MS Research Thesis

ANALYSIS OF LEVERAGING TECHNOLOGY FOR EDUCATIONAL REFORMS IN PUBLIC SCHOOLS OF ISLAMABAD

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PAKISTAN

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A thesis submitted in partial fulfillment of the requirement for the degree of MS Education

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APPROVAL SHEET

ANALYSIS OF LEVERAGING TECHNOLOGY FOR EDUCATIONAL REFORMS IN PUBLIC SCHOOLS OF ISLAMABAD

By

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This thesis has been accepted by the Department of Educational Leadership & Management (ELM), Faculty of Education, International Islamic University Islamabad in partial fulfillment of the degree of **MS Education**.

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AUTHOR'S DECLARATION

It is hereby declared that author of the study has completed the entire requirement for submitting this research work in partial fulfillment for the degree of MS Education. This thesis is in its present form is the original work of the author except those which are acknowledged in the text. The material included in the thesis has not been submitted wholly or partially for award of any other academic certification than for which it is being presented.

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SUPERVISOR'S CERTIFICATE

The thesis titled "Analysis of Leveraging Technology for Educational Reforms In Public Schools of Islamabad" submitted by Ms. Asma Rehman Regd. No. 38-FOE/MSELM/F23 is partial fulfillment of MS degree in Educational Leadership and Management, has been completed under my guidance and supervision. I am satisfied with the quality of student's research work and allow her to submit this for further process as per IIUI rules and regulations.

_____

Dr. Munazza Mahmood

Dedication

I dedicate this thesis to Allah Almighty, the most compassionate and merciful, whose blessings have made this journey possible. I also dedicate this work to my beloved parents whose unwavering support and encouragement helped me persevere through the challenges of balancing my research with my job.

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First and foremost, all Praise is due to Allah Almighty, the Lord of the Worlds. It is through His countless blessings, infinite mercy and unwavering guidance that I was granted the strength, wisdom, and perseverance to complete this research. I am forever grateful for the opportunities He has bestowed upon me on this academic journey and throughout life.

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Abstract

The integration of technology in education has emerged as a pivotal factor in driving reform within public schools. As educational institutions face increasing pressures to improve student outcomes and operational efficiency, the role of technology becomes critical. The researcher aimed to explore strategies of principals for the implementation of technology, to find out challenges in implementation of technology, to explore utilization of technology in the classrooms, to identify teachers' capacity development opportunities for the implementation of technology. The study is beneficial for students, teachers, principals and policymakers. Despite the potential of technology to enhance teaching and learning, many public schools struggle to implement these innovations effectively. Common challenges include resistance to change among teachers, insufficient training, and a lack of coherent strategies for integrating technology into existing curricula. The study employed a mixed-methods approach. Research paradigm of the study was pragmatism. Concurrent triangulation research design was employed for the study. The population of the study was 516 secondary school teachers and 58 secondary school principals of Urban zone of Islamabad FDE. The sample of 250 secondary school teachers was selected using Krejcie and Morgan (1970) sampling table, whereas 10 principals were selected for the semi structured interviews considering the availability of the Principals. Simple random sampling technique was used by the researcher to select the sample. Quantitative data were analyzed through percentage and mean scores and qualitative data through thematic analysis. Both quantitative and qualitative results were triangulate to interpret the findings of the study. The study revealed that Principals emphasized strategies like outreach programs, ongoing training, participatory decision making and upgrading of skills for smooth integration and leveraging of technology. Teachers also asserted that the school principals organized workshops, motivational sessions and involved them in professional development training for technology integration into classrooms. Teachers agreed that they were utilizing technology in the classrooms but also reiterated the challenges of poor internet, limited resources and workload pressures. It is recommended that awareness programs be held for teachers of all levels (primary, secondary and college and university) to make them conscious about the needs of pedagogical change from traditional teaching methods to new technological trends. It is also recommended that curriculum planners would screen and rationalize the current syllabus to correspond to technology-facilitated teaching and learning practices.

Key words: *Technology Integration, Leveraging Technology, Educational Reform*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

This chapter provides the background of the study to get the clear understanding about the present research. It also covers problem statement, objectives of the study, research questions, significance, delimitations, operational definitions, and conceptual framework. By doing so, this chapter provides overview of the subsequent chapters. It ensures that the reader understands both the rationale and the directions of the research.

1.1 Background of the Study

In the modern world where digitalization is expanding, technology integration with learning is the key to improvise teaching and learning. Public schools face pressure to implement new tools that can potentially ease personalized learning, increase student engagement and prepare students better for challenges in the future (Zhao Ma et al., 2024). Shifting to an environment within a school with abundant technological facilities is usually not an easy task and usually comes with numerous challenges; therefore, the implementation of proper change management strategies is essential for effectiveness.

The use of technology in education is progressively accepted as an innovative means of transforming educational systems, especially in the developing world. Pakistan's public schooling system is confronted with conventional systems of instruction, insufficient quality learning materials, and urban schools versus rural school differentials. These difficulties are augmented by poor infrastructure, insufficient digital literacy among teachers, and futurity of change in the guise of misinterpreting education as a closed system. The government of Pakistan, through Vision 2025, seeks to modernize its education sector by integrating technology to improve the quality of education, enhance student outcomes, and ensure more equitable access to resources.

The use of technology also differs from educator to educator as it depends on how comfortable they are, the beliefs they have toward pedagogy, and the professional development they have undergone. Research studies have also shown that whether technology has been effectively utilized in the classrooms depends on whether the teacher is confident about his or her use of the technology as well as their competence in applying digital tools (Leem & Sung, 2020). In this sense, the way a classroom uses technology can offer excellent information into which practices are best and which need modification.

Hence, teacher capacity building is a significant factor in this context. Professional development activities that entail the integration of technology for continuous furtherance on teaching will help educators grow their practices and competently utilize dtools (Koehler et al., 2020). The support and training of teachers will be of immense aid in creating a cuigital lture of innovation and continuous improvement.

This study engaged aspects connecting change management in public schools, including, but not limited to, how principals can lead schools through change, overcome particular challenges, foster effective use of technology, and facilitate teacher development. In doing so, the research contributes to the oft-debated debate over educational reform and the transformative potential of technology in public education.

1.2 Problem Statement

Even with government reforms and initiatives like Vision 2025, the integration of technology remains very poor in the public schools of Islamabad due to inadequate infrastructure, poorly trained teachers, resistance to change, and vague school principal leadership roles. Empirical data confirms this for instance, a phenomenological investigation into the experiences of Khyber Pakhtunkhwa secondary school teachers revealed that teachers identified "poor internet connectivity, lack of digital resources, resistance to change and inadequate professional training" as major impediments to technology adoption in lessons. Likewise, in a study on teachers' perceptions in Punjab, while the researchers found that educators were aware of the benefits of ICT for "enhancing instructional practices" and "improving student engagement and knowledge acquisition," they also identified "insufficient technical support" and "limited access to ICT resources" as critical obstacles.

Broader institutional level research also indicates that technology integration has positively influenced student learning outcomes a comparative study in Pakistani secondary schools found that technology enhanced instruction significantly improved academic achievement and conceptual understanding in mathematics and science compared to conventional teaching methods. These empirical insights suggest that education modernization in Islamabad's public schools is limited by systemic capacity issues, and not necessarily by resource and strategy gaps. Therefore, this study will investigate how technology is used to pursue education reforms at secondary school level, placing an emphasis on principals' strategies, teachers' readiness and challenges, utilization of technology, and the effectiveness of capacity-building initiatives.

1.3 Objectives of the Study

The objectives of the study are as follows,

1. To explore the strategies of the principals for technology integration into schools.
2. To find out challenges faced by principals and teachers in technology integration.
3. To examine the utilization of technology in the classrooms.
4. To identify teachers' capacity development opportunities for technology integration.

1.4 Research Questions

Following are the research questions of the study:

1. What strategies do principals employ to facilitate the technology integration in their schools?
2. What are the primary challenges faced by principals and teachers during technology integration?
3. How is technology currently utilized in classroom settings, and what impact does it have on teaching and learning?
4. What capacity development opportunities are available for the teachers for technology integration into classroom?

1.5 Significance of the Study

This study is important because it identifies the obstacles to seamless adoption and shows how technology integration transforms teaching and learning in secondary schools. In addition to highlighting the necessity of ongoing professional development to increase proficiency and confidence in technology use, it gives teachers insights into how digital tools can improve lesson design, instruction, and student engagement. The study emphasizes for principals the value of supervision, leadership, and school-wide cooperation in integrating technology into daily operations and maintaining change.

The results provide evidence-based recommendations for policymakers about the structural issues that schools encounter, including poor infrastructure, a lack of funding, and a lack of training opportunities. This information is crucial for planning focused interventions and allocating funds to establish classrooms that are conducive to technology use. According to research, technology helps children become more engaged, attend class more often, and

achieve better learning outcomes. It also helps them develop the confidence, independence, and curiosity that are essential for success in school and in the future.

Overall, by demonstrating that technology integration calls for not just tools but also institutional support, constant training, and strong leadership, the study advances the ongoing transformation of education in Islamabad. It provides a path for sustainable technology use that benefits all stakeholders and improves the general standard of education by taking into account the opinions of educators, principals, and legislators.

1.6 Delimitations of the Study

The study will be delimited to Secondary schools of Urban Zone I of Islamabad. The study will be delimited to Vision 2025, pillar 3, educational reforms in terms of strategic improvements in Pakistan's education system, emphasizing the integration of technology and modernization of teaching methods. Technology will be delimited to ICT and smartboards.

1.7 Operational Definitions

1.7.1 Leveraging Technology

Leveraging technology refers to the purposeful of the technology to increase the output of the resources to achieve the educational objectives.

1.7.2 Technology Integration

Technology integration involves incorporating technological tools like computers, LEDs, smartboards, chrome books and multimedia into teaching and learning process in order to improve the learning outcomes.

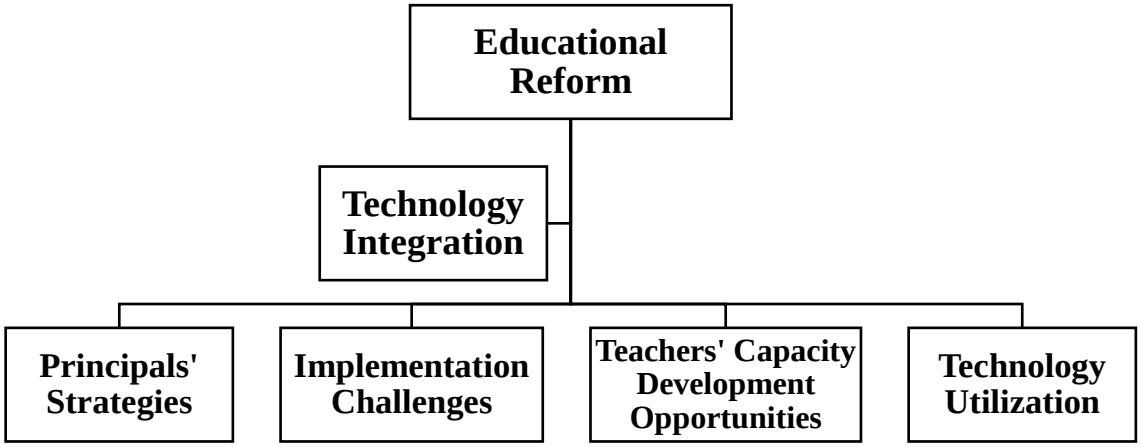
1.7.3 Educational Reforms

Educational reforms are deliberate educational enhancements made by Pakistan's government as stated in the vision 2025, pillar 3 i.e., modern teaching techniques, modernization of the public schools and improvements in the infrastructure.

1.8 Conceptual Framework

Figure 1.1

Conceptual Framework



Source: Venkatesh and Davis (2000) and Teo (2011).

CHAPTER 2

LITERATURE REVIEW

The use of technology in education has become a major force behind reform in public schools, with the aim of enhancing teaching strategies, student engagement, and overall learning outcomes. As schools face increasing expectations for efficiency and modernization, utilizing technology presents both advantages and challenges. By examining how digital tools, platforms, and resources may alter educational experiences, this study explores how technology may address systemic issues such as student performance disparities, access to high- quality education, and evolving needs of learners in the twenty first century. This study intends to uncover effective strategies for using technology to advance education and transform public school systems by exploring these processes in greater detail.

2.1 Technology

In general, technology refers to the tools and resources used in educational settings. These include digital content, such as simulations, videos, or e-books; software, such as learning management systems or online resources; and hardware, such as laptops, tablets, or interactive whiteboards. Therefore, technology in education encompasses more than just gadgets; it also includes a broad spectrum of digital advances that improve learning outcomes and facilitate or enhance the learning process. It improves information accessibility and results in individualized learning and differentiated education. "Effective educational technology becomes an integral part of teaching practices and empowers educators and learners alike to achieve their learning goals," according to the International Society for Technology in Education (ISTE, 2017).

2.2 Change Management

The process that offers an organized means of assisting individuals, groups, and organizations in transitioning from their current condition to the intended future state is known as change management. In academia, it gives teachers and administrators a position of preparedness and assistance as they embrace new procedures, regulations, and technologies. An essential instrument for making sure that implemented improvements are maintained is effective change management. Kotter proposed the eight-step guiding procedure known as the "Change Process" in 1996. It entails establishing a sense of urgency, assembling a steering group, formulating a plan and strategy, and integrating novel ideas into the company's ethos.

According to these recommendations, maintaining organizational transformation requires effective leadership, communication, and involvement. Managing change is essential to education reform because it helps overcome resistance, fosters an innovative culture, and keeps all stakeholders aligned with the project's objectives. Effective change management increases the likelihood of successful technology integration and better learning outcomes for schools, according to studies (Fullan, 2013).

Recent empirical studies within educational contexts continue to confirm and expand classic theories of technology acceptance and change management. For example, Errida and Lotfi (2021) conducted a systematic review of literature and identified effective change management as essential for a smooth transition during digital initiatives and reiterated that there is still a lack of consensus about the terminology and processes involved in managing change at the level of the organization. Moreover, Al-Haddad and Kotnour's work (2015) integrated the change management and technology acceptance literature to provide a model for successful change which emphasizes strong leadership and a supportive organization culture. These results are similar to those of this study, as findings emphasize that the principals' role is crucial to sustaining the program. These studies all affirm that structured change processes are needed to manage the "people side" of technology implementation as a means of minimizing disruption and ensuring stakeholder readiness.

Focusing on technology acceptance in schools, recent empirical work has applied and extended both the TAM and UTAUT models. A systematic review on transformational leadership in educational digitalization from studies between 2020 and 2025 indicated that the leadership models influence positive teacher performance and technology success within a school through collective agreement and professional growth (Kausar, Arif and Sebgag, 2025). This further supports the relationship between good leadership and facilitating conditions to enable technological acceptance. In another integration of the task-technology fit into the TAM model, results indicated that perceived ease of use did not influence the intention to use technology as much as how well the technology fit the instructional needs of the teachers (Hidayat, Sake, & Haryati, 2022). This again stresses that the provision of technology should not only be easy to use but also relevant and applicable directly to pedagogic practices, which falls in line with the observation of this study when issues of usefulness in comprehension were the major talking point.

2.3 Context of Educational Reform in Public Schools

2.3.1 Pakistan's Vision 2025 and Education Reform

The goal of the ambitious vision 2025 framework is to implement comprehensive changes to Pakistan's educational system, with an emphasis on closing the quality and access gaps between the public and private education systems in the nation. The improvement of governmental agencies, good governance and institutional reforms that affect the educational systems are the main objectives of vision 2025, third pillar. This vision is led to the modernization of the public school system, which now heavily relies on technology. The goals is to turn public schools into tech-enabled establishments with infrastructure and resources required to handle the problems of the twenty-first century (Planning Commission of Pakistan, 2014).

Under the auspices of Vision 2025, this is a purposeful endeavor to build a "flat, agile and automated" public administration what will make use of digital tools and processes to enhance transparency, encourage efficiency, and improve governance across the board, including education. Vision explains the need for an open, accountable, and capable educational system that gives kids the tools they need to thrive in a society that is becoming more and more digitally connected. It also emphasizes the necessity of a strong regulatory framework that encourages the use of technology in the classroom and guarantees that changes are implemented in accordance with international best practices.

2.3.2 Challenges in Pakistan's Public Education System

There are several structural and systematic flaws in Pakistan's public education system that hinder educational progress, particularly in underprivileged and rural areas. It is frequently observed that schools in these areas lack basic educational resources, such as up to date textbooks, libraries and qualified teachers. Most schools still use outdated facilities with inadequate infrastructure and classrooms are overly packed. It affects students' access to up to date learning resources that could help them succeed in the modern digital world in addition to their academic performance (Khudadad & Mickelson, 2021).

A significant barrier to technology embedding is the infrastructure gap as well as need for continuous professional development for the educators. The digital divide among the students in urban schools grows as a result of teachers' common lack of preparation and knowledge for using digital tools in the classrooms. It has been challenging for the technology

to become a standard component of the teaching practice because of teachers' resistance to adopting it and a lack of suitable training.

2.3.3 The Role of Technology in Educational Reforms

Technology's contribution to teaching and learning has been extensively documented across the globe, and its ability to change the learning experience is very high. Using computers, tablets and interactive whiteboards technology can be used to improve pedagogical practices, stimulate student learning and offer access to educational resources otherwise beyond the reach of resource-short schools. E-learning, digital textbooks and educational software can be used to meet multi-faceted learning demands across primary and secondary schooling, so that students are able to adapt to the demands of the digital world.

The use of technology in public schools for Pakistan is of special significance, as it may be one of the current means to overcome the educational disparities that exist between urban and rural areas. There is potential for technology, with appropriate infrastructure and backing, to unlock access to world-class education for students regardless of location and socio-economic status. This is in line with the objectives of Vision 2025, which stresses the need for a modern, digital-first approach to education (Planning Commission of Pakistan, 2014).

2.3.4 Governance, Institutional Reforms and Role of Technology

The third pillar of Pakistan's vision 2025 i.e., public sector modernization, institutional reform and governance, allows us to offer the framework required for integrating technology into the classroom. Building and strengthening the institutional capacity of public sector entities, including the Ministry of Education, provincial education agencies and public schools. It is essential to the effective implementation of educational initiatives. The drive for an efficient, transparent and tech enabled public sector is consistent with the objectives of using technology to change the educational system.

Furthermore, the 18th Amendment to the nation's constitution, which grants regional control over educational changes and shares authorities and responsibilities, offers a window for customizing technology-based educational reforms to fit local contexts. By allowing for a more localized approach to the adoption of technology in education, this decentralization of power guarantees that the reforms are pertinent to the local context and flexible enough to accommodate the distinct difficulties that each region faces.

There has been much discussion and interest in the use of information and communication technologies in the classroom. The potential of ICT to transform the education has been thoroughly investigated and supported by the government, investors and other stake holders. According to research, the constructivist teaching and successful ICT integration are closely related. ICT can improve learning outcomes and student engagement because it offers chances for problem solving, critical thinking and active learning where the student is more active than the teacher. However the effective use of ICT in the classroom is a complicated process that depends on a number variables such as the attitudes, and beliefs of teachers (Faulder, 2011).

Teachers are essential to the successful integration of ICT in the classroom, yet they continue to face obstacles that prevent it from being used to its full potential. According to the research teachers' adoption ICT technologies for meaningful learning experiences is frequently hampered by a lack of training, poor infrastructure and a lack of technical assistance (Faulder, 2011). Similar to this study conducted in Pakistan found that instructors face challenges related to inadequate infrastructure, pedagogical understanding and technological proficiency. It limits the successful integration of ICT in schools (Jamil et al., 2024). These results support the notion that ICT integration will continue to underutilize in improving teaching learning outcomes unless the instructors are sufficiently supported through ongoing professional development.

Professional development programs have been recognized as a crucial tactic to address these issues by giving educators the information and abilities they need. These programs can support the successful integration of ICT by giving educators the chance to learn about the newest technology, creating creative teaching methods and working together will colleagues. Professional development is only way for this purpose. A multifaceted strategy comprising cooperation between educators, administrators, legislators and technology specialists is required. It will guarantee the successful integration of ICT (Faulder, 2011).

The widespread infusion of technology in educational environments has unquestionably transformed teaching and learning since the previous century. Instead of merely implementing new hardware, researchers and policymakers have continually questioned what successful integration of technology really means. Although projects like one-to-one programs assured rewards, dreams of customization, improved student engagement. It is not sufficient for students to have a device at their desks if there is no stable internet connection at home, or the hardware itself is constantly malfunctioning. Digital equity, a lingering research identifies

persistent gaps in students' ability to learn with digitally mediated instruction. If students do not have consistently all access to current technology and connectivity, the potential of technology-aided instruction is far less feasible in practice. Teachers can leverage these resources to provide students with diverse content that can stimulate critical thinking and imagination, but the success really lies in careful integration and continuous monitoring.

Another essential domain is teacher readiness. Professional development programs such as workshops, coaching, or web-based training, have been instrumental in enabling teachers with the applied skills required to utilize technology for active learning. Technology tools involved in assessment e.g., computerized testing and adaptive learning systems, have indeed changed the manner in which some students are tested and taught. Although those systems can give feedback instantly to students and direct instruction, they are far from being the solution to every pedagogical and learning problem. It still becomes clear that the mere availability of technology does not necessarily translate to better learning. Rather, the right application of technology is followed by the right pedagogical interventions that lead to active participation and in-depth thinking. Overall it depends on thoughtful planning, continuous professional learning, and a commitment to true equity if its full promise is to be fulfilled (Davies and West, 2013).

Technology integration in the classroom has been a subject of much research and discussion. Technology can be utilized in many ways in facilitating teaching and learning, such as preparation for instruction, presentation of instruction, and student acquisition.

2.3.4.1 Technology for Instructional Preparation

Teachers can use technology to plan lessons, collaborate with colleagues and parents, communicate with students, and find digital learning materials. It can make lesson planning easier, aid collaboration and give you (and/or your students) access to a gold mine of information.

2.3.4.2 Technology for instructional delivery

Technology can be employed to present lesson of any type. Teachers can teach lessons via projectors and students can interact with computer-aided learning software suites like simulations and tutorials.

2.3.4.3 Technology as a learning tool

For students, technology can be an instrument for learning and innovation. They can do this with word processing, spreadsheet, database, and presentation applications as well as with Web 2.0 tools and concept mapping software. Despite the potential rewards of technology infusion there are many variables that affect successful application. Studies have found several important factors, including the teacher's characteristics, access to technology, and administrative support. But they tend to influence one another in multifaceted manners, which complicates separating their unique impacts on technology integration. In order to gain a better understanding of the process of technology integration, path analysis has been applied in research on how various variables interact. With this method, one can gain a broader perspective on drivers of technology use in the classroom. Examining interdependencies among these variables enables researchers to determine salient intervention and change areas.

2.4 Impact of technology on Quality Education

Technology has greatly influenced the world of education and learning environments. Many young individuals are doing everyday occasions on hand held devices and are expecting them to keep up with their needs. Research based on numerous studies finds out how helpful technology is in schools. While studying on devices we can react more with our computer then by pure notes. The use of multimedia can make very complicated topics into things that are much easier to understand. Technology can also help students learn by allowing them to work in groups. Technology gives each student a one on one learning experience that is messed up towards his or her strengths and weaknesses. Online things and the adaptive learning software allow people to learn on their own without a class. When technology and teaching methods are combined in perfect harmony, Learning Experiences can be raised.

2.5 The Role of Change Management in Reform

Educational reforms, especially technology integration, should include effective change management strategies. Change management is when you make arrangements for the people and along with the organization to the make changes. Something as simple as creating awareness within the school can help mitigate resistance.

Recent studies state that technology implementation in public education will only be effective with appropriate change management. Fullan (2016) urges school leaders to promote

a culture of collaboration with teachers. This allows for successful adoption of educational technologies. School leaders play a crucial role in building a trusting culture among teachers.

In addition, in the study of (Asad, Naz, Churi, & Tahanzadeh, 2021), it is highlighted that the professional development is essentially not a technical one but is pedagogic in nature that will provide the most viable practice to use technology. Educational reform in public schools is a very complex issue; it involves the latest technology advances, the needs for today's equity and access, and historical movements. The management of these challenges in public schools would depend a great deal on the ability to use effective change management strategies that make technology in education create actual reform.

The instructors are well aware that education is a process that goes on throughout one's life, and they foster sharp logical change, which ultimately reaches the students. Technology in schools has been at the center of public school reforms over the recent past. The varied applications of the technology also modify the way administrative procedures as well as teaching methods are carried out because the transformations that occur in the learning environments (Fullan, 2016). Through learning of online resources and platforms, there are opportunities of diverse, student-centered instruction; increased student engagement; and increased access. All these have the potential to meet a variety of educational needs (Anderson and Dexter, 2005). Despite that, sound change management is the most basic prerequisite of effective technology deployment in schools. Change management is the process of transforming people, teams, and organizations from some end state to some other end state. For public schools, change management has been an efficient means by which resistance is overcome, a culture of innovation is initiated, and technology assets are tied up long term (Harris and Jones, 2019). In fact, studies suggest that inadequate professional development, inadequate infrastructure, and inadequate networks have often been common explanations of the inability of teachers to utilize technology (Ertmer and Ottenbreit-Leftwich, 2010). Thus, by the strategic frameworks that school leaders adopt in the application of successful change, the achievement of the technology-based education reforms would be significantly enhanced. This research literature review aims to identify how change management strategies intersect with technology integration in public schools and in what ways such measures can be integrated for better results among students. In fact, this review paper will elucidate the debate about education reform by engaging in a dialogue of the aforementioned studies and models to attempt to elicit best practices in change management in educational technology environments. This is fresh focus on combining technology and change management in education reform,

especially for public schools. Technology has ever only been a driver of education change, provided it's done in response to the change management that it introduces. Successful technology implementation is an idea of taking up new instruments but entails an entire understanding of the organization dynamics being in the change process (Jamil, Aslam, & Shahzad, 2024).

2.6 Theoretical Frameworks for Change Management

There are different theoretical models, which drive change management in school settings. The most acknowledged include Kotter's eight-step process, Fullan's effective principles of change, and Lewin's change management model.

2.6.1 Kotter’s Eight-Step Process of Change Management

John Kotter's (1996) eight-step process for leading change is a widely used model that presents a detailed step-by-step procedure for initiating change in organizations. Steps are:

1. Create a Sense of Urgency: Help stakeholders understand the need for change and the likely benefits it offers.

2. Build a Guiding Coalition: Find a group of powerful professionals who can guide and drive the process of change.

3. Develop a Vision and Strategy: Create a clear vision about how the future should be and create strategies to achieve that.

4. Communicate the Change Vision: Tell everyone about the vision and specify their part in the change initiative.

5. Empower Broad-Based Action: Eliminate barriers to advancement and encourage people to take action.

6. Generate Short-Term Wins: Produce short-term success opportunities to create momentum and reinforce the effort toward change.

7. Consolidate Gains and Produce More Change: Use the credibility built through early successes to continue change.

8. Ground New Practices in the Culture: Implant the new practices in the organizational culture and maintain them in the long term.

Research has demonstrated that the success of schools employing Kotter's model is more probable when it comes to successful educational reform and technology integration (Thi Thanh, 2022).

2.6.2 Fullan's Principles of Effective Change

Michael Fullan (2013) stresses the need for collaboration, ongoing learning, and a focus on enhancing student achievement as key principles for successful change in the education environment. His main principles are:

1. Focus on Student Outcomes: Prioritize enhancing the learning and achievement of the students.

2. Develop a Collaborative Culture: Establish teamwork and collective accountability among educators and stakeholders.

3. Support Continuous Learning: Foster a culture of reflection and improvement and support ongoing professional development.

4. Engage with the Wider Community: Engage parents, community members, and other stakeholders in the change process to secure support and relevance.

Fullan's principles emphasize the need for relational trust and collaborative efforts to shape effective change, which is especially necessary in the context of educational reform initiatives (Fullan, 2013).

2.6.3 Lewin's Change Management Model

Kurt Lewin's change management model, which he formulated in the 1940s, is a basic model for organizational change. It has three main phases:

1. Unfreezing: This is a phase where awareness about the necessity for change and readiness for change must be created in the organization. This can involve resolving resistance and encouraging stakeholders to adopt new principles.

2. Changing: New behaviors, processes, and practices are instituted during this stage. Clear communication, training, and support must be provided to enable people to comprehend and accept the new changes.

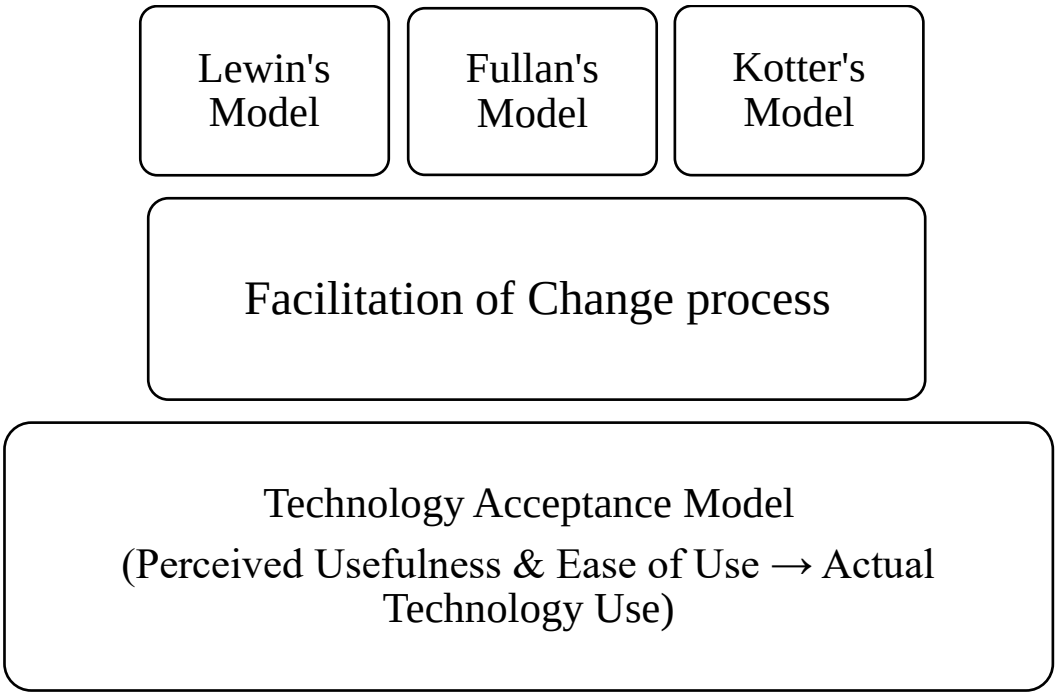
3. Refreezing: After successful implementation of changes, it is necessary to cement them into the organizational culture. This includes the reinforcement of new practices, celebration of achievements, and making the change part of the school's core operations.

Lewin's framework is still useful in modern education reform initiatives, particularly in advocating a sequential method of transition management and improvement maintenance (Lewin, 1951).

Change management is an essential aspect of educational reform, especially in the context of taking advantage of technology to drive improved teaching and learning. Theoretical models such as Kotter's eight-step process, Fullan's sound principles of successful change, and Lewin's model can be used to inform educators and school administrators how to navigate the intricate processes of change, overcome obstacles, and develop a culture of continuous improvement. Through successful change management, schools can have an atmosphere that allows for innovation and better learning outcomes.

Figure 2.1

Linkage between Technology Integration Models



2.7 Theoretical framework for Technology Integration

2.7.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) (Davis, 1989) offers a theoretical framework for explaining the determinants of individuals' intentions to use technology. In education, TAM posits that teachers' attitudes towards the perceived usefulness and ease of use of education technology are the main determinants of their adoption and utilization. Research has indicated that teachers' perceptions of the potential of technology to support student learning could influence the extent to which they adopt technology in their classrooms (Shifflet & Weilbacher, 2015).

2.7.2 Cognitive Load Theory

Cognitive Load Theory (CLT) (Sweller, 1988) suggests that instructional design must reduce cognitive load for learners. Through the segmentation of hard tasks into easier, manageable steps and explicit instructions, technology can reduce cognitive load and improve learning. As an example, the application of interactive simulations can assist in visualizing difficult-to-conceptualize ideas and simplify the cognitive burdens of solving problems (Moreno and Mayer, 2007).

2.7.3 Constructivist Learning Theory

Constructivist learning theory stresses the significance of active construction of knowledge and learning. Technology can support constructivist learning through allowing students to experiment, explore, and work in groups. Online forums and collaborative applications, for instance, can allow students to exchange ideas, conduct critical thinking, and co-construct knowledge (Garrison and Anderson, 2003).

2.7.4 Social Cognitive Theory

Social Cognitive Theory (Bandura, 1977) emphasizes the influence of social and cognitive processes in learning. Technology can be leveraged to develop social learning settings where students learn and observe others. For instance, virtual classrooms and online communities can offer social learning opportunities in which students can interact with peers, experts, and mentors (Davies et al., 2023).

By knowing these theories, teachers can make sound choices about how to use technology effectively in the classroom. By tapping the power of technology to transform learning, teachers can make learning more engaging, effective, and fair for all learners.

2.8 Effective Technology Use Strategies

2.8.1 Teacher Training and Education

Training and development, thus forms a vital aspect in ensuring that teachers develop suitable skills and knowledge to bring technology into their classrooms.

2.8.2 Preparation programs and support follow-up

Successful training programs form a critical aspect in enabling teachers to develop necessary competencies to ensure proper application of technology in the classrooms. The report indicates that teacher training must be continuous, collaborative, and context-specific to the teachers' contexts (Darling-Hammond, Hyler, & Gardner, 2017). The T3 Initiative (Teaching with Technology) in Texas, for example, is offering teachers a strong model of training involving workshops, coaching, and online resources. This program emphasizes practice through hands-on activity and working in peer groups, which translates into higher confidence and competency in the application of technology. Guidance not only at commencement but ongoing support also becomes vital. As per Penuel et al. (2017), ongoing professional development; mentoring and coaching can significantly increase the capacity of teachers to effectively implement technology into their normal teaching practice within the classroom. By establishing a support system for the teachers, schools can bring technology into the school culture incrementally while developing an environment for innovation.

2.8.3 Staff Technological Capability Building

Technological capability among staff needs to be acquired in order to realize all the possibilities that technology has to offer for education-including tool-specific training, but digital literacy more generally as well. Research on the topic by Ertmer and Ottenbreit-Leftwich (2010) shows that technology-using teachers will have higher chances of using those tools more efficiently in their teaching operations than other teachers. Thus, a professional development program must be planned not only with technical know-how in handling the technology but also with appropriate pedagogical strategies aimed at better learning outcomes. Furthermore, application of peer-to-peer learning can also be linked to technological know-how. Places such as PLCs enable teachers to collaborate and exchange best practices,

resources, and experience regarding the integration of technology in their teaching, fostering a culture or growth mindset (Vescio et al., 2008).

2.8.4 Developing Culture for Innovation

Innovation culture must be established within schools in order to fully adopt technology. This involves collaboration, risk taking, and support by the leaders.

2.8.4.1 Developing Collaboration and Risk-Taking

Instills students with a sense of belonging and collective responsibility to learn so that teachers would be encouraged to work in tandem with one another. In fact, available scholarship shows that such collaborative settings foster innovation and creativity; the two are essential preconditions for successful technology integration into learning (Fullan, 2016). Collaboration can be assisted within the teaching and learning process in a school setting. Time to plan, shared use of resources, and joint production of lessons that can be infused with technology must also be given to teachers. An excellent example will be in a co-teaching arrangement, where a teacher would share his or her strengths and experience with another teacher in order to strengthen his or her utilization of technology in the classroom. Risk taking is also important for the actualizing of innovation. Teachers must be given the freedom to try new approaches and new technologies without worrying about failure. Dweck, 2006 study focuses on a growth mindset where teachers perceive obstacles as opportunities for development rather than threats. It encourages teachers to try new things and learn from failures.

2.8.4.2 Leadership role while enacting the change

Leadership would be critical in building innovation culture as well as encouraging improved integration of technology. The school leaders should establish a healthy environment that will encourage innovation and foster ongoing professional growth along with cooperation at all levels of staffing (Schmitz, 2023)

Transformational leadership patterns are reported by various studies to be effective in creating a culture of innovation. This is due to the fact that transformational leaders have empowered and motivated their personnel, inspired shared vision, and facilitated resources for staff development in professional and personal growth. This fosters an open environment for change (Hu, 2024). Additionally, school principals ought to take professional development along with the staff to signal lifelong learning and lead commitment towards technology

integration (Harris & Muijs, 2005). It informs the teachers that assistance is available for learning application of technology. Methods for successful integration of technology in education must address both professional development for instructors and innovation culture. Ongoing training and assistance, technological knowledge growth, fostering collaboration as well as risk-taking, and successful school leadership establish an environment that will facilitate technology integration and profound educational change.

2.9 Challenges in Leveraging Technology for Reform

2.9.1 Resistance to Change among Educators and Staff

Resistance to change is one of the major hindrances when trying to introduce technology in schools. Teachers might resist changing their current ways of teaching by using new technologies due to fear of the unknown, lack of confidence, and fear of how their teaching will be affected.

Studies have shown that one's own attitudes and beliefs contribute significantly to resistance. Educators who believe technology is another burden and not an instructional aid are less likely to adopt it (Assulin & Dori, 2024). Furthermore, inadequate training and professional development can contribute to these feelings of uneasiness and enhance these resistant behaviors (Hew & Brush, 2007).

To overcome resistance, the school leaders have to involve the teachers in the change process through creating a facilitative environment that fosters open communication and cooperation. Allowing teachers an opportunity to express their concerns and involved in decision-making can alleviate resistance and develop buy-in for technology programs (Fullan, 2016).

2.9.2 Barriers to Access and Equity in Technology

Equity in technology access continues to be an issue in most public schools. Unequal resource distribution usually results in unequal opportunities for students, especially those who belong to low-income families or minority communities. The digital divide can be defined as the gap between persons having ready access to digital technology and those who lack this access, potentially widening current inequalities in learning (Warschauer, 2004).

Access barriers may involve poor infrastructure, a lack of devices, and limited internet connectivity. According to the National Education Association (NEA, 2019), in their report,

several schools, especially in rural and low-income communities, lack reliable internet access and current technology support, restricting students from technology-infused learning.

In order to address these inequalities, education leaders and policymakers need to invest in funding for technology infrastructure and ensure all students are supplied with necessary resources. Programs such as offering devices to students and increasing internet access in underprivileged communities can narrow the digital divide (Waqar et.al, 2024).

2.9.2.1 Tackling Digital Literacy among Students and Teachers

Digital literacy is a key skill for functioning in today's educational environment. Yet, students and teachers alike do not possess the requisite skills to manage technology effectively as a means of learning and teaching. Such a gap can limit the effective use of technology in classrooms (Hague & Payton, 2010).

To students, digital literacy involves a variety of skills, such as being able to locate, assess, and utilize information effectively online. A study by the Pew Research Center (2015) points out that although the majority of students are adept at using social media and mobile devices, they find it difficult to perform academic activities that involve critical thinking skills and information assessment.

Likewise, teachers themselves can also be short of digital literacy, which restricts their capability to adopt technology in teaching. Professional development initiatives should thus incorporate an emphasis on developing digital literacy skills among students and teachers alike (Tabieh et al., 2021).

Integrating digital literacy training in the curriculum and offering teachers continuous support and material can ensure that all parties are equipped to utilize technology suitably in their instructional methods.

Although the application of technology in educational reform holds substantial promise, some challenges have to be overcome. Some of the main challenges include resistance to change from educators, access and equity barriers, and the requirement for enhanced digital literacy among students and personnel. Addressing these challenges while understanding their implications is essential for schools to provide an environment where technology is optimally used to strengthen teaching and learning.

2.10 Best Change Management Practices for Public Schools

2.10.1 Involving Stakeholders in the Change Process

Involvement of stakeholders—teachers, parents, and community members—during the change process is essential for effective implementation of education reforms. Fostering a sense of ownership and accountability through effective involvement can go a long way in increasing the chances of effective change.

2.10.1.1 Involving Teachers, Parents, and Community Members

Engaging teachers in the change process is necessary because they are usually the ones putting new practices and technologies into action in the classroom. Studies show that where teachers are fully engaged in decision-making, they will be more likely to adopt and maintain change initiatives (Fullan, 2016). Joint professional development initiatives that enable teachers to raise concerns and input into the planning process can result in more efficient and accepted changes (Harris & Jones, 2019).

Parents and the community are also important in ensuring educational transformation. They can be engaged through continuous communication, information sharing, and participation in school activities. A study by Epstein and Sheldon (2023) indicates that where schools develop strong family-community partnerships, they are able to establish a nurturing atmosphere that supports the efforts toward change. Involving such stakeholders ensures that the changes are in line with the values and needs of the community, also encouraging buy-in and support.

2.10.2 Continuous Assessment and Feedback Loops

Ongoing assessment and feedback are essential elements in successful change management for public schools. The implementation of a systematic process in measuring the effects of changes ensures areas for improvement are realized and that the initiatives are achieving their target objectives.

Frequent feedback loops enable teachers and administrators to collect information regarding the impact of new strategies and technologies. As Penuel et al. (2017) has posited, integrating formative assessments in the process of change can facilitate schools in modifying and improving their strategies as per the immediate feedback received from students as well as

teachers. This cycle of continuous iteration not only increases the effectiveness of the change efforts but also promotes a continuous improvement as well as learning culture.

In addition, stakeholder feedback ought to be requested during the process of change. Surveys, focus groups, and consultations can help obtain useful information regarding teachers', parents', and students' experiences and perceptions, facilitating adjustments that more adequately address their needs (Hew & Brush, 2007).

2.10.3 Celebrating Short-Term Wins to Build Momentum

Celebrating short-term wins is an effective strategy for building momentum during the change process. Recognizing and rewarding small successes helps create a positive atmosphere and motivates stakeholders to continue their efforts.

Kotter (1996) is keen to highlight the need to create short-term wins as a means of sustaining the change effort and establishing credibility. Celebrations can be in many guises, including recognizing individual or team success, celebrating using school communications, or through events showcasing progress. These celebrations both increase morale but also show that the change is resulting in concrete payoffs.

Studies have indicated that the marking of milestones can create a sense of community and shared purpose among teachers and stakeholders (Fullan, 2016). When people witness the success of their efforts, they are better placed to stay engaged and committed to the continuous change process.

Best practices in change management in public education include the encouragement of stakeholder engagement, ongoing review and feedback, and the celebration of short-term wins. By engaging teachers, parents, and community members actively in the change process, the schools can generate feelings of ownership and responsibility. Ongoing review enables data-driven realignment of initiatives, while celebrating and recognizing success generates momentum and ensures motivation. In combination, they produce an enabling environment for successful educational reform.

2.11 Future Directions and Implications

2.11.1 The Role of Emerging Technologies (AI, VR) in Education

Artificial intelligence (AI) and virtual reality (VR) are emerging technologies that have the potential to revolutionize educational practices. AI can be used to improve personalized learning experiences by reading data from students to customize instruction according to student needs. Evidence indicates that AI-based adaptive learning platforms have the potential to enhance student engagement and attainment by offering customized support (Luckin et al., 2016). For example, AI systems are capable of studying learning patterns and suggesting resources, enabling educators to target students who need special attention.

Virtual reality provides immersive learning experiences that have the potential to engage and deepen understanding. VR has the ability to transport students to ancient locations, recreate scientific experiments, or offer real-world scenarios for practice. Research by Merchant et al. (2014) suggests that VR has the ability to enrich learning by generating engaging environments that enhance exploration and active engagement. With these technologies becoming more affordable, their inclusion in public schools would represent a game-changing means of expanding rich educational experiences.

2.11.2 Policy and Practice Recommendations in Public Schools

In order to make proper use of technology for educational reform, some policy and practice recommendations must be taken into consideration:

1. Invest in Infrastructure: Schmitz and Prahmana (2025) report that lack of reliable internet connectivity and inadequate digital infrastructure in rural schools severely hinders technology integration, while investment in infrastructure significantly improves access and educational equity.

2. In-depth Professional Development: Continued professional development programs must be created that emphasize infusing new technologies into the curriculum. The training must incorporate not just technical skills but also pedagogical methods to leverage these tools proficiently (Darling-Hammond et al., 2017).

3. Promote Collaborative Learning Environments: Schools need to establish frameworks that promote collaboration between teachers, parents, and community members. Collaborative

professional learning communities can promote the sharing of knowledge and collaborative problem-solving (Vescio et al., 2008).

4. Enact Data-Driven Decision Making: Schools need to employ data analytics in informing decision-making processes for integrating technology. This can assist in the identification of good practices and areas of weakness (Penuel et al., 2017).

By implementing these guidelines, public schools can establish an enabling environment for successful integration of technology that supports teaching and learning.

2.11.3 Additional Research on Technology and Change Management

Even with the advancement in knowledge regarding the integration of technology in education, there are a number of topics that need additional research:

1. Longitudinal Research on Technological Impact: Longitudinal studies are necessary that examine the long-term impact of technology integration on learner achievement and motivation. A clear understanding of the sustained impact will inform future practices and policy.

2. Equity and Access Research: Further research is required to examine the obstacles to technology access and their impact on student learning in a wide range of contexts. Examining the effectiveness of interventions to close the digital divide can provide input for more effective policy choices (Warschauer, 2004).

3. Teachers' Views of Change Management: Studies need to examine teachers' views on the change management approach. Their challenges and experiences can give insight into enhancing professional support systems and development (Ertmer & Ottenbreit-Leftwich, 2010).

4. Integration of Future Technologies: With new technologies emerging, more research is needed to find out how they can be integrated effectively into schools. Examining best practices in applying AI, VR, and other technologies can assist teachers in leveraging their full advantages (Luckin et al., 2016).

The potential of technology in education is highly promising in the future, especially with the emergence of new technologies such as AI and VR. With strategic policy and practice recommendations, public schools can maximize their potential for successful technology integration. Moreover, ongoing research in critical areas will play a crucial role in

comprehending the intricacies of technology and change management within schools to drive better student outcomes.

Literature review identifies the great role of technology in transforming public education, especially within the context of Pakistan's Vision 2025. It also identifies some challenges in achieving the use of technology in public schools effectively, such as uneven access, lack of teacher training, and poor infrastructure. Research stresses that there must be a strategic effort to overcome these obstacles, ascertaining that technology programs are aligned with national educational reforms. The review emphasizes ensuring equal access to digital resources, providing ongoing teachers' professional development, and enhancing the infrastructure to accommodate these technologies. Finally, as much as technology holds promise for revolutionizing education, its effective deployment in public schools depends on persistent investment, holistic planning, and collective action to make it enhance overall educational outcomes and support the purposes of Vision 2025. To sum up, the destiny of technology in public education will rest on our capacity to overcome the challenges and realize the opportunities afforded by advances in technology.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter explains the approach applied to explore how technology is shaping educational reforms in public schools. The purpose of the study was to explore strategies of principals for the technology integration, to find out challenges faced by principals and teachers in technology integration, to explore utilization of technology in the classrooms, to identify teachers' capacity development opportunities for technology integration. In the following sections, the research design, sampling methods, data collection techniques, analysis strategies, and ethical considerations will be discussed, providing a clear picture of how the study will be conducted to answer these important questions.

3.1 Research Design

The study was employed a mixed-methods approach. Research paradigm of the study was pragmatism. Concurrent triangulation research design was employed for the study to explore the implementation of technology in public schools. The research is exploratory in nature, aiming to uncover the underlying processes through which technology influences educational practices in public schools.

3.2 Population

The population of the study consisted of 516 secondary schools teachers and 58 principals working in public schools in urban zone of Islamabad.

(Source: Federal Directorate of Education Islamabad, 2023).

3.3 Sample

The sample of 250 secondary school teachers were selected using Krejcie and Morgan (1970) sampling table, whereas 10 principals were selected for the semi structured interviews for the qualitative part of the study considering the availability of the Principals. Simple random sampling technique was used by the researcher to select the sample.

3.4 Instruments

The researcher used self-structured questionnaire based on TAM model (Technology Acceptance Model) for the collection of quantitative data and semi-structured interview for the qualitative part of the study. The questionnaire were validated by the field experts.

3.5 Procedure

3.5.1 Validity

To validate the instrument, the researcher sought feedback from experts in the field to ensure its relevance, clarity, and alignment with the research objectives. These experts reviewed the content, structure, and wording of the instrument to confirm its appropriateness. The following suggestions were given to enhance the questionnaire: the flow of language was repetitive, adding specific technology names instead of "internet only", and reducing the number of questions in the interview protocol. All of these changes were made.

3.5.2 Pilot testing

A pilot test was conducted with secondary school teachers who were not part of the main study sample to ensure the reliability of the instrument. The pilot testing took place in secondary schools located in the F, G, H, and I sectors of Islamabad. The researcher personally visited these schools to administer the instrument. A total of 25 responses were collected during the pilot test.

3.5.3 Reliability

A pilot test was conducted with a small sample from the target population. The data collected were analyzed using Cronbach’s alpha.

Table 3.1

Reliability of Questionnaire

Variable	Dimension	No. of items	Reliability
Leveraging technology for educational reform		30	
	Challenges	10	.92
	Utilization	10	.91
	Capacity development	10	.91

3.6 Data Collection

The researcher personally visited the selected schools for the data collection. For this purpose prior approval was taken from Federal Directorate of Education Islamabad and the data were collected from the sample of the study through questionnaire and interviews. 250 questionnaires were distributed among secondary school teachers. Return rate of the questionnaires was 96.4%. The researcher personally visited the schools to get the questionnaires filled. Semi structured interviews were conducted from 10 secondary school principals who gave meaningful insights about the topic and interview questions.

3.7 Data Analysis

Quantitative data were analyzed through percentage and mean scores using SPSS software based on the objectives and qualitative data were analyzed through thematic analysis using Nvivo software. Both quantitative and qualitative results were triangulated to interpret the findings of the study.

3.8 Ethical Considerations

To ensure the psychological, emotional, and physical security of the participants in this study, the following ethical considerations adhered to:

- **Informed Consent:** Participants were fully informed about the purpose, procedures, and potential risks of the study before participating.
- **Confidentiality:** All personal information and responses from participants were kept strictly confidential. Data were kept anonymous to protect the identity of the participants, and only the researcher had access to the raw data.
- **Right to Withdraw:** Participants were informed of their right to withdraw from the study at any point without any consequences or explanations required.
- **Non-Coercive Participation:** Participation in the study was entirely voluntary. No participant were coerced, pressured, or unduly influenced to take part in the research.
- **Safe Environment:** All interviews and interactions with participants were conducted in a safe, comfortable, and neutral environment to ensure their physical safety and well-being.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

Data for the study were collected through questionnaires administered to secondary school teachers and interviews conducted with secondary school principals. The quantitative data obtained from the questionnaires were analyzed using descriptive statistical techniques, including percentages and mean scores, to summarize and interpret the responses. SPSS software was used to analyze the quantitative data. The qualitative data from the interviews were examined using thematic analysis (Braun and Clarke, 2003) along with Nvivo software. This allowed the researcher to identify recurring patterns, insights, and perspectives related to the research objectives. This combined approach provided a comprehensive understanding of the findings, ensuring that both numerical trends and contextual meanings were adequately captured and interpreted.

4.1 Cut-off points for Interpretation of Mean Scores

Table 4.1

Mean Score Cut off Points

Level	Value	Range
Low	1	1.0-2.4
Medium	2	2.5-3.4
High	3	3.5-5.0

(Oxford, 1990)

Table 4.1 shows the cut-off criteria used to categorize the respondents' mean scores into three distinct levels: Low, Medium, and High. These categories provide a structured method for interpreting the average responses obtained from the Likert-scale questionnaire. A mean score falling within the range of 1.0 to 2.4 corresponds to the Low level (Value = 1), indicating a generally negative or low agreement with the measured construct. Mean scores between 2.5 and 3.4 are classified as Medium (Value = 2), signifying a moderate or neutral level of agreement. Finally, mean scores ranging from 3.5 to 5.0 fall under the High level (Value = 3), reflecting strong agreement or a high perception toward the construct.

4.2 Descriptive Statistics used for Data Analysis

Table 4.2

Demographic Information (Age Range)

Age Range	No.of Respondents	Percentage
30-35	91	37.8
36-40	45	18.7
41-45	26	10.8
46-50	26	10.8
51-55	20	8.3
56-60	33	13.7

Table 4.2 presents the age distribution of the respondents. The largest proportion of participants falls within the 30–35 age range (37.8%), indicating that more than one-third of the sample consists of relatively younger teachers. This is followed by the 36–40 age group (18.7%) and the 56–60 age group (13.7%), showing a moderate representation of mid-career and senior teachers. The 41–45 and 46–50 age groups each account for 10.8%, while the 51–55 age group represents 8.3% of the respondents. Overall, the distribution suggests that the sample comprises a balanced mix of early-career, mid-career, and senior educators, with a notable concentration of younger teachers. This pattern is beneficial for the study, as younger educators are often more receptive to innovation and technology integration, aligning well with the focus of technology acceptance and educational reform.

Table 4.3

Demographic Information (Experience)

Experience	No.of Respondents	Percentage
1-5	98	40.7
6-10	44	18.3
11-15	28	11.6
16-20	31	12.9
21-25	23	9.5
26-30	17	7.1

Table 4.3 illustrates the distribution of respondents based on their teaching experience. The highest proportion of participants falls within the 1–5 years category (40.7%), indicating that a significant portion of the sample consists of early-career teachers. The next largest group includes teachers with 6–10 years of experience (18.3%), showing a considerable representation of mid-career educators. Respondents with 16–20 years (12.9%) and 11–15 years (11.6%) also form a notable segment of the sample. Smaller proportions are observed among those with 21–25 years (9.5%) and 26–30 years of experience (7.1%). Overall, the distribution reflects a balanced mix of novice, mid-career, and experienced teachers, with early-career educators forming the majority. This composition strengthens the study, as teachers with fewer years of experience are typically more adaptable to technology adoption and educational reforms, which aligns well with the objectives of the research

Table 4.4

Descriptive Statistics

Variable	N	Mean	Remarks
Leveraging technology for educational reform	241	3.66	Agree

Table 4.4 indicates that the mean value of leveraging technology for educational reform was 3.66 that indicates high level of agreement that technology is being utilized effectively in the classrooms.

Table 4.5

Challenges Faced by Teachers

Construct (Challenges)	N	Mean	Remarks
Challenges faced by teachers	241	3.36	Agree

Table 4.5 indicates that the mean value of challenges faced by the teachers was 3.36 which means that teachers are facing challenges in using technology in the classrooms.

Table 4.6

I find it challenging to manage student attention when technology is involved in the lesson.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	16	73	35	86	31	2.82
Percentage	100	6.6	30.3	14.5	35.7	12.9	

Table 4.6 shows that a total of 36.9% of teachers agreed that managing student attention is challenging when technology is involved, whereas 48.6% disagreed. The mean value of 2.82 suggests a moderate level of challenge.

Table 4.7

It is challenging to monitor each student during technology use in classroom.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	28	75	51	65	22	3.09
Percentage	100	11.6	31.1	21.2	27.0	9.1	

Table 4.7 indicates a total of 42.7% of respondents agreed with the statement, while 36.1% disagreed. The mean value of 3.09 indicates that teachers moderately agreed that monitoring every student during technology-based activities poses a challenge in classroom management.

Table 4.8

The use of technology in the classroom leads to increased off-task behavior among students.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	22	19	69	50	10	3.26
Percentage	100	9.1	37.3	28.6	20.7	4.1	

Table 4.8 indicates that a total of 46.4% of respondents agreed with the statement, while 24.8% disagreed. The mean value of 3.26 indicates that teachers moderately agreed that technology use in classrooms may sometimes contribute to students becoming distracted or engaging in off-task behavior.

Table 4.9

I face difficulties in integrating technology due to a lack of resources.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	36	90	50	55	10	3.36
Percentage	100	14.9	37.3	20.7	22.8	4.1	

Table 4.9 indicates that a total of 52.2% of respondents agreed with the statement, while 26.9% disagreed. The mean value of 3.36 indicates that teachers generally agreed that limited resources, such as insufficient equipment or infrastructure, hinder the effective integration of technology in classrooms.

Table 4.10

The unreliability of technology devices hinders my ability to teach effectively.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	35	81	45	67	13	3.24
Percentage	100	14.5	33.6	18.7	27.8	5.4	

Table 4.10 indicates that a total of 48.1% of respondents agreed with the statement, while 33.2% disagreed. The mean value of 3.24 suggests that teachers moderately agreed that frequent technical issues or unreliable devices negatively impact their ability to deliver effective lessons.

Table 4.11

Unreliable internet connectivity is a major obstacle in integrating technology into classroom teaching.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	79	87	47	24	4	3.88
Percentage	100	32.8	36.1	19.5	10.0	1.7	

Table 4.11 indicates that a total of 68.9% of respondents agreed with the statement, while only 11.7% disagreed. The mean value of 3.88 indicates strong agreement among teachers that unstable or weak internet connections significantly hinder the effective use of technology in classroom instruction.

Table 4.12

The amount of time it takes to troubleshoot and resolve technical issues with devices is a significant barrier for teachers.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	66	108	42	21	4	3.87
Percentage	100	27.4	44.8	17.4	8.7	1.7	

Table 4.12 indicates that a total of 72.2% of respondents agreed with the statement, while 10.4% disagreed. The mean value of 3.87 shows a strong level of agreement among teachers that the time spent addressing technical problems creates a major barrier to the smooth integration of technology in teaching.

Table 4.13

The time required to learn and integrate new technology into teaching is a barrier for teachers.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	27	82	61	61	10	3.22
Percentage	100	11.2	34.0	25.3	25.3	4.1	

Table 4.13 indicates that a total of 45.2% of respondents agreed with the statement, while 29.4% disagreed. The mean value of 3.22 indicates a moderate level of agreement among teachers that the time commitment needed to learn and implement new technologies poses a challenge to effective integration in classrooms.

Table 4.14

The workload associated with learning new technologies is overwhelming.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	35	82	65	43	16	3.31
Percentage	100	14.5	34.0	27.0	17.8	6.6	

Table 4.14 indicates that a total of 48.5% of respondents agreed with the statement, while 24.4% disagreed. The mean value of 3.31 indicates that teachers moderately agreed that the additional workload involved in learning and adapting to new technologies contributes to feelings of stress and overload.

Table 4.15

Insufficient training limits my ability to use technology effectively in the classroom.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	38	105	49	42	7	3.51
Percentage	100	15.8	43.6	20.3	17.4	2.9	

Table 4.15 indicates that a total of 59.4% of respondents agreed with the statement, while 20.3% disagreed. The mean value of 3.51 indicates that teachers generally agreed that a lack of adequate training hinders their ability to effectively incorporate technology into their teaching practices.

Table 4.16

Utilization of technology in classroom

Construct (Utilization)	N	Mean	Remarks
Utilization of technology in classroom	241	3.89	Agree

Table 4.16 indicates that the mean value of utilization of technology in classroom was 3.89 which means that teachers utilize the technology in the classroom.

Table 4.17

I find it easy to integrate technology into my teaching.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	27	150	42	13	9	3.71
Percentage	100	11.21	62.2	17.4	5.4	3.7	

Table 4.17 indicates that a total of 73.4% of respondents agreed with the statement, while 8.7% disagreed. The mean value of 3.71 indicates that teachers generally felt confident and comfortable incorporating technology into their teaching practices, reflecting a positive attitude toward digital integration in classrooms.

Table 4.18

I feel confident in my ability to integrate technology into my classroom activities.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	48	150	27	12	4	3.93
Percentage	100	19.9	62.2	11.2	5.0	1.7	

Table 4.18 indicates that a total of 82.1% of respondents agreed with the statement, while 6.7% disagreed. The mean value of 3.93 indicates a strong level of agreement among teachers, showing that most feel confident and capable of effectively using technology as part of their classroom teaching activities.

Table 4.19

I require minimal support to use technology in my classroom effectively.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	46	118	55	19	3	3.76
Percentage	100	19.1	49	22.8	7.9	1.2	

Table 4.19 indicates that a total of 68.1% of respondents agreed with the statement, while 9.1% disagreed. The mean value of 3.76 indicates a high level of agreement, showing that most teachers are capable of using technology in their classrooms with minimal assistance.

Table 4.20

I find it easy to use technology for lesson planning.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	66	132	31	9	3	4.03
Percentage	100	27.4	54.8	12.9	3.7	1.2	

Table 4.20 indicates that a total of 82.2% of respondents agreed with the statement, while 4.9% disagreed. The mean value of 4.03 indicates a very high level of agreement, showing that teachers find it easy to utilize technology in their lesson planning.

Table 4.21

I regularly integrate technology into lesson planning and instruction.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	37	116	54	26	8	3.61
Percentage	100	15.4	48.1	22.4	10.8	3.3	

Table 4.21 indicates that a total of 63.5% of respondents agreed with the statement, while 14.1% disagreed. The mean value of 3.61 indicates a high level of agreement, showing that teachers regularly incorporate technology into their lesson planning and instruction.

Table 4.22

The use of technology has improved student learning outcomes in my classroom.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	51	148	29	8	5	3.96
Percentage	100	21.2	61.4	12	3.3	2.1	

Table 4.22 indicates that a total of 82.6% of respondents agreed with the statement, while 5.4% disagreed. The mean value of 3.96 indicates a high level of agreement, showing that teachers believe technology has positively impacted student learning outcomes.

Table 4.23

I am comfortable experimenting with new educational technologies in my teaching.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	57	122	48	12	2	3.91
Percentage	100	23.71	50.6	19.9	5	0.8	

Table 4.23 indicates that a total of 74.31% of respondents agreed with the statement, whereas 5.8% disagreed. The mean value of 3.91 indicates a high level of agreement, showing that teachers are comfortable experimenting with new educational technologies in their teaching.

Table 4.24

Technology enhances my ability to deliver effective lessons.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	67	138	28	4	4	4.07
Percentage	100	27.8	57.3	11.6	1.7	1.7	

Table 4.24 indicates that a total of 85.1% of respondents agreed with the statement, whereas 3.4% disagreed. The mean value of 4.07 indicates a very high level of agreement, showing that teachers believe technology significantly enhances their ability to deliver effective lessons.

Table 4.25

I prefer using technology as a regular part of classroom instruction.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	61	111	40	24	5	3.82
Percentage	100	25.3	46.1	16.6	10	2.1	

Table 4.25 indicates that a total of 71.4% of respondents agreed with the statement, whereas 12.1% disagreed. The measn value of 3.82 indicates a high level of agreement, reflecting that teachers prefer integrating technology regularly into classroom instruction.

Table 4.26

I believe that increased capacity-building initiatives (e.g., workshops, training programs) would significantly enhance my ability to integrate technology into teaching practices.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	84	112	30	6	9	4.06
Percentage	100	34.9	46.5	12.4	2.5	3.7	

Table 4.26 indicates that a total of 81.4% of respondents agreed with the statement, while only 6.2% disagreed. The mean value of 4.06 indicates a strong level of agreement, suggesting that most teachers believe capacity-building initiatives such as workshops and training programs would greatly improve their ability to integrate technology into their teaching practices.

Table 4.27

Capacity development of the teachers

Construct (Capacity Development)	N	Mean	Remarks
Capacity development of the teachers	241	3.73	Agree

Table 4.27 indicates that the mean value of capacity development of the teachers was 3.73 which means that teachers agree with the statement that increased capacity development for the teachers would be helpful in utilization of technology in the classroom.

Table 4.28

My school provides sufficient training opportunities on technology integration.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	25	90	70	42	14	3.29
Percentage	100	10.4	37.3	29	17.4	5.8	

Table 4.28 indicates that a total of 47.7% of respondents agreed with the statement, while 23.2% disagreed. The mean value of 3.29 indicates a moderate to high level of agreement, suggesting that teachers generally feel their schools provide adequate training opportunities for technology integration, though there is still room for improvement.

Table 4.29

I have attended professional development programs related to educational technology in the past year.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	35	106	56	38	6	3.52
Percentage	100	14.5	44	23.2	15.8	2.5	

Table 4.29 indicates that a total of 58.5% of respondents agreed with the statement, while 18.3% disagreed. The mean value of 3.52 indicates a high level of agreement, showing that most teachers have participated in professional development programs related to educational technology within the past year.

Table 4.30

I feel confident using various digital tools in my teaching.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	51	125	56	6	3	3.89
Percentage	100	21.2	51.9	23.2	2.5	1.2	

Table 4.30 indicates that a total of 73.1% of respondents agreed with the statement, while 3.7% disagreed. The mean value of 3.89 indicates a high level of agreement, showing that teachers feel confident in using various digital tools in their teaching practices.

Table 4.31

I regularly collaborate with other teachers to improve technology use in education.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	39	111	60	28	3	3.64
Percentage	100	16.2	46.1	24.9	11.6	1.2	

Table 4.31 indicates that a total of 62.3% of respondents agreed with the statement, while 12.8% disagreed. The mean value of 3.64 indicates a high level of agreement, suggesting that teachers regularly collaborate with their peers to enhance the use of technology in education.

Table 4.32

My capacity development technology trainings are relevant to my classroom needs.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	32	111	73	20	5	3.60
Percentage	100	13.3	46.1	30.3	8.3	2.1	

Table 4.32 indicates that a total of 59.4% of respondents agreed with the statement, whereas 10.4% disagreed. The mean value of 3.60 indicates a high level of agreement, suggesting that teachers find their capacity development technology trainings relevant and applicable to their classroom needs.

Table 4.33

I find it easy to integrate technology into my teaching practices.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	43	139	50	5	4	3.87
Percentage	100	17.8	57.7	20.7	2.1	1.7	

Table 4.33 indicates that a total of 75.5% of respondents agreed with the statement, whereas 3.8% disagreed. The mean value of 3.87 indicates a high level of agreement, showing that teachers generally find it easy to integrate technology into their teaching practices.

Table 4.34

Time constraints prevent me from participating in technology training programs.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	42	105	49	39	6	3.57
Percentage	100	17.4	43.6	20.3	16.2	2.5	

Table 4.34 indicates that a total of 61% of respondents agreed with the statement, whereas 18.7% disagreed. The mean value of 3.57 indicates a high level of agreement that time constraints prevent teachers from participating in technology training programs.

Table 4.35

I believe continuous professional development in technology is essential for effective teaching.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	91	118	24	4	4	4.19
Percentage	100	37.8	49	10	1.7	1.7	

Table 4.35 indicates that a total of 86.8% of respondents agreed with the statement, whereas only 3.4% disagreed. The mean value of 4.19 indicates a very high level of agreement that continuous professional development in technology is essential for effective teaching.

Table 4.36

I am willing to learn new technologies that can improve my teaching methods.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	86	116	25	5	9	4.09
Percentage	100	35.7	48.1	10.4	2.1	3.7	

Table 4.36 indicates that a total of 83.8% of respondents agreed with the statement, whereas 5.8% disagreed. The mean value of 4.09 indicates a high level of agreement that teachers are willing to learn new technologies to enhance their teaching methods.

Table 4.37

The professional training i receive is relevant to my subject domain.

Respondents	N	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
Frequency	241	42	112	60	18	9	3.66
Percentage	100	17.4	26.5	24.9	7.5	3.7	

Table 4.37 indicates that a total of 43.9% of respondents agreed with the statement, whereas 11.2% disagreed. The mean value of 3.66 indicates a high level of agreement that the professional training teachers receive is relevant to their subject domain.

4.2 Thematic Analysis

Finding patterns or themes in qualitative data is known as thematic analysis. The researcher conducted the semi structured interview from the principals of secondary schools. Their responses were analyzed by using the thematic analysis technique. Finding themes i.e., intriguing patterns in the data and using them to address the topic or make a point are the objectives of the thematic analysis. Strong thematic analyses evaluate and interpret the data. Braun provided a six-phase guide that is tremendously helpful framework for conducting thematic analysis (Braun and Clarke, 2006). There are six steps of thematic analysis:

i. Become Familiar with the Data

In the first step, the researcher read and re-read the interview transcripts from principals to gain thorough understanding of their experiences with technology integration. Note were taken on recurring ideas, such as lack of infrastructure, training needs and attitudes towards technology integration and utilization in class.

ii. Generating initial codes

In this phase, the researcher systematically coded meaningful segments of the text. Codes such as lack of training, poor internet, limited access to devices and positive attitude were developed to organize the data into manageable parts representing common ideas.

iii. Searching for themes

The researcher then grouped the similar codes together to identify potential themes. Codes related to training needs and skill gaps were clustered together, while those concerning infrastructure and limited training were grouped together.

iv. Reviewing themes

The preliminary themes were refined and reviewed to ensure that they accurately represented participants' views. Overlapping ideas were merged and irrelevant codes were discarded. This process confirmed five major themes that aligned with research objectives.

v. Defining and naming themes

Each theme was clearly defined and named to reflect the essence. The final themes included:

Theme 1: Vision for Educational Reform

Theme 2: Strategies for Technology Integration

Theme 3: Challenges and Barriers: Navigating a Complex Landscape

Theme 4: Impact and Effectiveness

Theme 5: Support and Collaboration (Building a Supportive Ecosystem)

Each theme was aligned with research objective and question of the study.

vi. Write-up

In the final phase, the researcher compiled and interpreted the findings, presenting the themes in relation to the research questions and integrating them with the overall study results. Researcher also used illustrative quotes from the data.

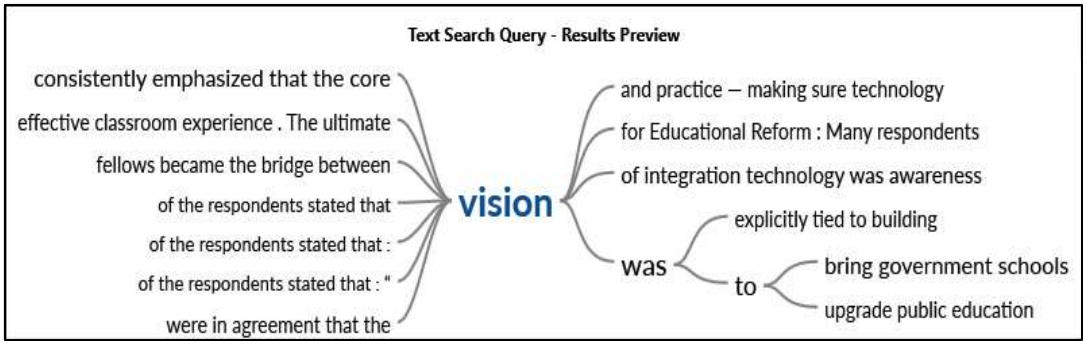
The analysis painted a vivid picture of the dynamic and evolving journey of technology integration within secondary schools in Islamabad. Rather than being seen as a passing trend, these initiatives were depicted as a transformative power shaping the future of education. The findings were carefully grouped into key themes, offering a broad understanding of the vision, strategies, challenges, and the tangible impact of these efforts

Theme 1: Vision for Educational Reform

One of the most pervasive sentiments that emerged from the principals' responses was a strong belief that technology integration was not merely another consideration but rather an indispensable and unavoidable necessity. Most principals agreed that the intent behind these programs was very strongly rooted in the recognition that technology is the need of the hour. It was framed as a strategic necessity, a look-ahead phase to orient education in response to the challenges of the 21st century. The vision was not merely about getting digital tools into schools but instead represented an expanded desire to bring government schools up to date, close gaps in the system, and enable students to excel in a digitally oriented world. Respondents underscored that the vision was motivated by an obligation to see that students are not left behind as the world becomes more technology-based. Teachers and policymakers alike felt a sense of urgency, that if the technology was not embraced, students would be denied the ability to gain necessary digital skills, problem-solving skills, and global skills which characterize future-proof education. To most of the principals, integrating technology represented progress and hope i.e., a means of enhancing learning as more interactive, inclusive, and meaningful. Others indicated the vision of classrooms where students were actively engaging through smart

boards and virtual libraries i.e., shifting away from memorization towards curiosity, creativity and critical thinking. Others emphasized technology's role in balancing the playing field, especially for government school students who in the past had very limited exposure to new learning materials. At its heart, this vision was about more than just computers and devices. It was about transforming the whole educational experience. It sought to foster a culture of curiosity, innovation, and lifelong learning, while also addressing the structural inequities that often hold students back. One of the principals stated that:

"Vision of integration technology was awareness of students and teachers with the latest technology trends, fostering an engaging and effective classroom experience, making learning pleasurable, exciting and engaging"



Theme 2: Strategies for Technology Integration

Sub-Theme 2.1: Collaborative Decision-Making

Many principals said that a key strategic pillar was the direct contribution of teachers in the decision-making process. They said that, recognizing teachers as the primary implementers, school leaders ensured their active participation in the implementation of technology. One of the principals added that:

"Teachers are the backbone of educational change, hence the teachers are allocated the prime importance while introducing any change into the system, keeping this in view teachers participated in decision making regarding technology integration"

Principals indicated that collaborative strategy encouraged ownership, and this was key in the successful implementation of new tools and practices.

Sub-Theme 2.2: Focus on Awareness and Skill Upgrading

Most principals were in agreement that the vision was explicitly tied to building students' capacity. Strategies were centered on raising awareness about the welfares of technology, providing chances for continuous skill upgrading, and improving interest in learning. This was seen as a foundational step to guarantee that technology was not just installed but was also accurately and effectively utilized in the classrooms. Most of the respondents agreed that;

"When we started talking about technology in schools, the first step wasn't just putting computers or smart boards in classrooms but it was about building awareness. People needed to understand why this change mattered and how it could actually make learning better. We concentrated on presenting teachers and students the benefits, step by step, so they wouldn't see it as a burden but as an opportunity. At the same time, we realized that skills don't stay fresh forever. So, we kept pushing for continuous training, workshops, and hands-on sessions to help teachers elevate their knowledge."

Sub-Theme 2.3: Teacher Training and Support

Many principals said that a significant portion of the strategy was dedicated to empowering teachers, recognizing that they were the hubs of successful technology integration. The support system was both formal and informal. Principals stated that to ensure teachers were adequately prepared, schools employed a variety of training strategies that were as follows,

- **Formal Workshops and CPD**

It was a shared view among the principals that the Federal Directorate of Education (FDE) and other relevant departments organized formal workshops and Continuous Professional Development (CPD) sessions. These were intended to provide structured, foundational training. The teachers attended the workshops and felt confident in using the technology. These trainings proved to be very useful. Many principals pointed out that;

"The Federal Directorate of Education (FDE) and related departments organized workshops and CPD meetings to deliver structured, foundational training for teachers."

- **Peer-to-Peer Assistance**

Many respondents emphasized that a highly effective, and widely practiced, strategy was the use of "tech fellows" and peer support. These individuals, with advanced technological skills provided instant support, helping teachers troubleshoot problems and integrate technology into their lesson plans. One of the principals stated that;

"One of the strategies that really was the idea of having 'tech fellows' and peer support. If a teacher faced problem while setting up a digital tool or didn't know how to add technology into a lesson, the tech fellows were right there to step in. It wasn't just about fixing small technical issues; it was about building confidence. Teachers felt relieved knowing that support was available immediately, and that made them more willing to tryout with new methods in their classrooms. In many ways, these tech fellows became the bridge between vision and practice."

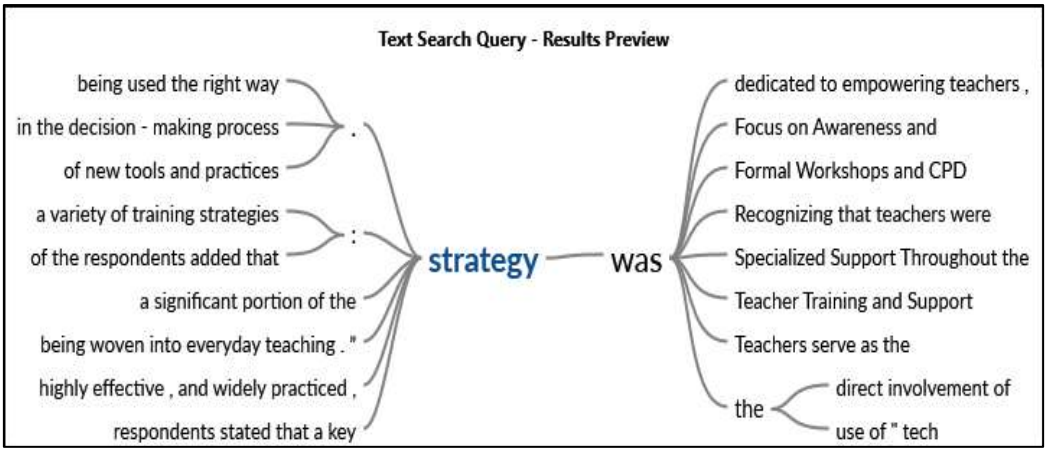
- **Specialized Support**

Throughout the interviews a recurring point stated by the principals was that IT teachers also played an important role by providing guidance and assistance to their colleagues, ensuring a continuous flow of technical knowledge within the staff. These IT professionals helped their peers in troubleshooting issues and made sure that teachers feel relaxed and confident in using technology into their lesson plans.

Sub-Theme 2.3.1: Addressing Resistance and Reluctance

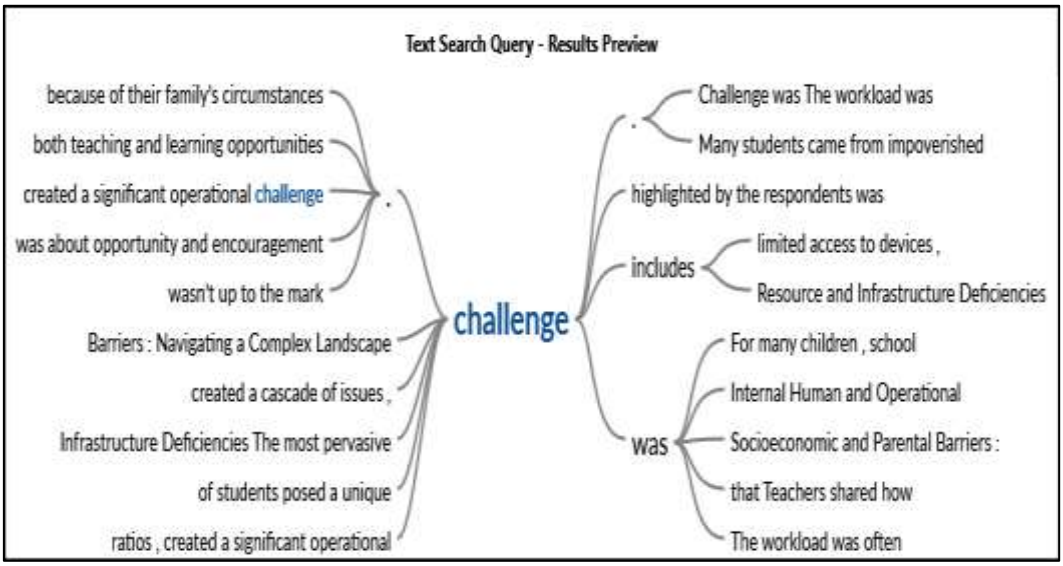
The principals emphasized an applied stance in addressing teacher resistance. Rather than requiring technology usage, principals indicated that they emphasized motivation and encouragement. Principals gave specific coaching and training sessions to illustrate the concrete advantages of technology, illustrating teachers how technology could streamline their workload and enhance student performance. The objective was to shift resistant teachers from a reluctance state to an inclination state with active participation. One insightful observation by one of the principals was

"Dealing with resistance from teachers was approached with sensitivity. Instead of pushing technology implementation, leaders provided coaching sessions that demonstrated concrete payoffs, such as reduced workloads and improved student outcomes. This soft approach slowly phased the teachers through resistance to willing and active participation."



Theme 3: Challenges and Barriers: Navigating a Complex Landscape

A recurring theme highlighted by the most of the principals was that the journey towards full technology integration was marked by several persistent challenges that had to be addressed for long-term success. Some of the challenges mentioned by the principals were as follows,



Sub-Theme 3.1: Deficiency in Resources and Infrastructure

The most widespread problem emphasized by the principals was the insufficiency of funds. This caused a chain reaction of problems, such as insufficient access to machines, a deficit in good-quality equipment, and a deficiency in adequate infrastructure. The difference between what was required and what was present continued to be a major obstacle.

"One of the greatest challenges all of us were referring to was that of not having funds. Teachers indicated how irritating it was to design tech lessons but not have the right infrastructure and technology tools to carry them out. It had a cascading effect i.e., restricting teaching and learning opportunities."

Sub-Theme 3.2: Socioeconomic and Parental Barriers

A majority of principals indicated that the socioeconomic background of students was a special challenge. Most of the students were from poor or illiterate families, so they did not have access to resources and support at home to practice or apply technology. They were from poor families where even basic necessities were difficult to fulfill, so it was a big problem having a computer or internet connection at home. Principals explained that parents were illiterate and could not instruct their children to work with technology, and others just did not perceive its value since they had never even experienced it themselves. Principals further stated that teachers reported that this left students without the guidance they needed to apply digital skills outside of school. School was the only place many children could seriously interact with technology. This left a tangible gap between students who had resources available at home and those who did not. Schools thus had the added burden of filling this digital gap, ensuring that no student was left behind merely because of their family situation.

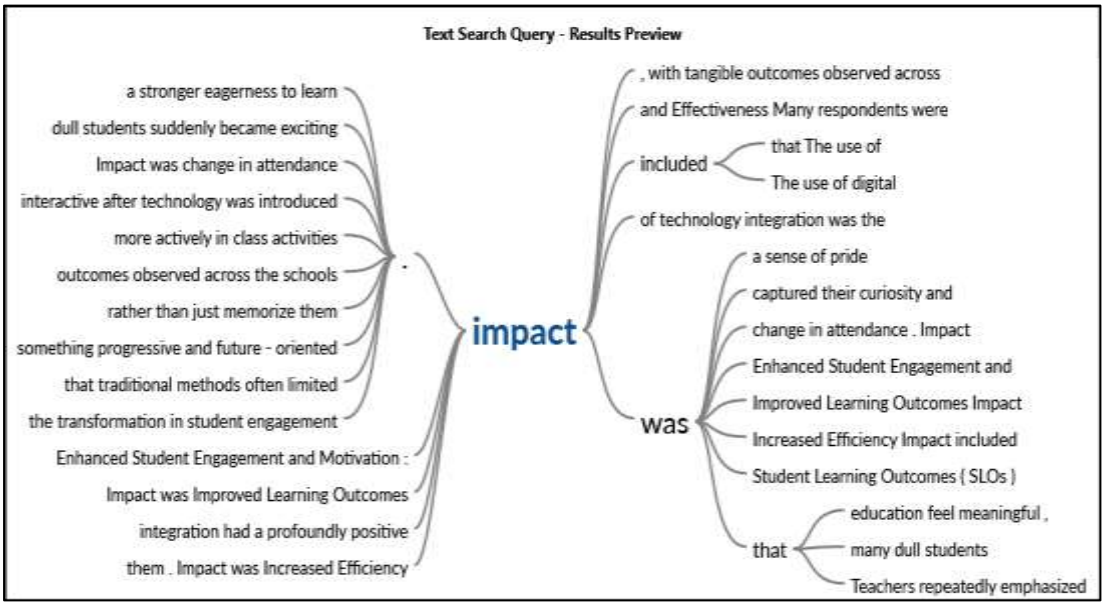
Sub-Theme 3.3: Internal Human and Operational Challenges

There was agreement among the principals that the teachers' hesitation, in addition to an already burdensome workload and high student-to-teacher ratios, represented a major operational issue for them.

The workload was frequently considered "unfair," and teachers struggled to find enough time for the new demands of technology integration with many students in the classroom. Principals noted that it was not humanly possible for the teachers to incorporate the technology in their classrooms with unjustified dominance of students.

Theme 4: Impact and Effectiveness

Many respondents were in agreement that despite the challenges, technology integration had a profoundly positive impact, with tangible outcomes observed across the schools. Some of the subthemes are mentioned below,



Sub-Theme 4.1: Enhanced Student Engagement and Motivation

According to most of the principals, the most noticeable and meaningful impact of technology integration was the transformation in student engagement. Principals mentioned that teachers repeatedly emphasized how classrooms felt changed i.e., more alive and more interactive after technology was familiarized. For many students, learning that once seemed routine or even grey students suddenly became exciting. Digital tools, smart boards, and multimedia lessons captured their curiosity and encouraged them to participate more actively in class activities. One of the strongest displays of this change was attendance. Several teachers mentioned that students who were formerly irregular started showing up more consistently because they didn't want to miss out on the new panache of learning. The modern, tech-based setting gave them a sense of pride and motivation, as if they were part of something enlightened and future-oriented. Principals mentioned students as being not only more involved, but also more confident. The use of technology allowed them to discover, research, and collaborate with their peers in ways that traditional methods often lacked. For many students, it was their first real experience of engaging with learning resources that connected directly to the world they saw outside the classroom i.e., videos, interactive exercises, and online resources. This relevance made education feel meaningful,

and in turn, nurtured a stronger enthusiasm to learn. In short, technology didn't just improve attendance or participation rather it reshaped the environment of classrooms, turning them into spaces where curiosity, motivation, and enthusiasm could truly flourish.

Sub-Theme 4.2: Enhanced Learning Outcomes

Principals gave real-life examples to illustrate just how drastically technology had altered learning outcomes in their institutions. They said that the use of digital tools wasn't about letting classrooms appear trendy. Indeed, they noted that Student Learning Outcomes (SLOs) were now easier to measure and significantly more robust following the transition. One administrator spoke about how topics such as science and robotics had experienced an unequivocal boost, with students demonstrating greater comprehension and improved outcomes since they were able to visually see and test concepts instead of merely being taught them. Others explained that technology facilitated interactive simulations, visual presentation aids, and hands-on virtual projects that helped abstract subjects become more tangible. The principals believed that the effect was not only seen in test scores but also in the manner in which the students approached learning—with greater self-confidence, curiosity, and preparedness to tackle problems. For them, these changes were evidence that technology was not merely an enabler, but a robust agent of significant academic progress.

Sub-Theme 4.3: Increased Efficiency

Most of the respondents mentioned that technology had introduced operational efficiencies for teachers and learners. The application of computer-based tools had minimized the amount of time needed to accomplish some tasks, causing productivity to rise and the learning process to become more efficient. Some of the subthemes are as follows

Theme 5: Support and Collaboration (Building a Supportive Ecosystem)

A key observation by the principals was that it took a commitment to continuous support and a collaborative culture to maintain the momentum of technology integration.

Sub-Theme 5.1: Ongoing Support and Evaluation

Most principals noted that they realized early training was not sufficient and additional training sessions are also needed. They provided continuous support through ongoing professional development sessions and technical guidance from tech fellows. Moreover, they utilized a strong monitoring and evaluation process that comprised:

- **Direct Supervision**

Several principals mentioned that they worked in hands-on manners, visiting classrooms personally to monitor and oversee the way technology was being implemented. They believed their visits not only guaranteed proper utilization, but also encouraged teachers to adopt such tools with greater confidence and responsibility.

- **Feedback Mechanisms**

Many principals said that feedback forms and regular audits were used to gather the insights from both teachers and students. These forms gave insights about the utilization of technology in the classroom, problems faced by teachers and suggestions for improvement.

Sub-Theme 5.2: Fostering Community and Parental Collaboration

Most principals were in agreement that, to address the challenge of parental disengagement, schools were proactively building bridges with the community. This included:

- **Formal Parent Teacher Associations:**

The majority of Principals emphasized the need for the formation of Parent-Teacher Associations (PTAs) as a method of enhancing communication and collaboration between schools and families. They explained that these associations offered an organized platform wherein teachers were able to meet parents on a regular basis, share classroom progress with them, and discuss the issues of technology integration. For most parents, particularly those who were not familiar with digital tools, PTAs served as a platform to query, complain, and learn how to serve their children better at home. For teachers, they were able to easily explain the reason for using technology in learning and also earn the trust and cooperation of parents. Respondents reported that this two-way communication frequently closed the digital divide, as

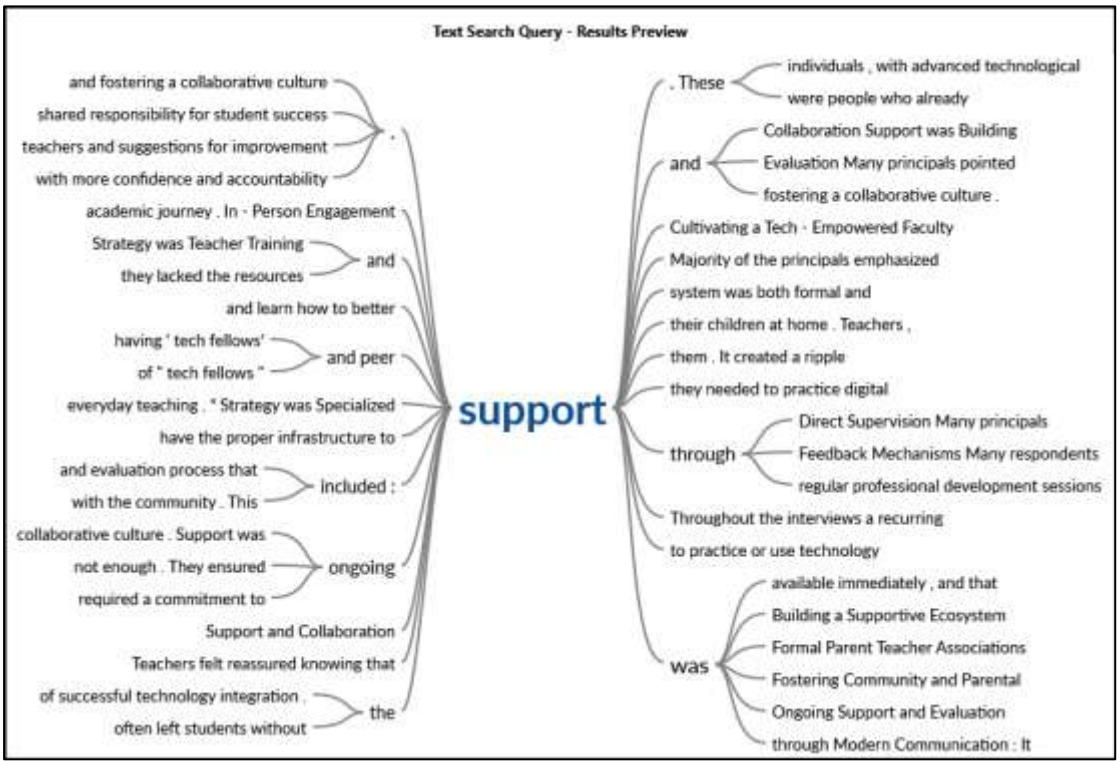
parents became more engaged with the role they could play. In doing so, PTAs became less bureaucracy and more collaborative spaces where a sense of shared responsibility for students' success was fostered.

- **Modern Communication:**

It was a common agreement among most principals that utilizing platforms like WhatsApp groups for teachers and principals to stay in touch with parents, ensuring they were informed and involved in their child's academic journey. As the world is advancing and communication can be done remotely so the teachers utilized modern trends and communicated with the parents using WhatsApp and Zoom etc.

- **In-Person Engagement:**

Majority of the principals emphasized that organizing regular meetings to foster a sense of community and to allow parents to witness the positive effects of technology on their children's education is very crucial. Formal PTMs were also done to ensure the students learning.



CHAPTER 5

SUMMARY, FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The present study aimed to carry out analysis of Leveraging Technology for Educational Reforms in Public Schools of Islamabad. The objectives of the study were to explore strategies of principals for the implementation of technology, to find out challenges in implementation of technology, to explore utilization of technology in the classrooms, to identify teachers' capacity development opportunities for the implementation of technology. The study employed a mixed-methods approach. Research paradigm of the study was pragmatism. Concurrent triangulation research design was employed. The researcher used self-structured questionnaire based on TAM model (Technology Acceptance Model) for the collection of quantitative data and semi-structured interview for the qualitative part of the study. The questionnaire was validated by the field experts. To validate the instrument, the researcher sought feedback from experts in the field to ensure its relevance, clarity, and alignment with the research objectives. These experts reviewed the content, structure, and wording of the instrument to confirm its appropriateness. For reliability, a pilot test was conducted with a small sample from the target population. The data collected was analyzed using statistical methods like Cronbach's alpha to assess the internal consistency. These steps ensured the instrument is both valid and reliable before the final data collection. The questionnaire consisted of three constructs i.e., Challenges faced by teachers, utilization of technology and capacity development opportunities. Each construct consisted of 10 items. The interview consisted of 20 questions. The respondents of the questionnaire were secondary school teachers working under FDE and respondents of the interview were secondary school Principals working under FDE. Data were collected through questionnaire and semi structured interview. Quantitative data were analyzed through percentage and mean score and qualitative data were analyzed through thematic analysis (Braun and Clarke, 2006).

5.2 Findings of the Quantitative Study

1. The mean value of 3.36 shows that teachers face challenges in using technology in classrooms (Table 4.5).
2. The mean value of 2.82 indicates that teachers find it moderately challenging to manage students' attention using technology (Table 4.6).
3. The mean value of 3.09 shows agreement that it is challenging to monitor each student during technology use (Table 4.7).
4. The mean value of 3.26 indicates agreement that technology use may increase off-task behavior among students (Table 4.8).
5. The mean value of 3.36 shows that teachers face difficulties in integrating technology due to a lack of resources (Table 4.9).
6. The mean value of 3.24 reflects agreement that unreliable devices hinder effective teaching (Table 4.10).
7. The mean value of 3.88 indicates high level of agreement that unreliable internet connectivity is a major obstacle (Table 4.11).
8. The mean value of 3.87 suggests strong agreement that troubleshooting technical issues is a significant barrier (Table 4.12).
9. The mean value of 3.22 shows agreement that learning and integrating new technology takes time and poses a challenge (Table 4.13).
10. The mean value of 3.31 reveals agreement that the workload associated with learning new technologies is overwhelming (Table 4.14).
11. The mean value of 3.51 shows agreement that insufficient training limits teachers' effective technology use (Table 4.15).
12. The mean value of 3.89 indicates that teachers frequently utilize technology in their classrooms (Table 4.16).
13. The mean value of 3.71 shows that teachers find it easy to integrate technology into their teaching (Table 4.17).
14. The mean value of 3.93 reflects a high level of confidence among teachers in integrating technology (Table 4.18).
15. The mean value of 3.76 shows that teachers require minimal support for effective technology use (Table 4.19).
16. The mean value of 4.03 indicates that teachers find it easy to use technology for lesson planning (Table 4.20).

17. The mean value of 3.61 shows agreement that teachers regularly integrate technology into lesson planning and instruction (Table 4.21).
18. The mean value of 3.96 reflects a strong agreement that technology has improved student learning outcomes (Table 4.22).
19. The mean value of 3.91 indicates agreement that teachers are comfortable experimenting with new technologies (Table 4.23).
20. The mean value of 4.07 reveals that teachers believe technology enhances their ability to deliver effective lessons (Table 4.24).
21. The mean value of 3.82 shows agreement that teachers prefer using technology as a regular part of instruction (Table 4.25).
22. The mean value of 4.06 shows strong agreement that capacity building initiatives improve teachers' technology integration skills (Table 4.26).
23. The mean value of 3.73 indicates agreement that teacher capacity development supports classroom technology utilization (Table 4.27).
24. The mean value of 3.29 reflects moderate agreement that schools provide sufficient technology training opportunities (Table 4.28).
25. The mean value of 3.52 indicates agreement that teachers have attended relevant professional development programs (Table 4.29).
26. The mean value of 3.89 shows that teacher feel confident using various digital tools in their teaching (Table 4.30).
27. The mean value of 3.64 indicates agreement that training programs are relevant to classroom needs (Table 4.31).
28. The mean value of 3.60 reflects agreement that training programs are relevant to classroom needs (Table 4.32).
29. The mean value of 3.87 shows that teachers find it easy to integrate technology into their teaching practices (Table 4.33).
30. The mean value of 3.57 indicates agreement that time constraints prevent teachers from practicing in training programs (Table 4.34).
31. The mean value of 4.19 reveals strong agreement that continuous professional development in technology is essential for effective teaching (Table 4.35).
32. The mean value of 4.09 indicates high agreement that teachers are willing to learn new technologies to improve their teaching (Table 4.36).
33. The mean value of 3.66 reflects agreement that professional training teachers receive is relevant to their subject domain (Table 4.37).

5.3 Findings of the Qualitative study

Theme 1: Vision for Educational Reform

34. Principals perceived technology integration as an essential educational reform, not merely an additional tool.
35. They viewed technology as a strategic move to modernize government schools and align education with 21st century demands.
36. Technology was regarded as a means to make learning interactive, inclusive and meaningful fostering curiosity and creativity.
37. Principals believed technology could reduce educational inequities by providing learning for students in resource limited government schools.

Theme 2: Technology Integration Strategies

Sub-Theme 2.1: Collaborative Decision-Making

38. Principals emphasized teacher involvement in planning and decision making, recognizing teachers as key implementers of technology.
39. Collaborative planning fostered ownership, commitment and sustainability of technology initiatives.

Sub-Theme 2.2: Awareness and Upgrading Skills

40. Principals highlighted that technology integration goes beyond equipment, it involves building awareness and positive attitudes.
41. They identifies continuous skill development through workshops, hands on training and refresher sessions as essential as effective use.

Sub-Theme 2.3: Teacher Support and Training

42. Structured support through Federal Directorate of Education (FDE) training programs and Continuous Professional Development (CPD) enhanced teacher confidence.
43. Peer support systems such as “tech-fellows” were effective in providing immediate help and boosting motivation.

44. Principals addressed teacher resistance through encouragement, mentoring and demonstration of benefits which gradually built acceptance.

Theme 3: Challenges and Barriers: Navigating a Complex Landscape

Sub-Theme 3.1: Resource and Infrastructure Deficiencies

45. Inadequate funding was identified as the major barrier to technology integration.
46. Lack of equipment, poor connectivity and insufficient digital access limited classroom innovation.

Sub-Theme 3.2: Socioeconomic and Parental Constraints

47. Students from low income and illiterate families had minimal access to technology at home, creating a digital divide.
48. Principals reported that schools became the primary space for digital exposure, placing additional responsibility on institutions.

Sub-Theme 3.3: Internal Human and Operational Challenges

49. Teacher resistance, high workload and large class sizes were consistent challenges.
50. The dual burden of traditional and digital instruction limited time and energy for effective implementation.

Theme 4: Effect and Impact

Sub-Theme 4.1: Enhanced Student Motivation and Engagement

51. Technology transformed classrooms into interactive and engaging spaces.
52. Principals observed increased attendance, participation and enthusiasm among students.

Sub-Theme 4.2: Improved Learning Outcomes

53. Noticeable improvements were reported in science and STEM related subjects through visual and experimental learning tools.

54. Students showed better understanding, improved performance and stronger problem solving abilities.

Sub-Theme 4.3: Increased Efficiency

55. Technology streamlined teaching and administrative tasks, improving efficacy and feedback systems.
56. Teachers managed lesson planning, assessments and communication more effectively with digital tools.

Theme 5: Support and Collaboration (Building a Supportive Ecosystem)

Sub-Theme 5.1: Ongoing Support and Evaluation

57. Principals emphasized the need for continuous professional support beyond initial training.
58. Regular monitoring, evaluation and feedback systems helped sustain technology use and track progress.
59. Principals' classroom visits and audits encouraged accountability and reflective practice.

Sub-Theme 5.2: Engaging Parental and Community Stakeholders

60. Schools strengthened Parent Teacher Associations (PTAs) to engage parents in digital learning processes.
61. Digital communication tools (WhatsApp, Zoom) improved transparency and collaboration between schools and families.
62. Parental engagement sessions and meetings increased awareness of technology's benefits and fostered shared responsibility for student learning.

5.4 Discussion

The findings of this study highlighted technology's role as a change agent in secondary schools, in relation to pedagogy, student participation and the school culture. Quantitative and qualitative results indicated that technology engaged students and led to higher levels of class participation, and students' comprehension of the subject matter, particularly in science, was better facilitated through simulations and other interactive technology. These results are aligned with earlier research (Selwyn, 2016; Ertmer and Ottenbreit-Leftwich, 2019) identifying the contribution of technology in enhancing and enriching students' learning experiences and making complex concepts clearer.

How technology facilitated reform was a major point of discussion. Principals and teachers commented on how students were more active in self-directed learning that included critical and creative thinking, and problem solving as classroom tasks. This constructivist perspective validates the argument that technology offers a system for collaborative and inquiry learning. These are also echoed in other research work from around the world that documents successful use of digital tools in pedagogy and learning, which reshapes teaching from a teacher-centered model of rote memorization to active learning (Ramírez-Montoya & Rozo-García, 2025)

Teachers highlighted barriers such as increased workloads, classroom distractions, and the constant demand to adapt to new and emerging technologies. Similar challenges have been reported in previous studies (Hew & Brush, 2007; Tondeur et al., 2017), which emphasize that without a systemic framework of support, technology can often hinder rather than enhance teaching. While noting these challenges, principals highlighted more positive strategies, such as professional development, good supervision, tech fellow support and increased parental involvement. This indicates that making technology access available is not sufficient but only meaningful reform will need thorough supports mechanisms and leadership in place in order to guarantee its effective use.

Leadership emerged as the key factor in ensuring the sustainability of technology-driven reform. The principals' emphasis on supervision, ongoing training, tech fellow assistance and community collaboration underscores the non-negotiable role of strong decision-making in this process. This aligns with Fullan's (2007) perspective that meaningful transformation is only achievable when leadership is coupled with a cultural shift within institutions. Without such

leadership, the potential benefits of technology remain difficult to realize, as reform requires not only tools but also vision, guidance, and a supportive organizational culture.

One of the conclusions that can be drawn is that it is vitally important to make sure the community gets involved. Both teachers and principals expressed that the reform stagnates when the degree of engagement is along the lines of disengaged parents or when there is a division of digital literacy among households. This is not any different from research that supports the development of school–community collaboration (Epstein, 2011). As a result, any reform that is based on the use of technology ought to expand from the boundaries of the classroom to the homes and the community, where equity and inclusion are principles that must be practiced.

Sustainability, as the findings show, is the most critical issue. Principals' emphasis on the need for continuous training is echoed by the teachers' request to be provided with ongoing assistance, supporting the notion that the change is a continuous one and not a singular event. The alignment of perspectives of both parties indicates that substantial reform is only achievable with a sustained approach, flexibility, and a commitment to policy-level change. This adds to existing research by arguing that integration of technology is not about the tools available, but rather about the reform strategies that are systemic (OECD, 2019).

This study builds on the current evidence base regarding the transforming role of technology in secondary education in fostering student-centered pedagogy, strengthening leadership practices, and broadening community partnerships. However, it also highlights that technology is not a panacea; reform depends on sustaining support, addressing barriers, and positioning technology within the overarching school culture. Our findings resonate strongly with key theories of technology adoption and organizational change. The success observed in student engagement and comprehension directly speaks to the construct of perceived usefulness (PU) within the Technology Acceptance Model (TAM), where users (both students and teachers) value technology that enhances performance and learning effectiveness (Davis, 1989). Conversely, the challenges highlighted by teachers increased workloads and distractions impact perceived ease of use (PEOU), a crucial determinant of acceptance that requires proactive mitigation through structured training and support (Venkatesh & Bala, 2008).

The critical role of leadership and systemic support further underscores the necessity of a deliberate change management approach, moving beyond mere tool provision to strategic implementation that addresses vision, culture, and ongoing support, as advocated by influential models like the Unified Theory of Acceptance and Use of Technology (UTAUT) and established change leadership frameworks (Fullan, 2007; Venkatesh et al., 2003).

5.5 Conclusion

1. Principals emphasized strategies like outreach programs, ongoing training, participatory decision making and upgrading of skills. Teachers also asserted that the school principals organized workshops, motivational sessions and involved them in professional development training for technology integration into classrooms.
2. The findings underscored the complementarity of the teacher and principal views. Teachers reiterated the challenges of poor internet, limited resources, workload pressures, and lack of training consistently while Principals recognized the same systemic challenges but gave more emphasis on the leadership role, supervision, and teamwork in overcoming the challenges.
3. Teachers underscored that they were applying technology and it has enhanced student engagement, attendance, and achievement, making it an agent of educational change. It was supplemented by the principals that they saw a noticeable transition towards student-centered learning, with the learners gaining confidence, autonomy, and curiosity with digital technology.
4. The teachers communicated that capacity-building activities, particularly continuous trainings and workshops, are necessary for sustained use of the technology. They concurred that they were being given professional trainings to prepare them with necessary skills to use the technology in the classrooms. Principals emphasized that they organized proper training workshops in addition to CPDs. Tech fellows were also present to assist the teachers.
5. Principals' leadership, supervision, and parental engagement were the most important in overcoming obstacles and integrating technology into school culture, though there are challenges, the research indicates that technology is transforming pedagogy and learning in Islamabad's secondary schools, subject to systemic support and leadership.

5.6 Recommendations

1. It is difficult for teachers to reconcile cumbersome course content with incorporating digital tools, limiting curriculum overloading and incorporating technology-friendly instructional designs can facilitate more effective teaching and learning outputs. It is thus recommended that curriculum planners may rationalize the current curriculum to correspond to technology-facilitated teaching and learning practices.
2. Principals stated that in order to test the performance of technology in the classroom, there might be proper mechanism for monitoring so it is recommended that systematic monitoring and evaluation mechanisms may be put in place to measure the effectiveness of technology integration, taking into consideration feedback from teachers, students, and parents.
3. Parent Teacher Associations play a crucial role in cooperation thus parental and community involvement is recommended to be increased through Parent-Teacher Associations (PTAs), contemporary communication devices (WhatsApp, Zoom), and frequent meetings to establish trust and cooperation.
4. Principals pointed out that disadvantaged students were not doing well because of the lack of resources so it is recommended that special interventions may be made for disadvantaged students to overcome the digital divide, e.g., school-based digital literacy programs for students belonging to low-income or illiterate family backgrounds.
5. As teachers were reluctant therefore it is recommended that awareness programs may be held for teachers of all levels (primary, secondary and college and university) to make them conscious about the needs of pedagogical change from traditional teaching methods to new technological trends.
6. Though trainings are conducted, it is recommended that there is a necessity to have specific programs that directly confront classroom realities.

5.7 Recommendations for Future Research

1. Future researchers may conduct longitudinal studies to examine the long term impact of technology integration on teaching practices, student achievement and school culture in Islamabad and other regions.
2. The current study focused on secondary schools in urban zone of Islamabad. Future studies could include rural areas to provide a more comprehensive understanding of contextual challenges and opportunities.
3. Comparative research between public and private sector schools may help identify differences in infrastructure, leadership approaches and teachers' readiness for technology integration.
4. Future studies may incorporate students' views to assess how technology integration affects motivation, engagement and academic performance from learner's standpoint.
5. Future studies may explore the use of Artificial Intelligence, Virtual reality and Learning management system in classrooms to assess their potential in improving learning outcomes.
6. Further investigation may be conducted to explore the role of educational leadership and policy interventions in sustaining technology integration, emphasizing how principals' digital leadership influences teacher performance and student outcomes.

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APPENDIX-A

QUESTIONNAIRE

Respected teachers, the Researcher is MS scholar at the International Islamic University, Islamabad, and researching the Analysis of Leveraging Technology for Educational Reforms in Public Schools of Islamabad**.** Dear Participants, I appreciate your participation in this Questionnaire**.** Your thoughtful and honest responses will provide valuable data for my research, leading to more precise insights for the utilization, challenges and teachers' capacity development for the integration of technology in schools.

Demographic Information

Gender		Male□			Female □	
Age Group	30-35□	36-40□	41-45□	46-50□	51-55□	56-60□
Experience as a teacher	1-5□	6-10□	11-15□	16-20□	21-25□	26-30□

Type of Technology in School (Tick all that apply)

○ **Computers**	○ **Internet**	○ **Smart boards**	○ **LEDs**

Please mark the space corresponding to the statement number that best describes you about each statement.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

Sr. No.	**Statements**	**SD 1**	**DA 2**	**N 3**	**A 4**	**SA 5**
	Challenges in Technology Integration					
1	I find it challenging to manage student attention when technology is involved in the lesson.					

2	It is challenging to monitor each student during technology use in classroom.					
3	The use of technology in the classroom leads to increased off-task behavior among students.					
4	I face difficulties in integrating technology due to a lack of resources.					
5	The unreliability of technology devices hinders my ability to teach effectively.					
6	Unreliable internet connectivity is a major obstacle in integrating technology into classroom teaching.					
7	The amount of time it takes to troubleshoot and resolve technical issues with devices is a significant barrier for teachers.					
8	The time required to learn and integrate new technology into teaching is a barrier for teachers.					
9	The workload associated with learning new technologies is overwhelming.					
10	Insufficient training limits my ability to use technology effectively in the classroom.					
	Utilization of Technology					
11	I find it easy to integrate technology into my teaching.					
12	I feel confident in my ability to integrate technology into my teaching practices.					
13	I require minimal support to use technology in my classroom effectively.					
14	I find it easy to use technology for lesson planning and classroom activities.					
15	I regularly integrate technology into lesson planning and instruction.					

16	The use of technology has improved student learning outcomes in my classroom.					
17	I am comfortable experimenting with new educational technologies in my teaching.					
18	Technology enhances my ability to deliver effective lessons.					
19	I prefer using technology as a regular part of classroom instruction.					
20	I believe that increased capacity-building initiatives (e.g., workshops, training programs) would significantly enhance myability to integrate technology into teaching practices.					
	Capacity Development Opportunities					
21	My school provides sufficient training opportunities on technology integration.					
22	I have attended professional development programs related to educational technology in the past year.					
23	I feel confident using various digital tools in my teaching.					
24	I regularly collaborate with other teachers to improve technology use in education.					
25	My capacity development technology trainings are relevant to my classroom needs.					
26	I find it easy to integrate technology into my teaching practices.					
27	Time constraints prevent me from participating in technology training programs.					

28	I believe continuous professional development in technology is essential for effective teaching.					
29	I am willing to learn new technologies that can improve my teaching methods.					
30	The professional training i receive is relevant to my subject domain.					

APPENDIX B

Interview Protocol

Interview Protocol for Principals: Technology Acceptance Model (TAM) in School Technology Integration

Introduction:

Thank you for agreeing to participate in this interview. The purpose of this interview is to explore your strategies and leadership approach to integrating technology into your school. The information you provide will contribute to understanding best practices and the challenges faced by school leaders in this process. The interview should take approximately 15-20 minutes.

1. Can you briefly describe your educational background and how long you've been serving as a principal?
2. How would you describe the current level of technology integration in your school?
3. What is your vision for integrating technology in your school, and how does it align with the overall educational goals of your institution?
4. How do you address challenges related to limited resources (e.g., funding, device availability, infrastructure) in the process of technology implementation?
5. Can you describe any formal plans or strategies your school has in place for technology integration?
6. How do you involve teachers and staff in the decision-making process when selecting and implementing technology in the school?
7. In your opinion, what is the role of leadership in successfully integrating technology in schools?
8. How do you provide direction and support to your staff?
9. What are the key steps you take to ensure the successful adoption of technology by both teachers and students?
10. What strategies do you employ to ensure teachers are adequately trained to use technology in the classroom?
11. How do you assess and address the different levels of technology skills among your teaching staff?

12. How do you support teachers who may be resistant to using technology in their teaching practices?
13. What are the biggest challenges you face in integrating technology in your school?
14. How do you address issues related to limited resources, such as funding, access to devices, or infrastructure, when implementing technology?
15. What challenges have you faced in terms of teacher adoption and how do you overcome resistance or reluctance?

16. How has technology impacted the teaching and learning process in your school?
17. Can you share any specific examples or outcomes that highlight its effectiveness?
18. How do you measure the success of technology integration in terms of student engagement and learning outcomes?
19. How do you ensure that there is ongoing support for teachers in using technology after initial implementation (e.g., professional development, technical support)?
20. How do you foster collaboration among teachers, students, and parents to utilize technology more effectively in educational activities?

Thank you for sharing your insights and experiences. Your responses will provide valuable information on how principals can effectively lead technology integration efforts in schools.