accepted**.

4.4.8. Overall Model Quality

This model has high explanatory power with an average 70.1% explained overall excellent quality. All path coefficients are statistically significant, meaning each independent variable has a meaningful influence on the dependent variable in the model.

4.5 Findings of Qualitative Analysis

How do stakeholders perceive the key enablers and barriers to implementing Entrepreneurial Education (EE) and TQM practices in schools serving hearing-impaired learners?

Five overarching themes emerged from the analysis, comprising fourteen sub-themes that together explain how stakeholders perceive the enablers and barriers shaping entrepreneurial education (EE) and Total Quality Management (TQM) in schools for hearing-impaired learners (see Table 19). The five themes are (1) Empowering Entrepreneurial Education, (2) Socio-Economic & Cultural, (3) Systemic Barriers, (4) Quality-Culture & Improvement, and (5) Inclusive Climate & Staff Well-being; the fourteen sub-themes span student agency & confidence, real-world integration, mentorship & role models; family attitudes & social norms; economic problem; resource & staffing gaps, geography & access, infrastructure limits; structured tools, data visibility, innovation loops; and inclusive practice, participatory leadership, workload & growth. This thematic structure provides a coherent answer to RQ7 by showing what helps, what hinders, and how organisational conditions convert intentions into outcomes.

Table 21: Themes, Sub-themes, Codes, and Sample Quotations (R = Response)

Theme	Sub-theme	Code	Sample quotation
	Student agency & confidence	Agency Boost	"*Entrepreneurial education boosts self-confidence... skills like digital literacy,*

			tailoring, and arts enable students to contribute to their communities." (R1)
		Resilience Build	"*Entrepreneurial tasks build resilience; students learn to handle failure safely within school…*" (R11)
Empowering Entrepreneurial Education	Real-world integration	Market Exposure	"*Exposure to market stalls and simple e-commerce tasks teaches students how to monetise crafts…*" (R6)
		Hands-on Fusion	"*When students manage a small campus garden shop, they apply science concepts and bookkeeping skills…*" (R10)
	Mentorship & role models	Mentor Catalyst	"*By involving local artisans as mentors, schools link the curriculum to community industries…*" (R8)
		Role Models	"*Successful mini-enterprises create role-model stories that inspire younger cohorts…*" (R21)
Socio-Economic & Cultural	Family attitudes & social norms	Awareness Gap	"*Most families lack awareness… and are unable to participate in school decisions."* (R3)
		Stigma Pressure	"*Collaborative ventures… reduce stigma."* (R15)
	Economic problem	Income Divide	"*Affluent… better support… Poor students lack school supplies, nutrition*." (R5)
		Rural Isolation	"*Particularly in rural schools... without exposure to basic entrepreneurial principles*." (R3)
Systemic Barriers	Resource & staffing gaps	Trainer Scarcity	"*…lack of trained educators, limited resources, and no formal entrepreneurship curriculum…*" (R2)
		Funding Gaps	"*The majority of schools … face significant gaps in funding, training, and equipment*." (R3)
	Geography & access	Rural Isolation	"*…particularly in rural schools, leaving students without exposure to basic entrepreneurial principles*." (R3)
		Transport Limit	"*Policy allows school transport only within a 50-kilometre radius … areas 70–100 km away remain unserved."* (Principal note)
	Infrastructure limits	Tech Shortage	"*…limited internet and power cuts make digital-skills workshops impractical."* (R11)
		Safety Constraint	"*Safety regulations stopped our planned carpentry course until we get proper tools*." (R19)
Quality-Culture & Improvement	Structured tools	PDCA Culture	"*Continuous-improvement charts (Plan-Do-Check-Act) are posted in every classroom.*" (R15)

		KPI Vigilance	"*We track KPIs, attendance, device uptime, sign-language usage and discuss red flags every Monday*." (R9)
		Micro-Walkthroughs	"*We conduct fortnightly micro-walkthroughs, focusing on sign-language accessibility*." (R23)
	Data visibility	Data Dashboards	"*Digital dashboards track attendance, lesson completion, and sign-language usage rates.*" (R9)
		Excel Tracker	"*Assessment data feed into an Excel tracker that flags learners needing support.*" (R22)
	Innovation loops	Innovation Expo	"*We host a bi-annual 'innovation expo' where staff showcase new techniques and vote on ones to adopt.*" (R15)
		Lesson Study	"*We run fortnightly 'lesson-study' groups where pairs of teachers co-plan, observe, and refine one class."* (R4)
Inclusive Climate & Staff Well-being	Inclusive practice	Sign Fluency	"*Some schools utilise visual aids, role-play … where teachers are trained in sign language…*" (R1)
		Buddy Bridges	"*A peer-buddy system pairs hearing and deaf students, creating interactive, supportive study groups*." (R6)
		Captioned Tech	"*Teachers use captioned videos and real-time speech-to-text apps, markedly boosting engagement*." (R7)
	Participatory leadership	Assembly Access	"*Morning assemblies include live sign translation, modelling respect for deaf culture school-wide*." (R9)
		Student Council	"*Deaf students sit on the student council and captain sports teams…*" (R21)
	Workload & growth	Role Overload	"*Some teachers report job dissatisfaction due to being overburdened…*" (R3)
		Burnout	"*Teachers are expected to multitask without extra compensation, which leads to burnout*." (R2)
		Growth Pathways	"*Recognition by higher authorities, job stability, and freedom in lesson planning motivate teachers*." (R1)

Source: Authors' computations.

The following section elaborates four main themes that emerged from the thematic analysis of 24 stakeholder interviews addressing RQ6, each supported by verbatim quotations (R1–R24). These themes provide a coherent and practically useful account of how and why EE and TQM succeed or struggle in schools serving hearing-impaired learners.

Theme 1: Empowering Entrepreneurial Education

Stakeholders explained that entrepreneurial education helps students become more confident and practical in daily life. One participant shared that entrepreneurial activities help students learn skills such as basic computer use, tailoring (stitching), arts and beautician, which allow them to contribute

to their families and communities. For example, exposure to small market stalls or simple online selling activities helped students understand how to earn income from their work. In some schools, students managing small garden or shop projects were able to apply what they learned in science and basic accounting in a practical way. Participants also emphasized that entrepreneurial education works best when students are guided by mentors and role models. Involving local craftsmen and community workers as mentors helped connect classroom learning with real community businesses.

> "*Entrepreneurial education boosts self-confidence, decision-making, and income-generating skills in hearing-impaired students, especially in urban areas where opportunities are more accessible. Skills like digital literacy (computer use), tailoring (stitching), arts and beautician enable students to contribute to their communities*." (R1).

Overall, participants viewed entrepreneurial education as a practical teaching approach that links learning with real economic opportunities and prepares hearing-impaired students for independent and productive lives.

Theme 2: Socio-Economic & Cultural

Participants explained that **family attitudes and social norms strongly influence whether entrepreneurial education and quality practices can succeed**. Many families lack awareness about these programs and are therefore unable to support or take part in school decisions. Some parents prefer an exam-focused approach and worry that practical activities may distract students from academic preparation. Others noted that social stigma can prevent students from participating in group or mixed activities, as a result, families often act as gatekeepers who decide how much time, permission, and encouragement students receive.

Economic and location-based differences also shape participation. Students from better-off families receive more support, while those from poorer households struggle due to lack of basic resources and proper nutrition. Participants further highlighted that rural students face fewer opportunities and limited exposure to entrepreneurial learning. These economic and geographic barriers reduce access to mentors, market connections, and regular quality practices, weakening the impact of both entrepreneurial education and TQM for hearing-impaired learners.

Theme 3: Systemic Barriers

Participants pointed out several **system-level problems** that weaken both entrepreneurial education and quality management in schools for hearing-impaired students. A major issue is the shortage of trained teachers, lack of professional development (outdated trainings) limited resources, and the absence of a structured entrepreneurship curriculum. Many schools also face ongoing funding shortages, which make it difficult to plan and continue practical learning activities. Distance and location create further barriers, as transport support often covers only nearby areas, leaving students in remote locations unable to access schools regularly.

Infrastructure problems were also widely reported. Unreliable electricity and poor internet connectivity frequently disrupt digital learning and skill-based activities. These limitations also affect monitoring and quality practices that depend on digital tools. Together, these systemic challenges

reduce schools' ability to deliver consistent, technology-supported learning and to maintain the quality processes needed for effective entrepreneurial and inclusive education.

> "*Limited internet and power cuts make digital-skills workshops impractical*." (R11) "*Digital dashboards track attendance, lesson completion, and sign-language usage rates*." (R9) "*Assessment data feed into an Excel tracker that flags learners needing support*." (R22)

Physical safety rules and equipment shortages further curtailed implementation by narrowing what schools could attempt and sustain. Respondents pointed to regulatory constraints, broken systems, and stalled procurement as interlocking obstacles that make improvement fragile. The following extended, multi-voice excerpt illustrates these limits:

> "*Safety regulations stopped our planned carpentry course until we get proper tools*." (R19) "*Broken hearing-loop systems and poor acoustics limit effective participation despite good intentions*." (R8) "*Improvement plans exist on paper, but budget freezes stall almost every action step*." (R23)

Together, these statements indicate that even motivated staff are forced to scale back or postpone initiatives when basic tools, assistive facilities or funding are limited, especially in schools that need consistent support the most.

Theme 4: Quality-Culture & Improvement

Stakeholders perceived visible, routine quality practices as key enablers that amplify EE. Multiple schools displayed "*Continuous-improvement charts (Plan-Do-Check-Act) … in every classroom*" (R15) and met weekly to "*track KPIs—attendance, device uptime, sign-language usage—and discuss red flags*" (R9). These practices were reinforced by micro-walkthroughs that "*focus[ed] on sign-language accessibility*" (R23). Taken together, these routines align with a continuous-improvement ethos that keeps staff attention on learner access and progress. "*Digital dashboards track attendance, lesson completion, and sign-language usage rates*" (R9),

Stakeholders explained that regular and visible quality routines help strengthen entrepreneurial education in schools. Many schools use simple tools such as improvement charts, weekly meetings, and tracking of attendance, device use, and sign-language support to stay focused on student progress. Making data visible through charts or basic digital dashboards helps teachers quickly see learning gaps and respond in time. These practices support continuous improvement by guiding small, timely actions rather than relying on guesswork. In contrast, schools with weak record-keeping and informal feedback tend to respond only when problems become serious, which slows improvement. Overall, consistent documentation and data use help sustain quality practices and keep attention on learning access and progress.

Theme 5: Inclusive Climate & Staff Well-being

Participants explained that inclusive communication and student leadership play a key role in making entrepreneurial education and quality practices work. Schools that used visual aids, sign language, and peer support systems created a more welcoming learning environment. In some cases,

deaf students were actively involved in assemblies, student councils, and sports leadership, which helped normalise participation. However, heavy workloads made it difficult for teachers to sustain these efforts. When staff were overburdened, activities such as skill clubs, data review, and quality improvement slowed down. Strong implementation was seen in schools where inclusive practices were supported by manageable workloads.

4.6. Discussion and Conclusion

The structural model demonstrates that Entrepreneurial Education has a strong and positive influence on Inclusive School Climate, indicating that entrepreneurship-oriented curricula, skills development, and experiential learning practices contribute meaningfully to creating an inclusive and supportive school environment. Entrepreneurial Education also shows a direct positive effect on Quality School Assessment, suggesting that innovative and skill-based educational approaches enhance overall school quality outcomes. Contextual Factors, including family, socio-economic, and environmental conditions, significantly influence Quality School Assessment, highlighting the importance of external support systems in strengthening school performance. Similarly, Total Quality Management (TQM) exhibits a substantial positive relationship with Job Satisfaction, reflecting that structured processes, leadership commitment, and continuous improvement practices improve staff morale and satisfaction. Job Satisfaction, in turn, positively contributes to Quality School Assessment, indicating its mediating role in translating management practices into measurable quality outcomes. Furthermore, Inclusive School Climate also positively affects Quality School Assessment, emphasizing that inclusive practices, collaboration, and supportive environments are essential for achieving high-quality educational performance. Overall, the model explains a substantial proportion of variance in Quality School Assessment, confirming the combined importance of entrepreneurial education, management quality, contextual support, inclusive climate, and staff satisfaction in improving school performance.

The qualitative evidence indicates that EE functions as an agentic, market-connected pedagogy that is strengthened by routine quality practices and an inclusive, well-resourced climate. Conversely, thin staffing, funding gaps, distance, and infrastructure deficits jointly constrain implementation, with workload pressures further weakening follow-through. These findings suggest that scaling EE and TQM for hearing-impaired learners requires simultaneous investment in dual-competency staffing, reliable infrastructure, institutionalised data routines, and basic conditions for inclusion. Such a configuration addresses both the enablers and barriers that stakeholders identified, thereby offering a coherent answer to RQ7.

CONCLUSION

This research is of great importance because it can help improve public policy in Pakistan as it highlights the main problems identified among the hearing-impaired students, leads to informed strategies for policy development and advocates more inclusiveness and effectiveness in educational practices. The research may contribute to raise the quality of educational administration in both developed and developing nations by proposing equity in growing up through turning all school children of Pakistan on state feed, supported by entrepreneurial education and TQM, and considering the roles of school climate and teacher satisfaction, the research encourages equity in developing into higher quality educational administration by focusing on feeding all school children of Pakistan.

5.1. Expected Public Policy Implications

1. **Shift from Access-Only to Performance-Based Policy:** Public policy should not just be about increasing enrollment but also focus on quality learning. The quality that that can transform student's skill & knowledge into income. This could be possible when performance indicators Entrepreneurial education, TQM, DISC and teacher job satisfaction must include.
2. **Disability Sensitive Financing reforms**: HI schools cost more to run, but current funding does not recognize this reality. Equity requires unequal but fair funding. Protect non-salary budget for assistive devices, purpose buildings, transport, ICT and captioning tools, visual aids.
3. Institutionalize a Context-Responsive Quality Assurance System (QAS)
4. Global quality models (ISO, EFQM, Baldrige) must be adapted, not copied.
5. Governance Reform through Decentralization
6. In New public management/service decision should be decentralized. Centralized control delay decisions and ignore local needs.
7. Teacher Centric policy approach
8. Teachers are the main drivers of quality education. If Govt wants to improve a school support and empower teachers.
9. Integrate Entrepreneurial Education as a Learning KPI
10. Quality education happens in the 21st century where education encompasses more than classroom learning. Inclusion of entrepreneurship and life skills as key performance indicators of education. Since HEC has previously recommended "comprehensive education for entrepreneurs," why can't the government include it as KPI? "The Government of Pakistan has been providing students with more entrepreneurial and future-ready education." This implies that the brands of the Government of Pakistan are defined by skilled Branding.
11. Promote School Climate as a Policy Tool
12. A supportive school environment enhances learning outcomes over and above the physical infrastructure. Encourage, "Curriculum Innovation and Student-Centered Technology, Motivated Learning Strategies, Digital Learning Experience & Cognitive Response, Interactive & visual-Based Pedagogy, Teaching Quality & Instructional Depth, Collaborative and Active

Learning, Inclusive leadership, Learner-Centered Education in Technology-Enhanced Environments," a completely new conceptual integration in the literature. School climate variables (index) to monitor in school evaluation, "Quality grows where trust exists.

13. Rural and Gender-Inclusive Expansion Strategy

14. Rural boys and girls face the most significant access gaps. Expand HI schools in underserved districts, provide safe transportation, gender-sensitive facilities, and hostel support as needed.

15. Policy Alignment for Digital and Assistive Technologies

16. Assistive Technology should be made a Fundamental Right in Education.

17. Alignment with the SDGs and Modern Public Administration

18. This model reflects Pakistan's worldwide commitments. By Supporting SDG 4 (Quality Education), SDG 8 (Decent Work), and SDG 10 (Reduced Inequality)

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

RECOMMENDATION / POLICY IMPLICATIONS

6.1. Relevance and Value of the Research to Public Policy in Pakistan

1. Integrate Digitalized curriculum including Entrepreneurial Education: Integrate Digitalized curriculum including Entrepreneurial Education into the national syllabus to develop students' skills, creativity, problem-solving, and business skills from an early stage, especially for hearing-impaired learners. 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. Starting a Matric (10th grade) level program that focuses on vocational (practical and job-related) subjects, so that students can learn useful skills for future jobs or self-employment. Govt. introduce internship programs for Matric students. Govt. should first improve digital curriculum due to low cost than provide relevant trainings to the teacher for successful implement the curriculum than last but no least due to time taking process make effective policies for the people to improve their socio-economic factor through Govt. Assistance.

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. HI schools cost more to run, but current funding does not recognize this reality. Equity requires unequal but fair funding. 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.

4. Governance Reform through Decentralization: In New public management/service decision should be decentralized. In Centralized control, decision making delayed and ignore local needs. Govt. should establish district level special education unit. From 41 districts only 17 DEO posted, which is not sufficient for monitoring & evaluation. Grant schools limited financial and operational resources autonomy. The school principals must be authorized to handle assistive resources, maintenance devices, local partnership and teacher development. Good governance means closer governance.

5. Teacher Centric policy approach: Teachers are the main drivers of quality education. If Govt wants to improve the quality of school they should support and empower teachers. Link TQM practices with Job security, recognition and career progression. There should be mandatory CPD in sign language and inclusive pedagogy, address work load and emotional stress.

Satisfied teachers deliver better quality. Teachers are the primary drivers of outstanding education. If the government has to increase the quality of education, it should support and empower teachers. Link TQM practices to job security, recognition, and career advancement. There should be mandated continuing professional development in sign language and inclusive pedagogy to alleviate work load and emotional stress. Satisfied teachers provide better quality.

6. Integrate Entrepreneurial Education as a Learning KPI: Quality education happens in the 21st century where education encompasses more than classroom learning. Inclusion of entrepreneurship and life skills as key performance indicators of education. Coverage of education curriculum through: Problem-solving skills, Digital skills, Paths of self-employment. Quotas should be fixed for HI students in TVET institutions. Independence, not dependence, should be developed through education. Since HEC has previously recommended "comprehensive education for entrepreneurs," why can't the government include it as KPI? "The Government of Pakistan has been providing students with more entrepreneurial and future-ready education." This implies that the brands of the Government of Pakistan are defined by skilled Branding.

7. Promote Digital Inclusive School Climate as a Policy Tool: Digital Inclusive School climate variables (index) to monitor in school evaluation. A supportive school environment enhances learning outcomes over and above the physical infrastructure. Encourage, "Curriculum Innovation and Student-Centered Technology, Motivated Learning Strategies, Digital Learning Experience & Cognitive Response, Interactive & visual-Based Pedagogy, Teaching Quality & Instructional Depth, Collaborative and Active Learning, Inclusive leadership, Learner-Centered Education in Technology-Enhanced Environments," a completely new conceptual integration in the literature. "Quality grows where trust exists.

8. Rural and Gender-Inclusive Expansion Strategy: Rural boys and girls face the most significant access gaps. Expand HI schools in underserved districts, provide safe transportation, gender-sensitive facilities, and hostel support as needed. Inclusion without reach is symbolic.

9. Policy Alignment for Digital and Assistive Technologies: Technology is not an option in HI education anymore. Assistive Technology should be made a **Fundamental Right in Education**. Ensure Budgets for maintenance, Training for teachers, Cyber security measures, Inclusion is unaccomplished without technology.

10. Alignment with the SDGs and Modern Public Administration: This model reflects Pakistan's vision, mission and worldwide commitments. By Supporting SDG 4 (Quality Education), SDG 8 (Decent Work), and SDG 10 (Reduced Inequality). Promotes management driven on outcomes. Policy formulation based on empirical evidence. Governance centered on the requirements of people. This paradigm revises the governance of special education.

11. Align with International Development Partners (World Bank, UNICEF, UNESCO): This research is in line, with the World Bank, UNICEF and UNESCO by emphasis on inclusive education, human capital development, and equitable access for children with disabilities. The proposed Quality Assurance System (QAS) supports the World Bank's Human Capital Index by improving learning outcomes through better governance, teacher performance, and assistive infrastructure. By integrating quality assurance, digital Inclusive school climate, and contextual support, the model offers an evidence-based framework that development partners can support through financing, capacity building, and system-level reforms.

12. The Development of Professional Certificate Module for Special Education Teachers: Develop the professional certificate module for special education HI teachers.

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

Table 22: Unmet Social Needs of Hearing-Impaired (HI) Students and Required Protections

Unmet Social Need	Why It's a Problem for HI Students	Required Protection / Policy Action
Access to Schools	Most HI schools are concentrated in cities; rural children have no nearby option.	Establish more HI schools in rural areas; provide safe transport and hostel facilities. Established purpose-built campuses.
Assistive Devices	Tech Intervention, Hearing aids, cochlear implants, and batteries are expensive; most poor families cannot afford them.	Free or subsidized provision of devices; regular maintenance and replacement by government.
Safe & Gender-Sensitive Facilities	Girls face lack of separate toilets, hygiene support, and safe transport; parents hesitate to send them.	Build gender-sensitive WASH facilities; ensure safe transport with female attendants, clean drinking water, medical assesment.
Quality Teachers & Training	Shortage of trained special education teachers, especially in rural areas.	Continuous Professional Development (CPD); hiring through PPSC; rural posting incentives.
Vocational & Career Pathways	HI students often end education without job skills, leading to unemployment.	Introduce vocational training linked to TEVTA/PVTC; reserve quotas for HI students in skills programs.
Community Acceptance	Stigma, discrimination, and social isolation keep families from enrolling HI children.	Community awareness campaigns; parent counseling; inclusion of HI role models in media.
Inclusive Policy	Govt. face problems in inclusive education	Govt. take initiative from partial segregation
Financial Burden on Families	Even "free" schools require uniforms, transport, and materials which poor families cannot cover.	Cash stipends, scholarships, and Ehsaas/BISP-style support for disabled students.

Source: Authors' compilations.

The findings of the present study underscore that school quality assurance for students with hearing impairment cannot be improved through institutional reforms mentioned above alone without addressing the contextual factors. Socio-economic constraints, ineffective government support, a lack of assistive technology, and weak family support are powerful contextual variables that determine the way policies emanate at the school level. For this reason, public policy must shift toward context-responsive implementation, providing schools in disadvantaged and rural areas with additional financial resources, assistive infrastructure, and mechanisms for community engagement. Only by embedding contextual factors in policy design and implementation can the government ensure that the proposed quality assurance reforms, entrepreneurial education initiatives, and management practices yield fair, relevant, and quality learning outcomes. This would enhance the alignment of public policy with the three pillars of governance, access, and quality as prescribed in the Punjab Special Education Policy 2020.

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APPENDICES

Appendix I: Project Questionnaire

Title: Optimizing School Performance for Hearing-Impaired Students in Bahawalpur and Multan

Dear-Respondent,

I am working on a research project funded by RASTA, titled "Optimizing School Performance for Hearing-Impaired Students in Bahawalpur and Multan." Your honest and objective response will be highly appreciated.

Section I: Demographic Part

Name (optional):	
Qualification:	☐ B.Ed ☐ M.Ed ☐ M.Phil ☐ PhD ☐ Others: _____
Age:	☐ Below 30 ☐ 30 - 40 ☐ Above 40
Gender:	☐ Male ☐ Female
School:	☐ Urban ☐ Rural
Designation:	☐ Teacher ☐ Principal ☐ Others: _____

Professional Experience: ☐ Below 5 years ☐ 5-10 years ☐ Above 10 years

Please indicate your views by making a tick (☑)with the box of your choice against each statement.

SA= Strongly Agree
A= Agree
UD= Undecided
DA= Disagree
SDA=Strongly Disagree

Entrepreneurial Education

Curriculum Design:

Sr.#	Statement	SDA	DA	UD	A	SA
1.	The curriculum includes entrepreneurship-related topics.					
2.	The curriculum is designed to meet the needs of hearing-impaired students.					
3.	Entrepreneurial education is aligned with students' future career needs.					
4.	The curriculum promotes creativity and innovation in students.					

Teaching Methods and Pedagogical Approaches:

Sr.#	Statement	SDA	DA	UD	A	SA
6.	Teachers use interactive and experiential teaching methods for entrepreneurship.					
7.	Teaching strategies are adapted for hearing-impaired students.					
8.	Case studies and project-based learning are used in entrepreneurial education.					
9.	Visual aids and technology are effectively used in entrepreneurial lessons.					

Skill Development:

Sr.#	Statement	SDA	DA	UD	A	SA

11.	Students develop communication and leadership skills through entrepreneurial activities.					
12.	The program focuses on real-life problem-solving skills.					
13.	Students gain confidence in presenting and pitching their ideas.					
14.	Students learn teamwork and collaboration through entrepreneurial tasks.					

Entrepreneurial Attitude and Mindset:

Sr.#	Statement	SDA	DA	UD	A	SA
15.	Students are encouraged to take initiative and be self-reliant					
16.	The school environment promotes a growth mindset and resilience.					
17.	Students show increased interest in starting their own ventures					
18.	Risk-taking is seen as a positive learning experience.					

Support and Resources:

Sr.#	Statement	SDA	DA	UD	A	SA
19.	Adequate resources (materials, tools, space) are available for entrepreneurship activities.					
20.	Students have access to mentors or coaches for guidance					
21.	Learning materials are suitable for hearing-impaired students.					
22.	The school provides digital tools to support entrepreneurial learning					

Evaluation and Feedback:

Sr.#	Statement	SDA	DA	UD	A	SA
23.	Entrepreneurial activities are assessed through appropriate and fair evaluation methods.					
24.	Students receive constructive feedback to improve their entrepreneurial skills.					
25.	Evaluation processes support learning and growth in entrepreneurship.					
26.	Assessment is inclusive of all learning styles and challenges.					

Institutional Support and Environment:

Sr.#	Statement	SDA	DA	UD	A	SA
27.	The school leadership supports entrepreneurial education initiatives.					
28.	There is a culture of innovation and creativity in the school.					
29.	The school has clear goals for entrepreneurial education					
30.	Facilities and infrastructure support entrepreneurial activities.					

Family Support: Moos & Moos, 2002, Family heath Scale (Crandall et al.,2020)

Sr.#	Statement	SDA	DA	UD	A	SA
31.	Families encourage students to participate in entrepreneurial activities					
32.	Parents are informed about the importance of entrepreneurial education.					
33.	Family involvement enhances student motivation and performance..					
34.	Family values align with the goals of entrepreneurial learning.					

Government Assistance: (No Scale Exists)

Sr.#	Statement	SDA	DA	UD	A	SA
35.	Government programs support entrepreneurial education for special students					

36.	Funding and resources are provided by the government to support entrepreneurship.					
37.	There is policy-level recognition of entrepreneurship education in special education					
38.	Government provides training/workshops for teachers on entrepreneurship.					

Socio-economic Factor: parental education, occupation, household possess

Sr.#	Statement	SDA	DA	UD	A	SA
39.	Socio-economic status of students affects their participation in entrepreneurial activities.					
40.	Financial challenges hinder access to entrepreneurship programs.					
41.	Students from economically disadvantaged backgrounds receive adequate support.					
42.	Community initiatives help bridge socio-economic gaps in entrepreneurship education.					

Technology & Assistive Infrastructure: TAI (Mahmood & Anwar, **2025)**

Sr.#	Statement	SDA	DA	UD	A	SA
43.	My school provides students with hearing aids, captioned tools, or other assistive technologies that support learning.					
44.	Classrooms are equipped with digital infrastructure (e.g., projectors, captioning software, visual alerts) suitable for hearing-impaired students.					
45.	Teachers are trained to use assistive and digital technologies effectively in teaching hearing-impaired students.					
46.	There is regular maintenance and technical support for assistive devices and digital tools in my school.					

Total Quality Management

Top Management Commitment: (Mahmood, 2020)

Sr.#	Statement	SDA	DA	UD	A	SA
1.	Top management is actively involved in quality management in my school.					
2.	Top management promotes a philosophy of delivering quality education.					
3.	Top management encourages the involvement of all staff in quality management.					
4.	Top management regularly discusses quality-related issues with higher authorities.					
5.	Top management applies TQM principles in leading the school.					
6.	My school has clear quality goals set by top management.					
7.	Top management allocates resources to achieve quality goals.					
8.	Top management develops an integrated quality plan to achieve school objectives.					
9.	Top management demonstrates a daily commitment to TQM practices.					

Customer Focus:

Sr.#	Statement	SDA	DA	UD	A	SA

10.	My school collects information regarding customer complaints.					
11.	Customer focus is a long-standing practice in my school.					
12.	The school conducts annual customer satisfaction surveys.					
13.	The school gathers recommendations from internal and external customers for improvement.					

Training and Education:

Sr.#	Statement	SDA	DA	UD	A	SA
14.	Training increases work quality, and research & development are emphasized during teachers' careers.					
15.	Quality awareness education is provided to all staff.					
16.	Financial resources are allocated for training and education to achieve quality in teaching surveys.					
17.	Staff are interested in attending quality-related seminars or training programs.					

Involvement of all staff:

Sr.#	Statement	SDA	DA	UD	A	SA
18.	Teachers collaborate to improve school quality.					
19.	All staff actively participate in programs to improve teaching and learning quality.					
20.	All staff are committed to the school's success.					
21.	All staff focused on improving teaching skills.					

Continuous improvement:

Sr.#	Statement	SDA	DA	UD	A	SA
22.	Our school has a database that supports continuous improvement processes					
23.	My school widely uses the PDCA (Plan-Do-Check-Act) cycle for continuous improvement.					
24.	Training in problem identification and solving skills is provided to staff.					

Digital Inclusive School Climate

Digital Access & Equity: (DAAE, 5)

Sr.#	Statement	SDA	DA	UD	A	SA
1.	My school provides sufficient digital devices to support teaching and learning.					
2.	I always have the opportunity to work through Internet.					
3.	Internet access in the school is reliable for classroom activities.					
4.	Digital and assistive technologies are available for students who need additional support.					
5.	All students have equal opportunities to benefit from digital learning resources.					

Digital Relationship & Belonging: (DRAC, 6.6)

Sr.#	Statement	SDA	DA	UD	A	SA
7.	Digital platforms improve communication between teachers and students.					
8.	Students collaborate positively with each other using digital tools.					
9.	Digital communication strengthens relationships between school and parents.					
10.	Technology helps create a sense of inclusion and belonging among students.					

Teacher Digital Capacity & Support: (TDCAS, 5)

Sr.#	Statement	SDA	DA	UD	A	SA
11.	I feel confident using digital technologies for teaching.					
12.	The school provides adequate training to improve teachers' digital skills.					
13.	Technical support is available when digital problems occur.					
14.	Teachers are encouraged to integrate digital tools into their teaching practices.					

Digital Safety, Ethics & Well-Being: (DSEWB, 3.9)

Sr.#	Statement	SDA	DA	UD	A	SA
15.	The school promotes safe and responsible use of digital technologies.					
16.	Clear rules exist regarding ethical and appropriate use of digital tools.					
17.	Students feel safe while using digital platforms at school.					
18.	The school takes steps to protect privacy and digital well-being.					
19.	Support is available for students who face stress, misuse, or harassment related to digital technology use.					
20.	The school provides awareness sessions or training on cyber safety and responsible digital behavior.					

Inclusive digital Teaching & Learning: (IDTA, L5.8)

Sr.#	Statement	SDA	DA	UD	A	SA
18.	I use digital tools to address different learning needs of students.					
19.	Digital teaching materials are designed to be understandable for all students.					
20.	Technology helps me reduce learning barriers in my classroom.					
21.	Digital methods increase student engagement in lessons.					

Job Satisfaction (Lester, 1987)

Salary and Incentives:

Sr.#	Statement	SDA	DA	UD	A	SA
1.	Teacher income is barely enough to live on.					
2.	Teacher income is adequate for normal expenses.					
3.	Teaching provides me with financial security.					
4.	Teacher income is less than I deserve.					
5	I am well paid in proportion to my ability.					

Working Conditions:

Sr.#	Statement	SDA	DA	UD	A	SA
6.	Working conditions in my school are good.					
7.	Working conditions in my school are comfortable.					
8.	Physical surroundings in my school are unpleasant.					
9.	The administration in my school does not clearly define its policies.					
10.	The administration in my school communicates its policies well.					

Pay/ Salary:

Sr.#	Statement	SDA	DA	UD	A	SA
11.	Teacher income is barely enough to live on.					
12.	Teacher income is adequate for normal expenses.					
13.	Teaching provides me with financial security.					
14.	I am well paid in proportion to my ability.					

Responsibility:

Sr.#	Statement	SDA	DA	UD	A	SA
15.	I get along well with my students.					
16.	I try to be aware of the policies of my school.					
17.	I am not interested in the policies of my school.					
18.	I do have responsibility for my teaching.					

Work Itself:

Sr.#	Statement	SDA	DA	UD	A	SA
19.	Teaching encourages originality and innovation in learning.					
20.	Teaching is very interesting work.					
21.	Teaching encourages me to be creative.					
22.	Teaching does not provide me the chance to develop new methods.					

Advancement:

Sr.#	Statement	SDA	DA	UD	A	SA
23.	Teaching provides a good opportunity for advancement.					
24.	Teaching provides an opportunity for promotion.					
25.	Teaching provides me with an opportunity to advance professionally					
26.	Teaching provides limited opportunities for advancement.					
27.	I am not getting ahead in my present teaching position.					

Security (Adapt):

Sr.#	Statement	SDA	DA	UD	A	SA
28.	I am confident in my teaching abilities and job security.					
29.	Teaching provides for a secure future.					
30.	I am working towards feeling more secure and confident in my teaching job.					

Recognition:

Sr.#	Statement	SDA	DA	UD	A	SA
31.	I receive full recognition for my successful teaching.					
32.	I believe in my abilities as a good teacher.					
33.	I am starting to receive more recognition for my efforts.					
34.	I receive too little recognition.					

Quality School Assessment

Academic Excellence:

Sr.#	Statement	SDA	DA	UD	A	SA
1.	The school sets high academic expectations for all students.					
2.	Teachers regularly monitor and assess student progress					
3.	The curriculum challenges students to reach their full potential.					
4.	Students receive timely feedback on their academic performance.					

School Environment & Safety:

Sr.#	Statement	SDA	DA	UD	A	SA
5.	The school provides a physically safe environment for students.					
6.	Bullying and harassment are effectively addressed.					
7.	Students feel emotionally secure in the school setting.					
8.	There are clear policies to ensure student discipline and behaviour.					

Resources & Facilities:

Sr.#	Statement	SDA	DA	UD	A	SA
9.	Classrooms are well-equipped with teaching and learning materials.					
10.	The school has access to adequate technology and internet services.					
11.	The library and labs meet the educational needs of students.					
12.	The school infrastructure (buildings, furniture, etc.) is well-maintained.					

Parent & Community Involvement:

Sr.#	Statement	SDA	DA	UD	A	SA
13.	Parents are encouraged to participate in school activities.					
14.	The school regularly communicates with parents about student progress.					
15.	Community members are involved in school improvement initiatives.					
16.	Parent-teacher meetings are held regularly and effectively.					

Teacher-Student Relationships:

Sr.#	Statement	SDA	DA	UD	A	SA
17.	Teachers treat students with respect and fairness.					
18.	Students feel comfortable approaching teachers for help.					
19.	Teachers motivate and inspire students to do their best.					
20.	Individual learning needs are recognized and supported by teachers.					

Educational Leadership:

Sr.#	Statement	SDA	DA	UD	A	SA
21.	School leadership communicates a clear vision for academic success					
22.	The school principal supports teachers' professional growth.					
23.	Decisions are made collaboratively involving staff and stakeholders.					
24.	The leadership team actively works to improve school performance.					

Inclusivity & Diversity:

Sr.#	Statement	SDA	DA	UD	A	SA
25.	The school respects and values cultural and religious diversity.					
26.	Students from all backgrounds are treated equitably.					

27.	The curriculum includes content that reflects diverse perspectives.					
28.	The school accommodates students with different learning needs.					

Appendix II: Qualitative Interview Questionnaire

Optimising School Performance for Hearing-Impaired Students in Bahawalpur and Multan

Section A: Demographic Information

1. 1. Name (Optional): _____
2. 2. Gender: ☐ Male ☐ Female ☐ Other
3. 3. Age: _____
4. 4. Designation: ☐ Teacher ☐ Principal ☐ Administrator ☐ Other: _____
5. 5. Highest Qualification: ☐ B.Ed ☐ M.Ed ☐ M.Phil ☐ PhD ☐ Other: _____
6. 6. Years of Experience in Special Education: _____
7. 7. School Location: ☐ Urban ☐ Semi-Urban ☐ Rural
8. . Have you received any training in entrepreneurial education or TQM practices? ☐ Yes ☐ No
   If yes, please specify: _____

Section B: Entrepreneurial Education

9. What role do you think entrepreneurial education plays in improving the performance of hearing-impaired students?
10. Have you been involved in any entrepreneurial activities or skill-building programs in your school? If so, please describe.

Section C: Total Quality Management (TQM)

11. How is quality in education managed or measured in your school?
12. What kind of continuous improvement processes are practiced in your school? How effective are they?

Section D: School Climate (DISC)

13. How would you describe relationships among teachers and students and overall atmosphere in your school?
14. How digitalize and inclusive is the school environment for hearing-impaired students?

Section E: Teacher Job Satisfaction

15. How do you feel about your current role and working environment?
16. What factors contribute positively to your job satisfaction?
17. What aspects of your job cause dissatisfaction or stress?

Section F: School Performance

18. What have been the recent achievements or improvements in your school?
19. What strategies or support systems could further improve school performance?

Section G: Family Support

20. What kinds of support (emotional, financial, academic) do students receive from their families?
21. What are the main challenges families report or that you observe?

Section H: Infrastructure

22. Are the learning materials and facilities adapted to the needs of hearing-impaired students?
23. What infrastructural improvements are most urgently needed?

Section I: Government Assistance

24. Are you aware of any government initiatives…?
25. How effective is the support (funding, training, equipment) provided by the government?

Section J: Socioeconomic Factors

26. How do students' socioeconomic backgrounds affect their learning outcomes and access to resources?
27. What could schools or policymakers do to support students from lower-income backgrounds?

Section K: Final Reflections

28. What key improvements or reforms do you suggest for enhancing education for hearing-impaired students in Southern Punjab?
29. Is there anything else you would like to share regarding your experiences or recommendations?

Appendix III: Comparative Table of Quality Models and QAS Model

Framework / Model	Main Focus	Limitations (in Pakistan's Education Context)	Unique Additions in QAS	Alignment with Punjab Special Education Policy 2020 (Three Pillars)
ISO 9001 (QMS)	Process standardization, customer satisfaction, continual improvement	Generic; not education-specific; lacks inclusion and teacher motivation	Incorporates *teacher-centered improvement*, *collaboration*, and *feedback loops* for HI schools	**Governance & Institutional Capacity:** introduces documented processes, monitoring, and data-driven management
ISO 21001 (EOMS)	Education-specific management system focusing on learner needs and inclusivity	Not adopted in Pakistan yet; focuses on formal institutions	Localizes learner-centered quality for *special and inclusive schools*; embeds sign-language and assistive-device support	**Access & Inclusion:** ensures equity through learner-focused and assistive-friendly approaches
EFQM Excellence Model	Leadership, people, strategy, partnerships, innovation	Complex, resource-intensive, designed for large organizations	Simplifies into measurable **school-level indicators** for small resource-limited schools	**Governance & Quality:** enhances leadership, planning, and evidence-based improvement
Malcolm Baldrige Model (USA)	Leadership, strategy, customer focus, measurement, results	No local adaptation; ignores socio-economic realities	Adds *teacher recognition, well-being, and motivation* dimensions	**Quality & Relevance:** focuses on teacher job satisfaction as driver of school performance
HEC QEC (Pakistan)	Program accreditation, self-assessment, faculty evaluation	Applies only to universities; no mechanism for schools	Converts into **"QEC-Lite for Schools"** with self-evaluation checklists	**Governance:** institutional accountability through internal audits
Punjab Govt. KPIs (PMIU)	Student learning, attendance, infrastructure, enrolment	Quantitative only; ignores innovation, motivation, and inclusion	Expands KPIs into **Qualitative Quality Indicators (QQIs)** — e.g., collaboration, creativity, inclusion	**Access & Quality:** captures teaching innovation and student empowerment
QAS (EE + TQM + SC + JS)	Integrative model combining TQM, Entrepreneurial Education, School Climate & Job Satisfaction	—	**Entrepreneurial skills**, **Top Management Commitment**, **Continuous Improvement**, **Training & Recognition**, **Collaboration**, **Sign-language Inclusion**, and **Digital Empowerment**	**Governance:** institutional leadership & accountability.**Access:** inclusive, gender-sensitive, assistive provision.**Quality:** teacher motivation, innovation, and continuous improvement.

While international quality models such as ISO 9001, ISO 21001, EFQM, and Baldrige focus on organizational excellence and process management, Pakistan's education sector relies mainly on HEC's QEC framework for universities and basic KPIs for schools. These systems lack contextualization for special and inclusive education. Therefore, this study proposes a localized Quality Assurance System (QAS) integrating Total Quality Management, Entrepreneurial Education, Digital Inclusive School Climate, and Teacher Job Satisfaction. The QAS introduces new quality indicators including top management commitment, teaching innovation, training and recognition, collaboration, sign-language competence, and continuous improvement. Inspired by global awards like the Deming Prize (Japan) and the Baldrige Award (USA), the proposed model—termed the Punjab Award for Quality & Educational Advancement (PAQEA, Albanian (Peace))—aims to provide a replicable framework for assessing and improving the quality of hearing-impaired and inclusive schools in Pakistan.

Context	**Phonetic Guide**	**Sounds Like**
Albanian (Peace)	PA-kyah	"PA-chya" (soft ch)
Pangaea (Continent)	pan-JEE-uh	"Pan-G-uh"
Pākehā (Māori)	PAA-keh-haa	"PAR-keh-hah"