MS Research Thesis

CHALLENGES AND PROSPECTS OF EDUCATIONAL LEADERS IN THE TECHNOLOGY INTEGRATION AT HIGHER EDUCATIONAL LEVEL

Researcher   **Supervisor**

SABAHAT WAQAR   DR. FOUZIA AJMAL

25-FOE/MSEDU/S23

DEPARTMENT OF EDUCATIONAL LEADERSHIP AND MANAGEMENT

FACULTY OF EDUCATION

INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD PAKISTAN

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Sabahat Waqar

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A thesis submitted in partial fulfillment of the requirement for the degree of
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BY

Sabahat Waqar

25-FOE/MSEDU/S23

This thesis has been accepted by the Department of Educational Leadership and Management, Faculty of Education, International Islamic University Islamabad, Pakistan in partial fulfillment of the Degree of **MS Education.**

Supervisor: _____

Dr.Fouzia Ajmal

Internal Examiner: _____

Dr. Azhar Mahmood

^External Examiner: _____

Dr. Jahan Ara Shams

Dated: _____

_____   _____

Chairperson   **Dean**

Department of Educational   **Faculty of Education**

Leadership & Management   **International Islamic**

International Islamic University   **University**

Islamabad, Pakistan   **Islamabad, Pakistan**

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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Sabahat Waqar
25-FOE/MSEDU/SP23

SUPERVISOR'S CERTIFICATE

The thesis titled "Challenges and Prospects of Educational Leaders in Integrating Technology at Higher Education" submitted by Ms. Sabahat Waqar. Regd. No. 25FOE-MSEDU/S23 is partial fulfillment of MS degree in Education, has been completed under my/our 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. Fouzia Ajmal

Dedication

Dedicated
To
My Loving "Ammi"
&
Dearly missed "Abu"

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Abstract

In the dynamic digital age, technology served as a catalyst for empowerment and transformation in education, rather than merely an enhancement tool. Significant advancements had been made in the educational sector through technology, yet its integration remained a challenge in underdeveloped countries like Pakistan. This study explored the perceptions of educational leaders (chairpersons, and teachers) regarding technological integration, analyzed the policy documents HEC Vision 2025 and NEP 2017, and identified the challenges faced by educators along with potential solutions. The study population was divided into two categories: Category 1 comprised all 11 deans (one from each faculty) of the International Islamic University Islamabad (IIUI), while Category 2 included 142 educational leaders (12 chairpersons and 130 teachers) from three faculties of the same university. A universal sampling technique was employed to select all 11 deans for interviews, whereas proportionate random sampling (based on Adam, 2020) was used to select 106 participants from Category 2 for survey responses. The first objective was addressed through document analysis of HEC Vision 2025 and NEP 2017. For the second objective, a 24-item closed-ended questionnaire was developed. The third and fourth objectives were achieved through structured interviews. Data were analyzed using thematic analysis and SPSS. Findings revealed that while most respondents supported technology integration in classrooms, challenges such as outdated equipment, insufficient funding, inadequate infrastructure, and ineffective training hindered its adoption. However, prospects like collaborations with private/non-governmental institutions and optimal utilization of university resources were identified as potential solutions to overcome these barriers.

Key Words: technology, educational leaders, challenges, prospects, technological integration.

CHAPTER 1

INTRODUCTION

Integration of technology in education has change the way to learn and teach. Integration of technology has introduced creativity in the field of education by impacting the style of teaching and learning process. Technology effect every aspect of education including innovations of e books, e class, online class room and flipped classroom. Teacher can work on student's personalized customized learning that can enhance student's creativity. Teachers can get help for lesson planning to achieve their goals. We cannot imagine our life without technology, technology brings innovation, revolution and advancement to the life.

1.1 Background and the Context of the Study

In fast-paced world of today, technology is influencing every part of our life more and more. The significance of technology in healthcare, education, communication, and entertainment cannot be emphasized. Technology offers innumerable advantages and boundless creative possibilities, revolutionizing the way we work, live, and connect with one other. It is essential for individual, corporations, and society to comprehend the significance of technology as we traverse the intricacies of the digital era. We shall examine the importance of technology and its tremendous effects on our contemporary world in this essay.

A new era of unprecedented access, engagement, and creativity has been brought about by the integration of technology into education, which has completely changed the way we teach and learn. Technology has impacted every facet of education, from virtual reality experiences to online learning environments and digital textbooks. Teachers may personalize learning, encourage teamwork, and enable students to explore, create, and succeed in ways that were previously unattainable by utilizing technology. In addition to seizing the benefits presented by technology, we must also overcome its drawbacks and make sure that its application is just, meaningful, and sensitive to the requirements of a wide range of learners. The use of technology into education in this dynamic digital age serves as a key catalyst for empowerment and transformation, not just an enhancement tool.

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The digital revolution has profoundly reshaped higher education, transforming how knowledge is delivered, accessed, and managed. Over the past decade, technological advancements have moved from being peripheral tools to central components of academic ecosystems (Williamson, 2021). Universities globally are adopting innovative solutions like artificial intelligence-driven tutoring systems, blockchain-based credentialing, and immersive learning through virtual reality (Luckin, 2018). These developments promise to enhance educational quality, increase accessibility, and prepare students for an increasingly digital workforce. However, the pace and success of this transformation vary significantly across different contexts, particularly between developed and developing nations (Selwyn, 2019).

The COVID-19 pandemic served as a catalyst for digital education, compelling institutions worldwide to rapidly adopt online learning modalities (Hodges et al., 2020). This sudden shift revealed both the potential of technology-enabled education and the stark disparities in institutional readiness. While some universities seamlessly transitioned to digital platforms, others struggled with basic connectivity issues and faculty unpreparedness (Jandrić et al., 2021). The pandemic experience underscored how technological integration in higher education is not merely a matter of adopting tools, but requires comprehensive institutional transformation encompassing infrastructure, pedagogy, and organizational culture (Fawns, 2022).

Institutional leadership plays a pivotal role in navigating this complex landscape of digital transformation. Educational leaders must balance technological possibilities with institutional constraints, faculty capabilities, and student needs (Macfarlane, 2021). Their decisions regarding technology adoption can significantly influence teaching quality, research productivity, and institutional reputation. However, leadership in this domain faces unique complexities, as it requires not only technical understanding but also the ability to manage change across diverse stakeholder groups (Brown & Flood, 2020). The effectiveness of such leadership is particularly crucial in resource-constrained environments where strategic decisions about technology investments carry higher stakes (Czerniewicz, 2021).

Pakistan's technological infrastructure has advanced recently, allowing digital technologies to be integrated into higher education institutions across the country. Universities throughout the world, from Karachi to far-off places like Balochistan, are using technology to close gaps and democratize access to education. This change has been expedited by the COVID-19 epidemic, making internet platforms indispensable. Not with standing advancements, problems with cybersecurity, digital literacy, and internet access in remote areas still exist. Government, academia, civil society and business must work together to overcome these obstacles in order to ensure that technological integration is inclusive, sustainable, and in line with national aspirations.

Technology has become the important support for the effective education system so it is important to identify the challenges and prospects of technological integration in higher education.

1.2 Problem Statement

Since the invention of technology it is becoming the integral part of all the discipline of life. Same as in the field of education technology is continuously facilitating teaching learning process. The COVID-19 pandemic has also shown how urgent it is for higher education to incorporate technology. Institutions were forced to rely significantly on digital tools and online platforms to maintain educational continuity due to the abrupt change to remote learning. This crisis made it clear that there are still gaps in digital literacy, pedagogical preparedness, and technical infrastructure, underscoring the necessity for all-encompassing approaches to improve technology integration in higher education.

Further, technology integration in higher education is essential if Pakistan is to compete globally and establish itself as a knowledge economy. Institutions with sophisticated technological capabilities are more suited to draw in foreign students, establish collaborative research partnerships, and support economic growth and innovation. Pakistan's capacity to realize the full potential of its human resources is hampered by the failure to resolve the obstacles to technological integration. Furthermore after COVID 19 world educational trend are rapidly moving towards hybrid learning mode, and blended learning. A lot of well-known international universities are offering complete degree programs online but unfortunately Pakistan is

not standing in this Que. So it is important to investigate the challenges faced by educational leaders to integrate technology in higher education and also what prospects can help them to make teaching learning process effective at higher education level.

1.3 Objectives of the Study

Objectives of study were to:

1. Analyze policy documents with reference to technology integration.

2. Examine the perception of teachers and chairperson about technology integration in classroom.

3. Explore the perceived challenges hindering the adoption of technology in higher education among educational leaders.

4. Reconnoiter the prospects identified by educational leader to overcome barriers of technology integration in higher education.

1.4 Research Questions

Research will address the following questions:

1. What are the provisions/ targets proposed in the National Education Policy (2017) regarding integrating technology at higher education institutions?

2. Which type of provision have been proposed in the HEC[*] vision 2025 regarding technology integration?

3. What are the current practices of teachers and chairpersons about technology integration in classroom?

4. Which kind of the challenges faced by teachers and chairpersons in technology integration in classroom?

5. Which kind of challenges hindering the adoption of technology in higher education among educational leader?

6. What are the prospects identified by educational leader to overcome challenges to technology integration in higher education?

* Higher Education Commission

1.5   Significance of the Study

This study is beneficial for educational leaders themselves, including university administrators, department heads, and faculty members. They benefit from this study by gaining a deeper understanding of the complexities involved in leveraging technology for educational purposes. The findings help these leaders identify specific obstacles that hinder the effective integration of technology and develop strategies to overcome them, ultimately enhancing the quality of education and learning outcomes.

This research is valuable for policymakers and government officials responsible for shaping education policies and allocating resources. By shedding light on the challenges faced by educational leaders in adopting and implementing technology-driven initiatives, this study informs the development of targeted policies and initiatives aimed at promoting digital literacy, improving infrastructure, and fostering innovation in higher education institutions across Pakistan.

Furthermore, this study is also beneficial for academic departments and research institutions focused on educational leadership and management. By examining the intricate dynamics of technology integration in higher education, this study contributes to the existing body of knowledge in this field, paving the way for further research and scholarly inquiry. It also serves as a valuable resource for educators and researchers seeking to understand the evolving role of technology in shaping teaching and learning practices in the Pakistani context.

1.6   Delimitations of the Study

1.   The study was be delimited to International Islamic University, Islamabad.

2.   The study was delimited to chairpersons and all teaching staff of only three faculties i.e. Education, Language and Linguistics and Social Sciences.

1.7   Operational Definitions

1.7.1   Educational Leader

An educational leader is someone (deans, chairpersons and teacher) who develops and maintains a supportive learning environment, encourages student success supports staff and faculty professional developments, implement

initiatives, and makes sure that resources are managed and allocated effectively.

1.7.2 Technology Integration

The systematic application of knowledge, tools, and techniques such as digital gadgets, software programmers, communication platforms, hardware and software tools and instructional material to improve and facilitate teaching, learning, administrative, and research processes, in higher education institutions is referred to as technology.

1.7.3 Educational Challenges

Educational challenges in universities are systemic barriers, such as outdated curricula, limited funding, and resistance to digital transformation that compromise the quality of higher education and student outcomes.

1.7.4 Prospects

Prospects refer to, potential advancements, and future opportunities available to organizations, individuals or initiatives within a specific field.

1.8 Conceptual Framework
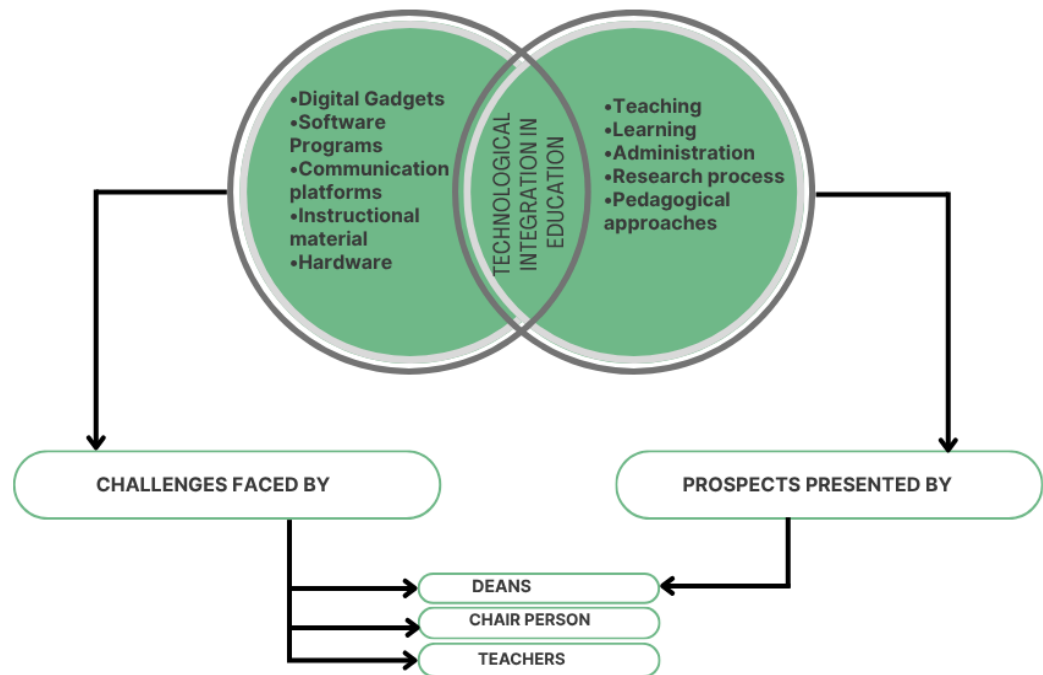
Fig 1.1 Conceptual Framework Integration of Technology with Education

Al-masri et al.,(2020)

Abid Haleem et al.,(2022)

K. Ratheeswari (2018)

CHAPTER 2

LITERATURE REVIEW

Technology into education has change the way to learn and teach. Technological integration has been brought creativity in the field of education. It impact the style of teaching learning process. Technology effect every aspect of education from e books to e class to online class room to flipped classroom. Teachers can get facilities from technology. They can work on student's personalized learning, can enhance their creativity. It can help teachers to plan their lesson to achieve their goals and can contribute in students learning.

We cannot imagine the modern society without technology. Technology is the reason of revolution in different aspects of daily life. It includes system and tools also include the platforms that are designed to increase efficiency, communication and productivity. These speedy advancement in technology are the responsible of its widespread acceptance in different fields, including education.

Technology has change the way we learn and teach. It has change the trends of teaching learning process. Experts are working day and night to enhance the possible advantages of technology in the field just to make it more useable and effecting. Although there are always some challenges and negative impact of it. But it can be hindered. It helps in empowering professionals and transform their skills.

The Reasons of using Technology in Education is to improve accessibility, educate students for the digital world, and improve teaching and learning experiences, technology is incorporated into education. Technology is vital in education for the following main reasons are given blow.

2.1 Improving Educational Experiences

Through gamification, simulations, and multimedia content, technology enhances the interactive and captivating nature of learning. Videos, animations, and virtual reality are examples of digital tools that make difficult ideas easier to understand. (Zawacki et al., 2019)

2.1.1 Individualize Education

In order to provide a personalized educational experience, adaptive learning

Platforms modify information according to a student's progress and preferred method of learning. Pupils can access resources as needed and learn at their own speed. (Luckin et al., 2016)

2.1.2 Expanding Educational Access

Online learning systems make education more accessible by enabling students to access it from any location. Virtual classrooms and digital tools can help students in underserved or rural places. Promoting Cooperation and Interaction Real-time collaboration is made possible by technology through platforms like discussion boards, Microsoft Teams, and Google Classroom. (Crompton et al., 2022)

2.1.3 Increasing the Productivity of Teachers

The administrative burden on teachers is lessened by automated grading, attendance, and learning management systems. Teachers can access professional development resources, online courses, and digital teaching tools to improve their skills. Preparing Students for the Future Digital literacy is essential in today's job market, and integrating technology in education prepares students for careers in an increasingly digital world. Exposure to coding, artificial intelligence, and data analysis equips students with valuable. Assisting Individuals with Special Needs Learning Students with disabilities benefit from assistive technologies like screen readers and speech-to-text software. Different student demands are met by personalized learning strategies.

The integration of technology into livelihood education has the potential to empower teachers and prepare students for a digital future. This systematic review highlights the impact of technology-enhanced vocational training on student engagement, learning outcomes, and the development of essential skills. It emphasizes the importance of equipping educators with the knowledge and confidence to effectively leverage technology in the classroom while addressing the digital divide to ensure inclusive education. Technology integration has proven to create engaging and effective learning experiences for students in livelihood education, using interactive simulations, virtual reality modules, and augmented reality applications. These immersive learning experiences have enhanced student engagement and promoted personalized instruction, catering to diverse learning styles and needs. However, the success of technology integration hinges on teacher empowerment, as digitally

Competent teachers are better positioned to guide students in developing 21st-century skills, including digital literacy, critical thinking, and problem-solving. Teacher empowerment fosters a positive and inclusive learning environment where students can explore their interests and strengths.

The digital divide remains a significant challenge in realizing the full potential of technology-enhanced livelihood education. Collaborative efforts involving governments, private organizations, and international agencies are essential to extend technology and internet connectivity to underserved populations. Inclusive initiatives, such as "One Laptop per Child" (OLPC) programs and mobile-based learning platforms, offer promising solutions to bridge the gap and create equal opportunities for all learners. Technology integration in livelihood education holds transformative potential by empowering teachers and providing equitable access to technology. As stakeholders work collaboratively to implement the implications of this research, they have the power to shape inclusive and future-oriented learning ecosystems that equip the workforce with the skills and adaptability needed to thrive in the dynamic and digitalized world of tomorrow (kilag at el., 2023).

2.2   Transformations

Technology has advanced quickly in recent years, altering industry, communication, and daily life. Here are some of the major ways it has transformed:

2.2.1   AI and Automation:

AI-powered catboats, virtual assistants (such as ChatGPT, Siri, and Alexa), and machine learning algorithms automate tasks.AI is revolutionizing healthcare, banking, and customer service by boosting efficiency and decision-making. (Brynjolfsson et al., 2022)

2.2.2   5G and Connectivity:

5G internet connections are faster and more dependable, improving mobile connectivity and allowing for smoother remote work, streaming, and IoT applications. This has resulted in advancements in smart cities, driverless vehicles, and augmented reality (AR). Block chain technology makes financial transactions more secure and

Decentralized. Cryptocurrencies such as Bitcoin and Ethereum have gained popularity, with applications in finance, gaming, and supply chain management. (Rainie & Anderson 2020)

2.2.3   Work and Digital Collaboration:

Platforms such as Zoom, Microsoft Teams, and Slack have made distant work easier. The epidemic has spurred the use of hybrid work approaches and cloud-based collaborations. (Bao 2020)

2.2.4   Metaverse and Virtual/Augmented Reality (VR/AR):

Companies such as Meta (Facebook) are investing in the metaverse to create digital environments for social interactions, games, and work. Augmented and virtual reality are utilized for training, education, and entertainment.. (kye et al., 2021)

2.2.5   Advancements in Healthcare Technology:

Wearable health devices, such as smartwatches, monitor heart rate, oxygen levels, and more. AI-powered drug discovery and telemedicine have significantly enhanced patient care and accessibility. (Dinh-Le et al., 2020)

2.2.6   Quantum Computing:

While still in its early stages, quantum computing has the potential to transform cryptography, problem solving, and scientific research. (Humble et al., 2021)

2.2.7   Green Tech and Sustainability:

The efficiency of renewable energy sources, such as wind and solar, is increasing. Carbon footprints are being reduced by battery technologies and electric vehicles (EVs). (Sovacool et al., 2020)

2.2.8   Robotics and Smart Automation:

Robots are currently helping in a variety of areas, including healthcare (e.g., robotic surgeries), manufacturing, and logistics. AI-powered automation is used in smart homes to regulate the lighting, climate, and security. (Madaev et.,al 2023)

2.2.9   Improving Privacy and Cybersecurity:

AlDaajeh et al., 2022 concluded in their study that advanced encryption, biometric identification, and zero-trust security methods are becoming commonplace as cyber threats increase. All things considered, technology is developing at a never-before-seen rate, improving connectivity, efficiency, and convenience.

With AR and VR, educational technology (EdTech) has grown significantly and now offers new approaches to improve learning. But there are drawbacks to adopting them as well. Let's examine the potential and difficulties of incorporating AR and VR into the classroom.

Makransky et al 2021 concluded that Development of Skills and Practical Training provides realistic, hands-on experience without posing any physical dangers in the engineering, medical, and vocational training domains. Through the sharing of digital models and annotations in group projects, augmented reality facilitates real-time student collaboration. Tailored and Flexible Education Applications for AR and VR driven by AI adapt content to a student's learning style and speed. Real-time student progress tracking allows teachers to give tailored comments. High prices and problems with accessibility due of their high cost, VR headsets and AR-enabled gadgets may not be widely available in underfunded schools or developing nations. It need constant expenditure to keep the technology updated and maintained. Many teachers are not properly trained to incorporate AR and VR into their lesson plans. Adoption is slowed by resistance to departing from conventional teaching techniques.

Alfalah (2022) concluded the Students may lose focus on learning objectives as a result of AR and VR being more fun than instructive at times. Students may interact with the technology but not fully understand the teachings if there is no structured content. Safety and Health Issues Some users may experience discomfort from VR motion sickness. Long-term VR use might cause eye strain, exhaustion, or a loss of reality awareness. Tracking student interactions on AR/VR platforms raises privacy and data security issues.

According to Onyema concluded in his study in 2020 that the importance of addressing challenges that hinder the seamless integration of emerging technologies in

the 21st-century teaching and learning process. It asserts that these technologies modify outdated methods and content, often putting teachers as the sole disseminator of knowledge. Therefore, all stakeholders in the education sector must promptly address identified impediments to maximize the potential benefits of emerging educational technologies. The integration of these technologies is crucial for achieving teaching and learning objectives in the 21st century.

2.3 Importance of Technology

According to Abbas et al. (2023) also concluded that ICT plays a crucial role in education, supporting classroom activities by reducing work load, providing easy access to content material, and facilitating distance learning. However, it also has disadvantages such as heavy administrative workloads and inability to provide proper feedback to students. Teachers are skilled in using email for feedback, but due to time constraints and workload, they struggle to provide timely feedback. Teachers face various problems when using ICTs, including lack of interest, electricity fluctuations, and high technology costs, lack of training, time constraints, large workloads, and low internet connectivity. These issues hinder the effective use of ICTs in teaching and learning processes due to electricity fluctuations.

For the advancement of learning outcomes, teaching methodologies, and shaping the students for steal in the modern technological settings.

Teachers believe that ICT is the important and effective practice in teaching learning process and facilitate learners to get their concept deeper in different and many ways. This is the reason for what technology is consider important in education. One can never ignore the importance of technology but still situations like COVID-19 emphases on effective use of technology also. This study also highlights the challenges in integrating ICT including appropriate infrastructure, not having proper policies related to ICT, not provided with pedagogical models for technology, lack of leadership support, lack of resources, not provided with the trainings for professional development, not having technical support. These problems can only be solved if concerned authorities take deep interest in these problems and working on the gaps that hinder the adoption of technology. By working on challenges institutes can minimize

the problems in adoption of technology and maximize the benefits of technology in educational institute. . Akram et al., 2022

According to Domingo et al,.2020 concluded that It will become inevitable for universities to transition to a situation where technology is an integral part of everything. Furthermore, this reflection necessitates reconsidering how these modifications may impact the educational experience of both students and professors. Students can access high-quality information, join particular interest groups, and publish and share their own work if they are aware of the benefits that these digital environments can offer.

To excel in 21st century skills information and communication technology plays vital role.it is also quoted to achieve 21st century skills like critical thinking, collaboration and communication, among students technical support and investments are required. Capitalizing and integrating the Information and Communicational Technologies that go along with the quality teaching for the purpose of ongoing improvement in teaching learning process required constant innovation and renovation in universities. (Liesa-Orus et al., 2020).

2.4   Technology in Education

Traditional teaching and learning trends has been expired and outdated because of the integration of technology in education. Because of this advancement access to vast resources, collaborative learning, facilities approach to modern world educational. Digital tools and platforms change the definition of classroom. Modern classrooms have are more focus on personalized learning and more interaction. Integration of E- learning resources, virtual classroom and learning management systems (LMS) demonstrate the thoughtful effect of technology in education. Johnson et al. (2022).

Digital technology such as Interactive whiteboards, augmented reality and gamified learning platforms, artificial intelligence, and machine learning provide captivating experience for learners. These tools are redefining the concept of teaching learning process also advanced the pedagogy by empowering educators to adopt students centered approaches. Study also shows that students who are associate with technology achieve higher scores than traditional method. For instructors who want to

Comprehend the climate of digital innovation, this review offers a starting point. Several technologies may become outdated in the years to come, and several are being modified for delivery during the epidemic. This review advises teachers to follow evaluation and reporting requirements to share their practice and think about how technology might be used with learning designs in their particular curriculum contexts to enhance student teaching (Choi-Lundberg et al., 2023)

Advancement in technology have led to important innovation in educational sector. Virtual reality (VR), Artificial intelligence (AI), and adaptive learning technologies have changed the way of educational delivery and consumption system. For example china recently invent an AI based student learning evaluation tool who analyzed student's performance and offer personalized learning to enhance student's output. Also technology provide flexible online learning platforms, providing easy access for diverse population (Jones et al.,2023)

According to Ahmad et al.,(2023) present the concept of education 5.0. They analyzed the advancement in educational process from 2019 to 2023.they divided it into five categories i.e. Education 1.0, Education 2.0, Education 3.0, Education 4.0 and Education 5.0.

Education 1.0 describe that teacher is the primary and only source of learning, rote memorization were focused, it was more focused to memorize the information rather than the understanding. Usage of technology was not focused at all. Only teachers use technology only to get access to the resources. Which hindered the students learning through technology. Teacher did not take count on individual differences and personalized learning. They rather worked on one size fits all approach. These shortcoming was the

Education 2.0 represent the evaluation in educational field by working on the short comes of education 1.0. Education 2.0 shifting focus from rote memorization to active and more collaborative by introducing technology. Primary feature of education 2.0 is usage of technology to make learning more engaging and interactive e.g. by using computer and internet one can approach the digital materials and learning resources like interactive simulations, animations, and videos. All of these technologies can definitely used as the alternative of traditional teaching. It also make education way more accessible to the world. Educational materials, information and knowledge is accessible

Without considering the location and socioeconomically background as a hurdle. This helps to eliminate the barriers to quality education and make learning process more unbiased. One size fit approach suggested by education 1.0 is strongly eliminated by this approach as it focuses on distance learning, and blended learning which allows learners to learn on their own pace and on time which suits them. It is an advanced approach who make learner independent by boosting the independent thinking and creativity. It is possible only with the use of technology for interactive learning and collaboration.

Building on the accomplishments of Education 2.0 and resolving its flaws, Education 3.0 is an advancement in the field of education. Education 3.0 places a high emphasis on active and collaborative learning while completely integrating technology into the teaching and learning process. The "flipped classroom" strategy, which involves having students watch lectures and finish homework at home before using class time for discussion and interactive activities, is one of the main components of Education 3.0. Students can work at their own pace and level with this method, which enables more individualized and student-centered learning. Students can work at their own pace and level with this method, which enables more individualized and student-centered learning. Additionally, it develops critical thinking, creativity, and problem-solving abilities—all of which are vital in the twenty-first century. Collaboration and teamwork are also highly valued in Education 3.0, which motivates students to actively participate in their education. In addition to learning from one another, this helps students develop critical thinking, communication, and teamwork—all of which are essential 21st-century abilities. Additionally, Education 3.0 tracks student progress and identifies learning gaps using data and analytics. This enables teachers to customize training to each student's requirements and make data-driven decisions to enhance student results. Education 4.0 was created as a result of its flaws, even though it offered numerous advantages over previous models of education. These drawbacks include a lack of emphasis on student and teacher well-being, stress management, and mental health support; limited opportunities for collaboration and teamwork; limited opportunities for individualization and student-centered learning; and a limited use of technology, which is primarily used for content delivery.

By fully integrating technology to support student-centered learning,

collaboration, and personalization, emphasizing well-being, stress, and mental health support for both teachers and students, and leveraging cutting-edge technologies like artificial intelligence, virtual and augmented reality, the Internet of Things, cloud computing, big data and analytics, block chain, and 5G networks to improve the teaching and learning process, Education 4.0 addresses these shortcomings.

By thoroughly analyzing the shortcomings of education 2.0 and striving to improve it, D. Education 4.0 This phase concentrated on leveraging technology to improve the educational process and expanded upon the ideas of Education 3.0. Teaching 4.0 is a comprehensive approach to teaching that uses the newest technology to improve student learning. It is intended to foster 21st-century abilities including digital literacy, teamwork, communication, and critical thinking and is based on the ideas of personalized, student-centered, and adaptive learning. The use of artificial intelligence (AI) and machine learning (ML) in education has been made possible by recent studies and technical developments. By evaluating student data and adapting the curriculum and pacing of instruction to fit each student's unique requirements and skills, AI and ML can be used to personalize the learning process. In order to create engaging and dynamic learning environments, virtual and augmented reality (VR/AR) are also being utilized in education more and more. By simulating real-world situations, VR and AR can give students the opportunity to learn through practical experiences in a secure setting. Because it makes it possible to integrate smart devices and sensors in the classroom, the Internet of Things is also playing a big part in Education 4.0. This enables teachers to deliver more specialized and individualized instruction while also allowing for real-time monitoring and tracking of student engagement and development.

Additionally, gamification the use of games and interactive simulations to make learning more interesting and pleasurable is becoming more popular in the educational sector. Additionally, gamification can be utilized to foster critical thinking and problem-solving abilities as well as to educate abstract and difficult subjects. In comparison to another version, it has a lot more beneficial modifications and technological integration, but it also has some serious drawbacks, which prompted the researchers to consider Education 5.0. Since Education 4.0 mostly depends on technology and the internet, it can be inaccessible to students who do not have access

to these resources. This is just one of its many drawbacks.

The integration of technology and the internet in Education 4.0 has the potential to contribute to already-existing differences in education by unfavorably affecting students from underprivileged backgrounds. Limited human engagement is another drawback of Education 4.0, as technology use may result in less human interaction, which is crucial for the development of social and emotional skills. One of the drawbacks is an excessive dependence on technology, which can lead to pupils being reliant on it for learning and lacking the abilities they need to learn on their own. One of the drawbacks is an excessive dependence on technology, which can lead to pupils being reliant on it for learning and lacking the abilities they need to learn on their own. By developing a more equal and inclusive educational system that makes use of technology to foster autonomous learning and improve human interaction, Education 5.0 seeks to overcome these flaws. More individualized and adaptive learning will probably be its main focus, with technology serving to supplement rather than to replace the human experience. The most recent technological developments, like big data, block chain, and quantum computing, will also be incorporated, and the emphasis will be on creating an interdisciplinary approach to education that integrates several academic disciplines and encourages greater student engagement.

2.5 Challenges Faced in Integrating the Technology

Akram et al., (2022) conclude in their study that teachers are integrating ICT into teaching-learning practices, but secondary school technology use is still lower than higher levels. The COVID-19 pandemic presents an opportunity to improve teaching-learning practices through ICT integration. Barriers include lack of resources, leadership support, ICT infrastructure accessibility, time, unclear policies, professional development, technical support, and appropriate pedagogical models. The requirement for systemic the implementation and strategic planning is one major obstacle. Successful technology integration necessitates thorough planning at several levels, including infrastructure building, policy creation, and ongoing professional development for educators, according to a systematic literature analysis. The study found that technological projects frequently face disintegration and limited impact in the absence of a coherent strategy. The readiness of educational leaders themselves is another important concern. According to research, a large number of school

administrators and principals might not have the skills and self-assurance needed to successfully lead technology integration. This disconnect may lead to uneven digital tool use and impede the growth of a tech-friendly school culture. Another constant challenge is the quick development of digital technologies. Educational leaders need to keep up with new tools and platforms, evaluating their applicability and their influence on instruction. Adaptability and a dedication to perpetual learning are necessary to meet this constant demand.

Inadequate Policies and Institutional Support:

Alam concluded in his study in 2019 that effective technological integration is depended on infrastructure. Infrastructure boost the effectiveness of technology. Technology is the base of effective integration of technology. Problems like Limited infrastructure facilities including electricity supply, unstable internet signals are present in Pakistan (Awan et al., 2020).

Lack of specific guidelines and institutional support is one of the main obstacles to technology integration. Comprehensive frameworks to direct the deployment of digital tools are lacking at many colleges and institutions. According to the Bećirović and Dervić stress that uneven technology adoption causes gaps in accessibility and efficacy due to a lack of clear laws and strategic planning (Bećirović, 2022). Furthermore Al-Emran et al., (2021) concluded that institutional and governmental regulations frequently lag behind technological developments, making it challenging for educational leaders to adopt modern solutions.

2.5.1 Insufficient Professional Training of Teachers:

Marginalized area have more stable and effective technological facilities than rural areas. This divide effects the smooth and equitable execution of technological integration (Hussain et al., 2018).There are some staff and faculty members who resist to adopt new technology. This hinder the smooth execution of technology. This hinders can be reduced by adopting effective management strategies and provide them proper related ongoing professional trainings. (Al Lily et al., 2018; Khan et al., 2021).

2.5.2 Attitudes of Teachers and Opposition to Change:

Teachers who are used to old teaching methods frequently oppose the adoption

of new technologies. While some educators are in favor about technology's ability to improve student involvement, others worry that it may eventually replace their jobs The adoption process is further slowed by instructors' reluctance to embrace change due to the high learning curve associated with new digital platforms. In order to allay these worries, educational leaders must promote an innovative culture and show the long-term advantages of integrating technology.

According Pusey & Sadera to Inadequate teacher and administrator training is a major challenge for educational leaders. Many teachers are not digitally literate enough to successfully incorporate technology into the classroom. According to studies, teachers find it difficult to adjust to new platforms in the absence of ongoing professional development programs, which leads to inefficient implementation and annoyance among teachers and pupils. Regular training sessions must be promoted and led by educational leaders, but this is challenging due to time and budget constraints (Pusey et al., 2021). Ensuring the quality of digital resources is compulsory for meaningful technological integration. However, the explosion of irrelevant digital content or low-quality poses tasks for educational leaders (Barak & Rafaeli, 2020).

2.5.3 Concerns about Cybersecurity and Ethics:

Concerns over cybersecurity risks and data privacy are growing as schools use digital technologies. Adequate cybersecurity safeguards are lacking in many educational institutions, making it difficult to protect student data from breaches and cyberattacks. Educational administrators face additional difficulties in ensuring appropriate technology use due to ethical concerns about student surveillance and artificial intelligence (AI).

2.6 Prospects for Educational Leaders in Integrating the Technology:

The role of technology in education and strategies for effective technology integration. It highlights the evolution of technology, its advantages, and challenges in adoption. Strategies for addressing equity in technology integration include identifying disparities in access, investing in infrastructure and resources, providing training and support for educators, implementing policies for digital inclusion, and fostering collaboration with stakeholders. The importance of ongoing efforts to enhance learning outcomes and promote equity through technology integration cannot be overstated. As

technology continues to evolve, it is crucial for educators, policymakers, and stakeholders to remain vigilant in ensuring equitable access to technology resources and opportunities for all students. By refining technology integration strategies, investing in professional development, and advocating for policies prioritizing digital equity, we can create more inclusive learning environments. A shared vision of inclusive education that embraces technology's transformative power is essential (Eden et al., 2024).

Since 2020, the use of technology in education has increased dramatically, mostly as a result of the COVID-19 pandemic's push for remote and hybrid learning approaches. Educational leaders are essential to managing, implementing, and maintaining technology-driven changes as schools around the world embrace new digital technologies. Nevertheless, despite the advantages, a number of obstacles prevent technology from being seamlessly incorporated into educational environments. These issues are examined in this review of the literature, along with the opportunities for educational leaders to successfully use technology. This gap could hinder the development of a tech-friendly school culture and result in unequal utilization of digital tools.

A persistent obstacle is the rapid advancement of digital technologies. Educational leaders must stay abreast of emerging tools and platforms, assessing their suitability and impact on teaching. To satisfy this ongoing need, one must be flexible and committed to lifelong learning. To promote inclusivity and equal opportunities   in education, for example, AI techniques have been used to help dyslexic kids become better readers and writers.Technology integration in secondary school is a challenging undertaking that calls for careful leadership. Educational leaders have to deal with issues including professional development, strategic planning, and keeping up with technology.

The prospects of enhanced learning experiences, data-informed decision-making, and inclusive education underscore the importance of embracing this digital transformation. Ongoing research and collaboration among policymakers, educators, and technologists are essential to harness the full potential of technology in education.

2.6.1 Enhanced Administrative powers and its collaboration:

Data-Driven Decision-Making enhanced Communication and Collaboration. The capacity to gather and evaluate data in order to enhance instructional methods and student results is one of the main benefits of technology in education. Educational leaders can monitor student progress, spot learning gaps, and carry out focused interventions with the use of AI-powered analytics and learning management systems (LMS). Personalized learning experiences and resource optimization are possible for schools that use data-driven decision-making. Technology integration can help in smoothing administrative execution and improve organizational efficiency. Data analytics tools, learning management systems (LMS) and online communication platforms enable educational leaders to manage their resource effectively. It can be helpful in tracking student progress, and make data-driven decisions (Bichel et al., 2019).

Teachers, students, and stakeholders can communicate more easily because to technology. More flexible and inclusive learning environments are produced by digital tools including virtual classrooms, cloud-based collaboration platforms, and video conferencing. These resources can be used by educational leaders to support teachers' knowledge sharing and collaborative professional development. Technology integration propose promising prospects for increasing improving learning outcomes and student engagement. Multimedia resources, personalized learning experiences and online platforms have the likely to strengthen student motivation and academic achievements of student (Dziuban et al., 2018).

2.6.2 Expand the Opportunities Access to Effective Education Model:

Technology can help in increasing the potential in higher education also it can expand the access to higher education. It is helpful for the students who lives in remote and underserved areas of Pakistan. Technical educational resources can facilitate students to get skills, and access to knowledge (UNESCO, 2020). Customized and Flexible Education: More individualized educational experiences are now possible because to the development of artificial intelligence and adaptive learning technologies. Differentiated instruction is made possible by these tools, which modify the way content is delivered according to the needs of the students. Educational leaders may

greatly improve student performance and engagement by investing in personalized learning initiatives.

2.6.3   Global Educational Prospects:

Learning can now take place outside of traditional classrooms because to technology, which connects educators and students to resources around the world. Knowledge-sharing opportunities are expanded through worldwide collaborations, virtual exchange programs, and online courses. Students can acquire vital 21st-century skills with the support of educational leaders who support global learning programs. Economical Models of Education: Digital learning resources can lower long-term expenditures related to textbooks, physical classrooms, and printed materials, even though initial investments in technology can be substantial. Educational leaders can increase the affordability and accessibility of education by implementing cost-effective technological solutions, such as open educational resources (OERs).

For school leaders, integrating technology into the classroom offers both opportunities and obstacles. The possibilities of improved data-driven decision-making, personalized learning, and international collaboration offer enormous potential for educational advancement, even as problems like insufficient policies, gaps in professional development, and digital inequality continue to be major obstacles. Educational leaders must support strategic policies, fund training initiatives, and adopt creative solutions that promote a technologically advanced learning environment in order to effectively manage these obstacles. (Selwyn & Jandrić, 2023)

2.6.4   Prospects on Public Private Partnership:

In the field of education, public-private partnerships (PPPs) entail cooperation between public and private organizations in order to accomplish common educational goals. These collaborations improve educational outcomes by utilizing the advantages of both sectors.

2.6.5   Opportunities for Public-Private Collaborations in Education:

Expanded Educational Access PPPs combine the efficiency of the private sector with public finance to increase educational opportunities. This partnership has the potential to provide access to high-quality education by establishing new schools and

educational initiatives, especially in underprivileged areas.

2.6.5.1   Better Education:

Innovation and specialized knowledge are frequently brought to educational projects by the commercial sector. These qualities can be incorporated into public education systems through PPPs, which will enhance curriculum creation, instructional strategies, and the standard of education in general.

2.6.5.2   Resource Optimization:

More effective utilization of resources can be achieved through cooperation between public and private organizations. By mobilizing more financial and human resources, PPPs can ease the strain on public budgets and make it possible to invest in teacher training, infrastructure, and technology.

2.6.5.3   Accountability and Performance:

Since private partners may be held to particular benchmarks and results, PPPs have the potential to implement performance-based accountability mechanisms. Better school administration techniques and an emphasis on attaining quantifiable learning outcomes may arise from this. Flexibility and Innovation: Including private partners can promote flexibility in introducing new teaching strategies and technological advancements as well as innovation in educational practices. This flexibility is essential for meeting the changing demands of the labor market and pupils.

In conclusion, (Patrinos, 2023) there are encouraging opportunities for improving educational systems' efficiency, quality, and accessibility through public-private partnerships. PPPs can solve current issues and aid in the creation of more resilient and adaptable educational frameworks by utilizing the assets.

2.7   Challenges and prospects of educational leaders

When it comes to incorporating technology into secondary education, educational leaders are essential. However, there are a number of opportunities and challenges associated with this process. (Girma, 2022)

2.7.1 Limited Resources:

A lot of schools struggle financially to buy the digital infrastructure and technology they need. Lack of resources can be a big problem, particularly in areas like public-private partnerships and education. A lack of vital inputs required to accomplish particular objectives is referred to as limited resources. These resources might be either intangible (like time or expertise) or tangible (like money or technology).

Examples of Challenges with Limited Resources:

- **Financial Constraints:**

Schools might not have enough money for infrastructure improvements, teacher training, or contemporary technology. If public money is limited or private partners are unwilling to make long-term investments, public-private partnerships may face difficulties.

- **Human Resources:**

A lack of qualified educators or educational administrators who are adept at utilizing and integrating technology. Limited availability of experts in curriculum creation, cybersecurity, and digital learning.

- **Technological Infrastructure:**

Outdated technology, inadequate internet access, and deficiency of necessary software tools. Schools in impoverished or rural areas might not have access to digital devices or dependable power.

2.7.2 Time and Capacity:

Teachers and leaders may already have a lot on their plates, which leaves little time for professional development or mastering new technology.

2.7.3 Policy and Support Structures:

Inadequate guidance from governing bodies or unclear policies regarding the adoption or innovation of technology in education. Strategic planning, innovative problem-solving, and cooperation (such as public-private partnerships!) are frequently needed to address these resource constraints in order to pool resources and close gaps.

2.7.4 Teacher Resistance and Training Needs:

Some teachers might be reluctant to adapt or might not have the necessary abilities to employ technology in the classroom. For a variety of reasons, many educators may be reluctant to embrace new technologies. Teachers used to more conventional approaches could feel uneasy or overpowered by digital resources.

2.7.5 Lack of Confidence:

Teachers may be concerned about seeming unprepared in front of students or question their capacity to use technology efficiently.

2.7.6 Perceived Ineffectiveness:

Some people might think that technology complicates things needlessly or interferes with learning. Added Workload: At first, learning and using new tools may seem like more work on top of an already taxing profession. Negative Experiences in the Past: Future attempts may be viewed with suspicion if there have been unsuccessful tech rollouts or insufficient support in the past.

2.8 Problems with Infrastructure and Connectivity

Outdated technology and poor internet access might reduce the efficiency of technology integration. The integration of technology in secondary school is severely hampered by problems with connectivity and infrastructure. Particularly in rural and underprivileged areas, many schools struggle with obsolete technology, restricted device access, erratic internet, and insufficient IT help. While socioeconomic differences create a digital divide that prevents certain kids from accessing online learning at home, bandwidth restrictions and cybersecurity concerns further hinder the adoption of technology. Meaningful changes may be thwarted by financial limitations and a lack of strategic planning, but creative policies, government funding, and public-private partnerships provide a way forward. To fully utilize technology in education, infrastructure must be strengthened and equitable access must be guaranteed.

2.8.1 Digital Divide:

Students may not have equal access to technology due to socioeconomic differences, which can lead to a learning gap. The difference between people who have access to contemporary technology and the internet and those who do not is known as the

digital divide. Particularly at the secondary level, this inequality in schooling leads to notable differences in learning opportunities. While students in rural or low-income locations might not have even the most basic connectivity and gadgets, those in well-funded, metropolitan schools might have access to cutting-edge digital tools and high-speed internet. This disparity goes beyond school boundaries; children who do not have access to the internet at home find it difficult to complete digital assignments, do online research, and participate in virtual learning. By preventing children from acquiring critical 21st-century skills, the digital gap exacerbates educational disparities. Infrastructure spending, reasonably priced internet plans, and laws that support equitable access to technology for all students are necessary to close this gap.

2.8.2 Concerns about Cybersecurity and Data Privacy:

There is a rising worry about safeguarding student data and preventing cyberattacks. Educational officials now have serious worries about cybersecurity and data privacy as a result of schools' growing reliance on technology. Sensitive data, including grades, personal information, and even behavioral records, is at risk from cyberattacks as a result of educators and students utilizing digital platforms, learning management systems, and cloud-based applications. Hacking, phishing, ransomware, and data breaches are threats that schools must deal with because they can jeopardize student safety and undermine confidence in digital systems. Furthermore, a lot of teachers and pupils are not properly trained in online security procedures, which leaves them vulnerable to attacks. In order to overcome these obstacles, leaders must invest in secure technologies, put in place robust cybersecurity procedures, and conduct frequent data protection training. Developing a safe, tech-driven learning environment requires striking a balance between creativity and safety.

2.8.3 Curriculum Integration:

It can be difficult and time-consuming to integrate technology with current curricula and assessment techniques. In order to assist students understand the connections between disciplines and apply information to real-world problems, curriculum integration is a teaching strategy that links many subjects to create a seamless learning experience. It might be transdisciplinary (focused on real-life issues or student-driven concerns), interdisciplinary (combining concepts and skills from

different topics), or multidisciplinary (subjects connected by a common theme). This approach makes learning more relevant and meaningful by encouraging deeper comprehension, teamwork, and critical thinking. To promote holistic development, it is frequently utilized in inquiry-driven classrooms, STEM/STEAM education, and project-based learning.

2.9. Improved Learning Outcomes

Diverse learners can benefit from technology's ability to make learning more dynamic, interesting, and accessible. The term "improved learning outcomes" describes how good teaching practices, curriculum design, and learning environments affect students' knowledge, abilities, and general academic performance. By combining several teaching strategies, such project-based learning, active learning, and individualized instruction, students are able to interact with the content more thoroughly, which improves their comprehension and memory. Furthermore, encouraging critical thinking, teamwork, and the practical application of ideas results in a more fulfilling educational process. Better results also entail the development of non-academic skills like communication, creativity, and problem-solving, which better equip pupils for obstacles in the future.

2.9.1 Personalized Education:

Learning that takes into account each student's unique demands and learning style is made possible by digital tools. Teaching and learning are adapted to each student's particular requirements, interests, skills, and learning preferences in a personalized education method. It entails modifying the tempo, subject matter, and teaching strategies to enable each student to reach their greatest potential. This can be accomplished through technology utilization, one-on-one assistance, individualized instruction, and giving kids a say in their education. Because it enables a more customized approach that honors a range of backgrounds and learning preferences, personalized education promotes increased student involvement, motivation, and ownership of their education.

2.9.2 Better Collaboration and Communication:

Teachers, students, and parents may engage more effectively thanks to online platforms. Improved communication and collaboration are the abilities and behaviors

that allow people to cooperate well and share information, ideas, and criticism. In the context of education, this entails creating settings in which educators, parents, and students can freely discuss topics, exchange ideas, and work together on projects. Peer learning, group projects, and the use of technology to improve communication—such as online forums or collaboration tools—can all improve it. Strong collaboration and communication skills are essential for building teamwork, resolving conflicts, and fostering a supportive learning community, all of which contribute to more positive and productive educational experiences.

2.9.3 Professional Development:

Teachers can improve their digital proficiency and efficacy by receiving ongoing training and assistance. Throughout their careers, educators can continuously improve their knowledge, abilities, and efficacy through a process known as professional development. It includes a range of activities, including conferences, online courses, mentoring, seminars, and peer-to-peer collaborative learning, all of which are designed to keep educators abreast of the most recent advancements in education, research, and technology. Good professional development enables teachers to adapt creative approaches, improve their teaching techniques, and meet the various needs of their pupils. It is essential for increasing teacher motivation, raising student achievement, and encouraging a continual improvement culture in schools.

2.9.4 Global Learning Opportunities:

Students can collaborate with peers around the world and access materials in virtual learning environments. Students have the opportunity to interact with information, viewpoints, and experiences from around the globe through global learning programs. This can involve working with classmates from diverse cultural backgrounds, taking part in international exchanges, learning about global issues, or connecting with schools in other nations via technology. These experiences increase students' worldview, foster cultural sensitivity, and equip them to be global citizens. Skills like critical thinking, problem-solving, and cross-cultural communication are also fostered by global learning and are crucial in today's diverse and interconnected society.

2.9.5 Effective Administration:

Technology makes school operations, such as communication, grading, and

attendance tracking, more efficient. With careful planning, training investments, and policies that support fair access, educational leaders can successfully integrate technology despite the obstacles. They can develop an education system that is more inclusive and prepared for the future by tackling these problems.

2.9.6   Technological Determinism:

While encouraging the acceptance and institutionalization of technology-improved practices, educational leaders achieve institutional pressures and limitations. Technological integration in education is prop up by power dynamics, social inequities, and ideological influences that can be examined with a critical lens. Educational leaders examine the social, economic, and political effects of technology use from a critical standpoint, questioning prevailing beliefs and promoting social justice, equity, and democratic engagement. (Giroux, 2011).

According to technological determinism, technology shapes society and affects the development of institutions like education. When integrating technology in secondary school, educational leaders encounter institutional constraints and demands. Although technology has the potential to improve administration and education, power dynamics, social injustices, and ideological considerations all have an impact on its uptake. The social, economic, and political ramifications of technology use must be rigorously evaluated by educational authorities. They should challenge prevailing narratives rather than embracing technology as inevitably advantageous, making sure that digital technologies advance social justice, equity, and democratic participation rather than escalating already-existing inequalities. This analytical method contributes to the development of an ethical and inclusive framework for the use of technology in classrooms.

2.10   The Role of Technology in Educational Leadership

The idea that technology is the main force behind society development, influencing relationships, institutions, and behavior, is known as technological determinism. This idea has a big impact on how educational leaders handle the integration of digital tools and infrastructure in secondary school. Technology adoption is not a neutral process, despite the fact that it presents countless chances for creativity, efficiency, and improved educational prospects. The use and use of technology in

schools are shaped by institutional pressures, social injustices, and ideological influences that educational leaders must manage.

Not all teachers and students have equal access to technology. The "digital divide," which is caused by socioeconomic differences, may prevent pupils from low-income families from having access to dependable internet, personal electronics, or tech-savvy education. Marginalized populations may be disproportionately affected by this split, which has the potential to exacerbate already-existing educational disparities. The implementation of inclusive policies that cater to a range of learning requirements, the provision of school-owned devices, and the acquisition of public or private money for digital projects are all examples of tactics that educational leaders must use to advance fair access.

2.10.1 Social Injustices and Power Relations:

Not every student or teacher has equal access to technology. Because of socioeconomic differences, there is a "digital divide," where kids from low-income families do not have access to dependable internet, personal electronics, or tech-savvy education. This gap has the potential to exacerbate already-existing educational disparities, which will disproportionately impact marginalized communities. Promoting equitable access requires educational leaders to take steps including granting school-owned devices, obtaining public or private funding for digital projects, and putting in place inclusive policies that take into account a range of learning requirements

2.10.2 A Critical Analysis of the Role of Technology:

Educational leaders must evaluate technology's effects on teaching, student engagement, and social structures critically rather than seeing it as a force for good. When technology is used carelessly, it can strengthen current power structures. Algorithm-driven learning platforms, for example, have the potential to reinforce biases in evaluations, while school surveillance technologies create moral questions regarding student privacy. In order to make sure that the use of digital tools is consistent with the values of justice, inclusivity, and democratic participation, leaders should challenge conventional wisdom.

Encouraging Equity and Social Justice Leaders should support digital literacy initiatives that empower teachers and students in order to use technology for significant

Educational change. Digital tools are used to improve learning rather than to replace critical thinking when teachers are trained in their ethical and efficient use. Involving communities in technology adoption decision-making also promotes democratic participation and adaptability to a range of demands.

In conclusion Technological determinism serves as a reminder that economic, political, and social considerations shape technology rather than it being a neutral force. In order to make sure that technology is used as a tool for empowerment rather than exclusion, educational leaders are essential. By analyzing its execution critically, resolving power disparities, and promoting inclusive digital policies, they may establish an educational system that genuinely helps all students, irrespective of their background.

2.11   Summary

Nevertheless, there are encouraging opportunities for technological integration among these difficulties. Through personalized learning experiences and interactive multimedia resources, technology offers the ability to improve learning outcomes and increase student engagement. Additionally, by using open educational resources and online learning platforms, it can increase access to education, particularly in rural areas. Furthermore, by utilizing data analytics and learning management systems, technology integration can increase institutional efficiency and optimize administrative procedures.

Theoretical frameworks that help comprehend the intricate dynamics of technology integration in higher education include technological determinism, diffusion of innovations theory, social constructivism, institutional theory, and critical theory. In order to navigate these dynamics, encourage creativity, deal with opposition to change, and create collaborative learning environments, educational leaders play a critical role.

Although incorporating technology at the secondary level presents several problems for school leaders, the opportunities outweigh the drawbacks. Successful technology adoption requires filling up infrastructure gaps, offering professional development, and putting in place efficient change management techniques. In order to assist educational leaders in overcoming these obstacles and optimizing the advantages of digital learning resources, future studies should investigate creative approaches.

One of the most important components of contemporary teaching and learning is the incorporation of technology into secondary school. The successful implementation of digital tools to improve student learning outcomes is largely dependent on educational leaders, such as administrators and principals. But even though technology has many advantages, integrating it can be very difficult. The difficulties and opportunities that educational leaders encounter when incorporating technology into secondary school are examined in this overview of the literature. Educational leaders must address these challenges through strategic planning, professional development, and effective implementation to maximize technology's benefits in secondary education. For educational leaders, integrating technology into secondary school offers both opportunity and obstacles. Limited resources and infrastructure: Many schools do not have access to contemporary technology or sufficient money. Parents, teachers, and students may be reluctant to embrace new digital technologies. Teachers who receive insufficient training are ill-equipped to use technology effectively. Online security and data privacy continue to be major concerns. Digital tools increase student participation and learning results. Analytics and artificial intelligence assist in monitoring student progress and guiding instructional tactics. Students, instructors, and parents work together more effectively thanks to platforms like Google Classroom. E-learning materials make high-quality education more accessible, especially in underprivileged communities.

CHAPTER 3

RESEARCH METHODOLOGY

Mixed method approach was employed for the study. For 1st objective researcher analyzed the document (HEC 2025 vision) and National Education policy 2017. For 2nd objective data was collected by an instrument containing close ended questions. For 3rd and 4th objective semi structure interview was conducted. Data was collected by personally visiting the people selected as sample.

3.1   Research Paradigm/Design

Research paradigm was pragmatism. Pragmatism paradigm is used for mixed methods research. It focuses on the usefulness and applicability of research findings. Mixed methods approach was used. Convergent mixed-methods design was used where both qualitative and quantitative data were collected and analyzed separately and simultaneously but integrated during interpretation to achieve comprehensive understanding.

3.2   Population and Sample

Population was selected in two groups. Group 1 included all deans (11 from the 11 faculties) of International Islamic University and group 2 included 142 educational leaders (12 Chairpersons and 130 Teachers) from 3 faculties (Education, Social Sciences and Language and Literature) of International Islamic University. 11 deans were selected as sample for interviews as a universal sampling technique (data was collected from every member of a population). 106 educational leaders was selected as sample for population of group 2 according to the Adam (2020). Proportionate random sampling technique was used for data collection.

Table 3.1

Sampling Frame

Faculty	Departments	Population	Sample
Education	Educational Leadership and Management	11	08
	Teacher Education	10	07
Language and literature	English	37	29
	Urdu	18	15
	Persian	02	01
Social Sciences	Anthropology	01	01
	Islamic Art and Architecture	02	01
	Politics and IR	13	09
	Media and Communication	16	12
	Psychology	15	11
	History and Pakistan Studies	07	05
	Sociology	11	08
Total		142	106

3.3   Instrument

1st objective was achieved by document analysis of HEC vision 2025 and NEP 2017. For 2nd objective researcher has used a qualitative instrument, designed by researcher having 24 items, were easily understandable. A five point Likert scale was used to rate the response.

Table 3.2

Key words of five-point Likert scale

Strongly Agreed (SA)	AS	5
Agreed (A)	AS	4
Neutral (N)	AS	3
Disagreed (D)	AS	2
Strongly Disagreed (SD)	AS	1

In the response teachers must select one option among above mentioned options for one statement.

For 3rd and 4th objectives a structured interview guide was created by researcher.

3.4 Validity, Pilot Testing and Reliability

3.4.1 Validity

The instruments were developed in alignment with the study's objectives and insights from the literature review. A team of experts in the field of education validated the instruments. To establish validity, the questionnaire was distributed to three teachers for construct and face validity assessment. Based on their feedback, the researcher modified specific items, refined wording, and corrected grammatical or linguistic errors. After incorporating these revisions, the questionnaire underwent a pilot test to evaluate its clarity and effectiveness further.

3.4.2 Pilot Testing

The qualitative instrument was piloted prior to implementation with the actual study sample to assess its reliability. For this purpose, a group of 25 teachers was selected from the target population. While these pilot participants were drawn from the actual study

population, their responses were not included in the final sample analysis. The reliability coefficient of the instrument was calculated using Cronbach's Alpha method.

3.4.3 Reliability

To establish the instrument's reliability, the pilot test data were analyzed using SPSS software, with Cronbach's alpha coefficient serving as the measure of internal consistency. The analysis yielded an overall reliability coefficient of 0.819 for the questionnaire, indicating strong internal consistency among the items.

Table 3.3

Reliability statistics

Cronbach's alpha value	No of items
0.819	25

It showed that the questionnaires ware both valid and reliable.

3.5 Data Collection

For category 1 eleven participants were selected through universal sampling. Initial contact was made via email, outlining the study's objectives. Agreed participants received a second email to schedule interviews, specifying time, date, and venue. Prior to interviews, informed consent was secured, and sessions were recorded for thematic analysis.

For Category 2, data were collected through personal visits to members using a proportionate random sampling technique. Participants were provided with a consent form and an information sheet (which included operational definitions of variables) explaining the research purpose and procedures. The data collection process lasted two months.

3.6 Data Analysis

The National Education Policy 2017 and HEC Vision 2025 were analyzed through document analysis. For quantitative data collected via closed-ended instruments, means were measured using the statistical tool SPSS. Qualitative data obtained from interviews were analyzed using thematic analysis technique.

3.7 Ethical Considerations

The researcher clearly explained the research intentions and objectives to all participants, ensuring they fully understood the purpose and scope of the study. Additionally, the researcher maintained confidentiality by safeguarding participants' identities, ensuring that their names and any other identifiable information were not disclosed to third parties or included in published materials. Furthermore, the collected data were used exclusively for this study and were not utilized for any other purposes. The confidentiality and integrity of participants' information were strictly upheld throughout the research process.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATIONS

This chapter represents the result derived from the collected data, offering a broad and comprehensive analysis of both policy documents and perspectives of teachers, chairpersons and deans. The study examines the National Education Policy 2017 and HEC Vision 2025 to evaluate their emphasis on technology integration in higher education. It explores the perceptions of teachers towards the use of technology in classrooms, along with the challenges faced by educational leaders in adopting these developments also highlights potential prospects identified by participants to overcome present barriers.

Table 4.1

Framework for analysis

Section	Objectives	Research Questions	Analysis Technique
A	1	RQ 1	Document Analysis
		RQ 2	Document Analysis
B	2	RQ 3	Mean
		RQ 4	Mean
C	3	RQ 5	Thematic Analysis
	4	RQ 6	Thematic Analysis

Section A:

Objective 1: Analyze policy documents with reference to technology integration. Document analysis

This part of study aims to analyze policy documents with reference to technology integration. Focus of this part is on provision of National Education policy (2017) and provision purposed in the HEC vision 2025 regarding technology integration. A qualitative research technique called document analysis was used to methodically interpret and assess documents in order to learn more about topic. Document analysis was done by following the steps discussed below:

1. **Selection of Documents**

National Education Policy (2017) for the general framework for higher Education in Pakistan and HEC Vision 2025 for the provision of specific strategies and initiative for the integration of technology in Higher Education institute were selected. The policy documents were gotten from official websites.

2. **Skimming and Preliminary Review**

A preliminary reading was conducted of the documents to identify relevant sections linked to technology integration. National educational policy 2017 document don't focus on any particular targets. Document of HEC vision 2025 consist on 6 main sections. Only one section called technological advancement were selected as the part of the study. Headings, subheadings, were examined to trace relevant content.

3. **Thematic Coding and Categorization**

The extracted data was organized into key themes through manual coding. The following themes emerged:

- Technology Infrastructure like Wi-Fi, Provision of smart campuses, and digital libraries.

- Smart Learning Initiatives: Learning Management Systems (LMS), Smart classrooms, and e-learning platforms.

- Security and Surveillance: Through IP surveillance systems implementation of safe campuses.

- Research and Development: Establishment of open-source research labs, incubation centers, and collaboration with Huawei.

- Assessment and Evaluation: Development of online grading systems and smart assessment tools.

5.   Analysis and Interpretation

The findings from the National Education Policy (2017) and HEC Vision 2025 were likened to:

- Identify the target existing regarding technology integration.

- Examine potential opportunities for improving technology-based education in higher education institutions.

RQ. 1 W h a t are the provisions/ targets proposed in the National Education Policy (2017) regarding integrating technology at higher education institutions?

Pakistan's National educational policy 2017 highlights the significance and importance of higher educational education as it says that higher education impart skills in human which create highly skilled human. To promote the standard of universities in Pakistan this policy purposed the national and international ranking to create the sense of competition, also policy focus on situation analysis of higher education in Pakistan including access, quality, financing, HEC vision 2025, 18th amendment and role of higher education commission. Challenges of higher education in Pakistan including low participation rate, unequal accessibility to higher educational institute, quality of higher education, teachers without PhD degrees, low quality of research, low budget allocation and lack of linkage between universities and industries are also highlighted in this policy. Also it shows the importance of international and national commitments for higher education in Pakistan like constitution of Pakistan, Pakistan vision 2025, and sustainable. This policy also focus on the importance of skilled and updated education also it recommended some actions to take for the improvement of higher education in Pakistan

included technology embedded distance education.

Focus of this policy is clearly on the overall setup of higher education. It does not mention the targets or provisions regarding the integration of technology at higher education level. But it mention HEC vision 2025 policy document for detail targets.

RQ. 2 Which type of provision have been proposed in the HEC vision 2025 regarding technology integration?

To increase productivity, cost effectiveness, research output and efficiency of Higher Education, it is important to provide Technology including e-books, computers, different education software, multimedia devices, financial aid and telecast services. For the industrial revolution of 21st century integration of Technology in Higher Education is important to enable institutions and scholars to participate in the merging industrial revolution with advance digital technologies.

4.1 Smart university

Smart universities is all about to create a new ecosystem of Higher Education that is embedded with technology. In which technology facilities that teachers, learners and scholars.

4.1.1 Smart bag Initiative of Government of Pakistan:

To overcome the problem of student Computer ratio (i.e more student and less computer) in public universities because of different reasons. HEC plan to provide free laptop with Internet access and digital library. This scheme covered 100,000 students every year (2013 2014) this scheme will facilitate student for three consecutive years and facilitate 300000 students. The goal of this program to facilitate more and more students and Scholars by reducing the digital divide.

4.1.2 Smart Campus:

To facilitate the public sector universities free Wi-Fi technology will be provided across the campus. It is to ensure the freely access to internet in Indoor and all open areas across the University Campus. By 2025 HEC plans implement this smart campus projects to all public University. Target were to convert 94 public universities into Smart campuses.

4.1.2 Safe Campus:

To improve our all security situation and for the protection of property and life of the people working in the campus project of safe campus will be initiated. 94 campus embedded with IP surveillance, cameras around main entrance and major area of Campus also installation of HD IP camera system and power over external Ethernet.

4.1.3 Transforming Classroom into Smart Classroom:

Learning is directly related with experience and explores. It is important for effective learning that classroom must be connected with the outer world. It is depending on the up to date course and innovative teaching methods integrated with technology. That's why HEC plan to equipped Campuses with smart classroom facilities up to departmental level. This aim to connect students with technology and facilities. By providing digital aid teacher can develop digital content including presentations and lectures. Target of this project is to provide and a digital system that is comprehensive instead of smart touch screen board. Target was set to convert 350 conservative classrooms into the smart classrooms.

4.1.4 Smart Assessment:

Introducing smart assessment and evaluation system LMS (learning management system) for online assessment and our all performance of students by reporting grade speedily.

4.2 Educloud and Services

The primary objective of Educloud and Services is to foster collaboration, boost productivity, and enhance IT infrastructure among Pakistani universities, offering cost-effective solutions to drive institutional excellence.

4.1 Pakistan Education and Research Network

The Pakistan Education and Research Network (PERN) enhances university ICT infrastructure and connects campuses. However, expanding internet access remains a pressing need within academic institutions. PERN's upgrade will establish an ultra-high-speed backbone network, providing 40Gbps connectivity across 50 cities and HEDs

nationwide. HEC's PERN-III project aims to upgrade the core network to 40Gbps and expand ICT services. The project will enhance connectivity in remote areas, including Balochistan, Azad Jammu and Kashmir, and Gilgit-Baltistan. PERN-III will increase access to ICT services in smaller cities, promoting education nationwide.

4.2   Higher Education Management Information System (HEMIS)

Pakistan's higher education sector requires data-driven decision-making to adapt to changing environments. Implementing HEMIS will provide reliable data and enhance analytical skills for informed decision-making. Colleges and universities must optimize administrative infrastructure to manage key processes efficiently. Upgrading systems helps reduce expenses and enhance competitiveness. HEC aims to implement a standardized Higher Education Information Management System (HEIMS) across Pakistan's HEIs. The rollout targets 50 institutions over 5 years, benefiting new universities and research institutions.

4.2.1   Online Learning Platform:

HEC aims to implement a Learning Management System (LMS) in research universities by 2025. LMS will deliver and manage instructional content, track progress, and assess learning goals. The system will enhance student learning experiences through online resources and support. HEC will provide guidance to public sector universities for LMS deployment and operation.

HEC's early intervention will guide universities in successfully implementing Learning Management Systems (LMS) and campus management systems. This will standardize course delivery, automate attendance, and enhance communication between students and faculty. It will also facilitate online course feedback, audit, and accreditation. HEC aims to deploy Learning Management Systems (LMS) in all public sector universities by 2025. The initial phase will focus on 5 universities, paving the way for nationwide implementation.

4.2.2 Introducing EduCard All in One Student Card:

HEC introduces EduCard, an all-in-one student card, to provide a secure and convenient way for students, faculty, and staff to conduct transactions. This initiative aims to integrate student information into various campus systems. EduCard is a key component of the Higher Education Management Information System (HEMIS). HEC aims to establish a centralized management system, enhancing administrative efficiency and effectiveness across universities. HEC plans to roll out the EduCard solution across higher education institutions, alongside HEMIS implementation. The goal is to issue EduCards to 300,000 graduate students over five years, with 10 institutions participating annually.

4.3   Promotion of ICT R and D and innovations at HEIs

4.3.1 The knowledge Incubation Center

HEC will establish Knowledge Incubation Centers to foster collaboration among IT stakeholders, researchers, and industry experts. Top ICT companies will partner with universities to develop tailored solutions. Entrepreneurs and faculty will work together to create complementary components for higher education institutions. HEC aims to create an ecosystem supporting IT solution development, fostering synergy among stakeholders. This ecosystem promotes research, innovation, and incubation, driving indigenous solutions for local challenges. HEC's Knowledge Incubation Centre aims to foster synergy among stakeholders, identifying and prioritizing ICT projects that address common interests of Higher Education Institutions (HEIs). The center will facilitate development of robust ICT solutions, promoting national e-strategies and capacity building. ICT solutions will be categorized into infrastructure and software solutions.

4.3.2 Huawei R and D center and HAINA Program

HEC Pakistan and Huawei Technologies signed a Memorandum of Understanding in 2016 to establish a research and development center, promoting innovation and technological advancement. This collaboration aims to foster research culture and provide cutting-edge solutions using ICT to address societal challenges. This initiative fosters innovation and creativity by integrating diverse disciplines, sparking new collaborations, and inspiring young scholars to pursue scientific endeavors. It also nurtures

entrepreneurship and business growth, driving progress and development.

Huawei's R&D center will be established in Islamabad, initially at HEC's premises, with facilities for research and conferences. A purpose-built center will be constructed later, with HEC's operational and administrative support. Huawei will provide equipment for key technology areas, fostering innovation and making scholars producers of ICT tools.

4.3.3 Design and Engineering Verification for Local Manufacturing of IT Equipment:

Asia's electronics manufacturing trajectory is shifting to South Asia and Africa, driven by lower labor costs. Pakistan is poised to capitalize on this trend, leveraging its ICT specialist talent pool to facilitate innovation. HEC's laptop assembly plant initiative is expected to spur the development of mobiles, tablets, and a productive knowledge economy.

This initiative promotes collaborative research with top manufacturers to enhance local production of high-quality products and microelectronic devices. It focuses on equipment performance testing, engineering, and design verification to drive innovation and excellence.

HEC has outlined a roadmap for electronic device manufacturing in Pakistan, starting with laptop assembly and laboratory setup for performance testing. Within five years, local facilities will offer research and design verification opportunities for engineers and researchers at higher education institutions.

4.3.4 Establishment of Open Source Research Laboratories

HEC aims to promote indigenous product development through open-source platforms, establishing research laboratories at top-tier universities. This initiative will provide students with hands-on experience, bridging the demand for skilled professionals in this domain. It will also enhance employability and adaptability in industries utilizing diverse high-tech systems.

HEC promotes product development and technological advancements through open platforms. This empowers students and researchers to design innovative solutions.

HEC plans to establish 30 open-source research labs at higher education institutions, equipped with computing terminals. These labs will receive technical support and mentorship from open-source forums and international organizations.

4.5.4 PiNet Platforms:

HEC's initiative supports technology-based solutions, including PiNet, a collaborative project fostering synergy between industry and academia. PiNet aims to drive a knowledge-based economy by leveraging combined resources for innovative research and development. An online platform connects Pakistani industrialists with researchers to solve industry challenges. This collaboration develops innovative products for domestic and international markets. The online portal enables industry representatives to share challenges with relevant researchers. Researchers then provide viable solutions online, fostering collaboration and innovation.

4.5.5 ORIC Automation and Research Cluster Management System:

ORIC's automation system ensures research programs align with HEC's core values and university standards. The system facilitates planning, monitoring, and evaluation of research clusters across HEIs for optimal management and development.

This project aims to establish collaborative research clusters across higher education institutions, enhancing data dissemination and analysis. The research cluster management system will provide insights into resource utilization, research directions, and policy implementation, driving innovation and public benefit.This project aims to establish a nationwide research cluster ecosystem across higher education institutions. Initially, the project will be rolled out in 12 selected public sector universities, with plans for future expansion to private sector institutions.

4.4 EduTV and Education Counselling Services:

Higher Education Web TV will offer educational content and counseling services to Pakistani citizens. The platform will provide information on scholarships, university admissions, academic programs, and expert guidance from university management.

The live broadcasting platform provides educational counseling services to students, parents, and citizens nationwide. It offers information on educational qualifications, services, and opportunities across Pakistan.

HEC's internet-based education TV aims to provide guidance and counseling to a vast audience on educational services offered by higher education institutions across Pakistan. Initially, the platform will offer 8 hours of programming daily, with plans to extend it to 16 hours in the next 5 years.
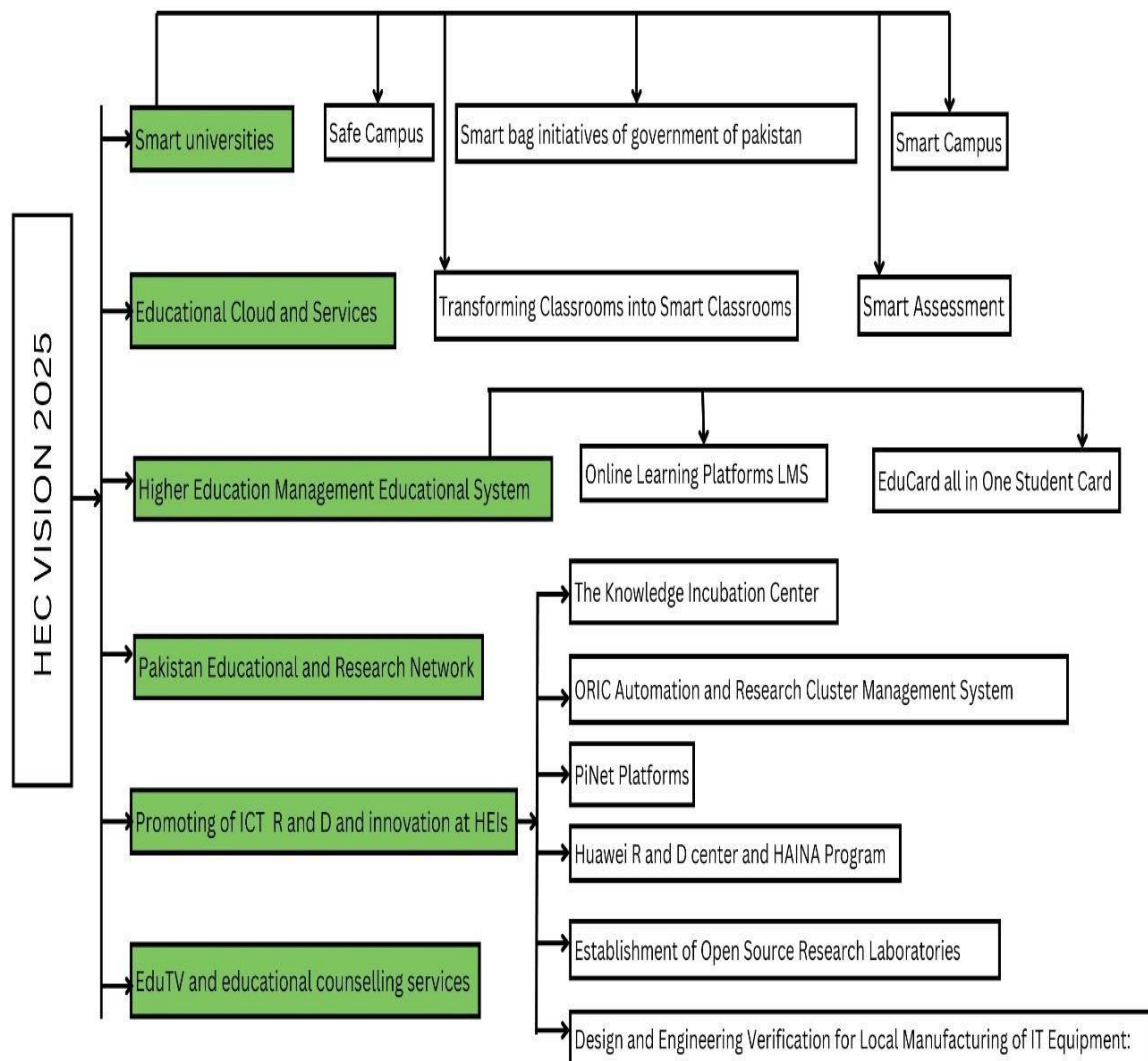
Fig 4.1 Analysis of HEC vision 2025

Section B:

Objective 2: Examine the perception of teachers and chairperson about technology integration in classroom.

Questionnaire Analysis:

This part of Study aims to examine the perception of teachers and chairperson about technology integration in classroom and also explore the perceived challenges hindering the adoption of technology in higher education among educational leaders. In this chapter researcher describes the research analysis and interpretation of data. Collected Data is analyzed and interpret using SPSS. Based on this data results, recommendations, finding, and conclusions are made.

Strongly Agreed (SA)	**AS**	5
Agreed (A)	**AS**	4
Neutral (N)	**AS**	3
Disagreed (D)	**AS**	2
Strongly Disagreed (SA)	**AS**	1

RQ. 3   What are the current practices of teachers and chairpersons about technology integration in classroom?

Table 4.2

Frequency of Technology Use in Teaching

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	30	68	4	4	0	
Percentage	100	28.3	64.2	3.8	3.8	0	4.17

Table 4.1 shows that out of 106, 30 respondents are strongly agreed that they are using technology in their teaching practices, 68 are agreed, 4 respondent are neutral and 4 are disagree whereas no body is strongly disagree with the statement. This data shows that 28.3% respondent shows that they are strongly using technology in classrooms while 64.2% are simply agreed with the statement. 3.8%   respondent are neutral and 3.8% are disagree. The mean score of the statement is 4.17 which clearly shows that most of the respondent agreed with the usage of technologies in their classrooms.

Table 4.3

Confidence in Technology Integration

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	46	54	6	0	0	
Percentage	100	43.4	50.9	5.7	0	0	4.37

Table 4.2 shows that out of 106, 30 respondents are strongly agreed that they are using technology in their teaching practices, 68 are agreed, 4 respondent are neutral and 4 are disagree whereas no body is strongly disagree with the statement. This data shows that 28.3% respondent shows that they are strongly using technology in classrooms while 64.2% are simply agreed with the statement. 3.8% respondent are neutral and 3.8% are disagree. The mean score of the statement is 4.37 which clearly shows that most of the respondent are agreed with the usage technologies in their classrooms.

Table 4.4

Perceived Impact on Learning Outcomes

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	52	52	2	0	0	
Percentage	100	49.1	49.1	1.9	0	0	4.47

Table 4.3 shows that out of 106, 52 respondents are strongly agreed that technology accelerate the student's learning,52 are agreed, 2 respondents are neutral and no respondent is disagree and same as with strongly disagree. This data shows that 49.1% respondents show that they are strongly consider that technology plays important part in student's learning outcome while 49.1% are simply agreed with the statement. 1.9% respondent are neutral and 0% are disagree and strongly disagree. The mean score of the statement is 4.47 which shows that most of the respondent are strongly agreed with the role of technology in boosting student learning output.

Table 4.5

Integration of Digital Tools

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	32	64	8	2	0	
Percentage	100	30.2	60.4	7.5	1.9	0	4.19

Table 4.4 Shows that out of 106, 32 respondents are strongly agreed, 64 are agreed that digital tools are being integrated into their teaching, whereas 8 respondents are neutral and 2 respondents are disagree and no body chose strongly disagree. This data shows that 30.2% respondents show that they are strongly integrating technology into their teaching while 60.4% are simply agreed with the statement.7.5 % respondent are neutral and 1.9% are disagree and 0% are strongly disagree. The mean score of the statement is 4.19 which shows that most of the respondent are using technology in the classroom.

Table 4.6

Availability of Technology Resources

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	38	44	6	16	2	
Percentage	100	35.8	41.5	5.7	15.1	1.9	3.94

Table 4.5 shows that out of 106, 38 respondents are strongly agreed and 44 are agreed with the statement that respondents have access to the important technological resources and these resources helping them for effective learning process, 6 respondents are neutral and 16 respondents are disagree and 2 respondents are strongly disagree. This data shows that 35.8% respondents show that they are strongly agreed with the statement that is inquire about accessibility of the necessary technological resources while 41.5% are simply agreed with the statement. 5.7%   respondent are neutral and 15.1% are disagree and 1.9% are strongly disagree. The mean score of the statement is 3.94 Which shows that most of the respondent have access to the necessary technological resources.

Table 4.7

Technology base teaching.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	40	38	22	6	0	
Percentage	100	37.7	35.8	20.8	5.7	0	4.05

Table 4.6 shows that out of 106, 40 respondents are strongly agreed and 38 are agreed that they prefer teaching strategies and activities that are technology based, 22 respondents are neutral and 6 respondents are disagree and 2 nobody is strongly disagree. This data shows that 37.7 % respondents show that they are strongly agreed while 35.8.5% are simply agreed with the statement. 20.8% respondent are neutral and 5.7% are disagree and nobody is strongly disagree. The mean score of the statement is 4.05 which shows that most of the teachers are agreed with the strategic teaching which include technological based activities.

Table 4.8

Use of Tech-Based Collaborative Tasks.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	36	46	10	14	0	
Percentage	100	34	43.4	9.4	13.2	0	3.98

Table 4.7 shows that out of 106, 36 respondents are strongly agreed and 46 are agreed with the statement that they are engaging students in technology based task and projects, 10 respondents are neutral and 14 respondents are disagree and nobody is strongly disagree. This data shows that 34% respondents show that they are strongly while 43.4% are simply agreed with the statement. 9.4% respondent select neutral and 13.2% are disagree and nobody is strongly disagree. The mean score of the statement is 3.98 which shows that most of the respondents are involving students in technology based task and projects.

Table 4.9

Training on Technology Integration.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	20	32	18	22	14	
Percentage	100	18.9	30.2	17	20.8	13.2	3.20

Table 4.8 shows that out of 106, 20 respondents are strongly agreed and 32 are agreed with the statement that they are getting up-to-date trainings.18 respondents are neutral and 22 respondents are disagree and 14 are strongly disagree. This data shows that 18.9% respondents show that they are strongly while 30.2% are simply agreed with the statement. 17% respondent select neutral and 20.8% are disagree and 13.2% are strongly disagree. The mean score of the statement is 3.20 which shows that most of the respondents are neutral about the provision of ample training related to use and integration of technology into the classroom.

RQ. 4 Which kind of the challenges faced by teachers and chairpersons in technology integration in classroom?

Table 4.10

Access to Technological Devices in classrooms.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	16	44	16	16	14	
Percentage	100	15.1	41.5	15.1	15.1	13.2	3.30

Table 4.9 shows that out of 106, 16 respondents are strongly agreed and 44 are agreed with the statement that they have access to the technological devices for classroom use , 16 respondents are neutral and 16 respondents are disagree and 14 respondents are strongly disagree. This data shows that 15.1% respondents show that they are strongly agreed while 41.5% are simply agreed with the statement. 15.1% respondent select neutral and 15.1% are disagree while 13.2 respondents are strongly disagree. The mean score of the statement is 3.30 which shows that most of the respondents are neutral about the accessibility of the technological devices into the classroom.

Table 4.11

Institutional Funding for Technology.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	4	17	27	32	26	
Percentage	100	3.77	16.0	25.4	30.2	24.5	3.21

Table 4.10 shows that out of 106, 4 respondents are strongly agreed and 17 are agreed with the statement, whereas 27 respondents are neutral about it, 32 respondents are disagree and 26 respondents are strongly disagree about the provision of financial aid from institute for the purchasing and maintaining of technological resources. This data shows that 3.77% respondents are strongly agreed while 16.0% are simply agreed with the statement. 25.4% respondent stay neutral and 30.2% are disagree while 24.5% respondents are strongly disagree. The mean score of the statement is 3.21 which shows that most of the respondents are neutral about the institutions cooperation regarding purchasing and maintain of technological devices for the classroom.

Table 4.12

Internet Reliability and Speed

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	4	30	16	34	22	
Percentage	100	3.8	28.3	15.1	32.1	20.8	2.40

Table 4.11 shows that out of 106, 4 respondents are strongly agreed and 30 are agreed with the statement, whereas 16 respondents are neutral about it, 34 respondents are disagree and 22 respondents are strongly disagree about the reliability of institute's internet connection for educational purpose. This data shows that 3.8% respondents are strongly agreed while 28.3% are simply agreed with the statement. 15.1% respondent stay neutral and 32.1% are disagree while 20.8% respondents are strongly disagree. The mean score of the statement is 2.40 which shows that most of the respondents are disagree about the institution's reliable internet connection for the educational purpose.

Table 4.13

Access to Educational Software

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	6	34	18	38	10	
Percentage	100	5.7	32.1	17	35.8	9.4	3.06

Table 4.12 shows that out of 106, 6 respondents are strongly agreed and 34 are agreed with the statement, whereas 18 respondents are neutral about it, 38 respondents are disagree and 10 respondents are strongly disagree about the access to essential educational software and licenses without financial issues. This data shows that 5.7% respondents are strongly agreed while 32.1% are simply agreed with the statement. 17% respondent stay neutral and 35.8% are disagree while 9.4% respondents are strongly disagree. The mean score of the statement is 3.06 which shows that most of the respondents are neutral about the statement.

Table 4.14

Equipment Up-to-Date and Functional.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	6	24	30	32	14	
Percentage	100	5.7	22.6	28.3	30.2	13.2	2.46

Table 4.13 shows that out of 106, 6 respondents are strongly agreed and 24 are agreed with the statement, whereas 30 respondents are neutral about it, 32 respondents are disagree and 14 respondents are strongly disagree with the statement the provision of the up to date and functional technological equipment. This data shows that 5.7% respondents are strongly agreed while 22.6% are simply agreed with the statement. 28.3% respondent stay neutral and 30.2% are disagree while 13.5% respondents are strongly disagree. The mean score of the statement is 2.46 which shows that most of the respondents are disagree about the provision of up to date and functional technological equipment.

Table 4.15

Training for Technology Integration

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	0	28	16	50	12	
Percentage	100	0	26.4	15.1	47.2	11.3	2.33

Table 4.14 shows that out of 106, no one is strongly agreed, while 28 are agreed with the statement, whereas 16 respondents are neutral about it, 50 respondents are disagree and 12 respondents are strongly disagree about the provision of proper and professional training for technology usage. This data shows that no one is strongly agreed while 26.4% are simply agreed with the statement. 15.1% respondent stay neutral and 47.2% are disagree while 11.3% respondents are strongly disagree. The mean score of the statement is 2.33 which shows that most of the respondents are disagree about the provision of adequate training for technology usage.

Table 4.16

Maintenance and Repair Efficiency

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	8	28	8	42	20	
Percentage	100	7.5	26.4	7.5	39.6	18.9	2.44

Table 4.15 shows that out of 106, 8 respondents are strongly agreed and 28 are agreed with the statement, whereas 8 respondents are neutral about it, 42 respondents are disagree and 20 respondents are strongly disagree about the replacement and repairing of technological equipment when it malfunctions. This data shows that 7.5% respondents are strongly agreed while 26.4% are simply agreed with the statement. 7.5% respondent stay neutral and 39.6% are disagree while 18.9% respondents are strongly disagree. The mean score of the statement is 2.44 which shows that most of the respondents are disagree about the provision of adequate training for technology usage.

Table 4.17

Curriculum Support for Tech Integration.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	8	60	24	10	4	
Percentage	100	7.5	56.6	22.6	9.4	3.8	3.74

Table 4.16 shows that out of 106, 8 respondents are strongly agreed and 60 are agreed with the statement, whereas 24 respondents are neutral about it, 10 respondents are disagree and 4 respondents are strongly disagree about the integration of technology into the current curriculum. This data shows that 7.5% respondents are strongly agreed while 56.6% are simply agreed with the statement. 22.6% respondent stay neutral and 9.4% are disagree while 3.8% respondents are strongly disagree. The mean score of the statement is 3.74 which shows that most of the respondents are agreed about the integration of technology into the current curriculum.

Table 4.18

Student Digital Literacy

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	8	44	22	26	6	
Percentage	100	7.5	41.5	20.8	24.5	5.7	3.21

Table 4.17 shows that out of 106, 8 respondents are strongly agreed and 44 are agreed with the statement, whereas 22 respondents are neutral about it, 26 respondents are disagree and 6 respondents are strongly disagree about the students that they possess the necessary digital literacy skills for effective use of technology for learning. This data shows that 7.5% respondents are strongly agreed while 41.5% are simply agreed with the statement. 20.8% respondent select neutral and 24.5% are disagree while 5.7% respondents are strongly disagree. The mean score of the statement is 3.21 which shows that most of the respondents are natural about the students that they possess the necessary digital literacy skills for effective use of technology for learning.

Table 4.19

Technology Integration Policies and Guidelines.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	8	26	26	36	10	
Percentage	100	7.5	24.5	24.5	34	9.4	2.88

Table 4.18 shows that out of 106, 8 respondents are strongly agreed and 26 are agreed with the statement, whereas 26 respondents are neutral about it, 36 respondents are disagree and 10 respondents are strongly disagree about the policies and guidelines for the instructed by institution for this integration. This data shows that 7.5% respondents are strongly agreed while 24.5% are simply agreed with the statement. 24.5% respondent select neutral and 34% are disagree while 9.4% respondents are strongly disagree. The mean score of the statement is 2.88 which shows that most of the respondents are neutral about the instructions of the institution about the clear policies for technological integration.

Table 4.20

Administrative Support for Tech Initiatives

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	4	30	26	30	16	
Percentage	100	3.8	28.3	24.5	28.3	15.1	2.38

Table 4.19 shows that out of 106, 4 respondents are strongly agreed and 30 are agreed with the statement, whereas 26 respondents are neutral about it, 30 respondents are disagree and 16 respondents are strongly disagree about the statement that Administrative processes do not hinder the implementation of technology initiatives. This data shows that 3.8% respondents are strongly agreed while 28.3% are simply agreed with the statement. 24.5% respondent select neutral and 28.3% are disagree while 15.1% respondents are strongly disagree. The mean score of the statement is 2.38 which shows that most of the respondents are disagree about the statement.

Table 4.21

Cultural Support for Tech Use.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	2	48	22	24	10	
Percentage	100	1.9	45.3	20.8	22.6	9.4	3.08

Table 4.20 shows that out of 106, 2 respondents are strongly agreed and 48 are agreed with the statement, whereas 22 respondents are neutral about it, 24 respondents are disagree and 10 respondents are strongly disagree about the cultural environment in my institution supports use of technology in education. This data shows that 1.9% respondents are strongly agreed while 45.3% are simply agreed with the statement. 20.8% respondent select neutral and 22.6% are disagree while 9.4% respondents are strongly disagree. The mean score of the statement is 3.08 which shows that most of the respondents are neutral about the support from the cultural environment of institution in the use of technology in education.

Table 4.22

Gender Equity in Tech Access

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	14	42	32	10	8	
Percentage	100	13.2	39.6	30.2	9.4	7.5	3.52

Table 4.21 shows that out of 106, 14 respondents are strongly agreed and 42 are agreed with the statement, whereas 32 respondents are neutral about it, 10 respondents are disagree and 8 respondents are strongly disagree about the barriers related to gender to accessing technology for both male and female students . This data shows that 13.2% respondents are strongly agreed while 39.6% are simply agreed with the statement. 30.2% respondent select neutral and 9.4% are disagree while 7.5% respondents are strongly disagree. The mean score of the statement is 3.42 which shows that most of the respondents are agreed about gender related barriers in accessing the technology.

Table 4.23

Tech-Based Assessment Methods.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	12	52	18	16	8	
Percentage	100	11.3	49.1	17	15.1	7.5	3.41

Table 4.22 shows that out of 106, 12 respondents are strongly agreed and 52 are agreed with the statement, whereas 18 respondents are neutral about it, 16 respondents are disagree and 8 respondents are strongly disagree about the access of teachers to the assessment and evaluation methods to evaluate students by using technology. This data shows that 11.3% respondents are strongly agreed while 49.1% are simply agreed with the statement. 17% respondent select neutral and 15.1% are disagree while 7.5% respondents are strongly disagree. The mean score of the statement is 3.41 which shows that most of the respondents are neutral with provision of access to the assessment methods to evaluate students' through technology.

Table 4.24

Measuring Tech Integration Impact

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	8	38	18	34	8	
Percentage	100	7.6	35.8	17	32.1	7.5	3.00

Table 4.23 shows that out of 106, 8 respondents are strongly agreed and 38 are agreed with the statement, whereas 18 respondents are neutral about it, 34 respondents are disagree and 8 respondents are strongly disagree about presence of effective ways to access the impact of technology integration on students outcome . This data shows that 7.6% respondents are strongly agreed while 35.8% are simply agreed with the statement. 17% respondent select neutral and 32.1% are disagree while 7.5% respondents are strongly disagree. The mean score of the statement is 3.00 which shows that most of the respondents are neutral about the presence of effective ways to measure the impact of technology integration on student's outcome.

Table 4.25

Data Privacy and Security Measures

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	4	40	30	20	12	
Percentage	100	3.8	37.7	28.3	18.9	11.3	3.03

Table 4.24 shows that out of 106, 4 respondents are strongly agreed and 40 are agreed with the statement, whereas 30 respondents are neutral about it, 20 respondents are disagree and 12 respondents are strongly disagree about the presence of security measure to ensure the privacy of teacher-student data. This data shows that 3.8% respondents are strongly agreed while 37.7% are simply agreed with the statement. 28.3% respondent select neutral and 18.9% are disagree while 11.3% respondents are strongly disagree. The mean score of the statement is 3.03 which shows that most of the respondents are neutral with the adequate measures in place to ensure the privacy and security of student teacher data.

Table 4.26

Cybersecurity Measures.

Respondent	N	SA	A	N	D	SD	Mean
Frequency	106	6	28	30	20	22	
Percentage	100	5.7	26.4	28.3	18.9	20.8	2.44

Table 4.25 shows that out of 106, 6 respondents are strongly agreed and 28 are agreed with the statement, whereas 30 respondents are neutral about it, 20 respondents are disagree and 22 respondents are strongly disagree about the strong security measures to protection form threats against cyber security. This data shows that 5.7% respondents are strongly agreed while 26.4% are simply agreed with the statement. 28.3% respondent select neutral and 18.9% are disagree while 20.8% respondents are strongly disagree. The mean score of the statement is 2.44 which shows that most of the respondents are disagree about the institute having strong security system to protect against the cyber threats.

26. What are the overall challenges do you faced in the adoption and integration of technology in Islamic international university?

Unavailable of required equipment by institutes, unstable and slow internet connection that led to delay in assigned tasks, outdated equipment that are also dysfunctions, lack of funds for technological infrastructure, some students comes from poor technological background, lack of basic facilities like no multimedia, lack of well technological equipped classrooms (smart boards, proper internet connection, multimedia, updated systems etc.), not proper facilitation from the administration. Students are more in number while provided technological facilities are very limited. No access or limited access to different subscriptions of legal databases and up-to-date licensed software. Labs are in poor conditions and outdated. Lack of assistance (limited trainings regarding to technology usage) also no ongoing assistance available.

Section C:

Objective 3: Explore the perceived challenges hindering the adoption of technology at higher Education among educational leaders.

Objective 4: Reconnoiter the prospects identified by educational leader to overcome barriers of technology integration in higher education.

Analysis of interviews:

Thematic analysis is a commonly used qualitative research method for analyzing, identifying, and reporting themes within data. For this study inductive approach was adopted, allowing themes to emerge originally from the raw interview data. All interview records were read multiple times to get data immersion and knowledge. During this process, initial observations and likely patterns were noted in a reflective journal to document early analytic insights.

RQ. 5 w h i c h kind of challenges hindering the adoption of technology in higher education among educational leader?

Current situation:

Administration is working on CMS, LMS is available, multimedia is also available but not enough, technology related tannings are available but not effective. Internet available but not proper signals most of time it is slow or not working effectively, labs are available but not functional in short present technology is not up-to-date, no smart board, no smart classroom available.

Satisfaction:

Most of the interviewee are not satisfied with the available technological resources as available facilities and resources are not enough for the fulfilment of the demands of students and teachers for the effective integration of technology. Most of teachers equipped their self by their own. They have their own laptops, they get trainings form different other platforms and most of the time they pay their self.

Challenges:

Inquiry about the overall changes faced by the deans of the faculties shows that budget, money, and resources for technology integration is very less which is the biggest

and prominent challenge , available facilities is almost equal to none. It also highlights the issues like lacking on provision of training to staff, senior staff faced issues in using technology and also not so keen to learn. Unstable internet connection works like pouring oil on fire. Infrastructure is not so supportive and proper technological infrastructure is required, most of the teachers are more comfortable with the conservational way of teaching. University administration wants to promote paper less education, availability of online distance learning programs, but challenges are hindering the ways.

RQ. 6 What are the prospects identified by educational leader to overcome challenges to technology integration in higher education?

Vision:

Dean of the faculties do support the integration of technology in education as all of them are well aware of importance of technology and they know the fact without technology there is no future. Also the analysis of interviews shows that smart classrooms, technology literate teachers and students, hybrid mode education, Flipped classrooms are the need of current education system. They wanted to offer first short courses then complete degree programs through distance by adopting and offering virtual and distance education system.

Administrative support:

When asked about the support from university administration, respondents acknowledged university administration support toward technology integration. However limited financial resources, higher user to resource ratio are some of the problems that hinder the adoption of technology.

Suggested prospects:

Analysis of interviews suggest the prospects that can be helpful for the minimizing these challenges. It include sign MOU with different private companies or with NGOs. They will not only provide funds but also they can help in constructing bridge between university and market for students. It is also suggested by the interviewee university administration should make strategies to use available resources of university to make money, like invest in solar power plant because university have huge land that is empty so by investing in solar plant they can reduce the cost of electricity, also houses should be

constructed and then rented out to the staff of university by this university can generate monthly income, school should be constructed with in in university, university location can help in attracting the commercialization for 3 sectors which can boost the generation of money way more than others.

CHALLENGES AND PROSPECTS OF EDUCATIONAL LEADERS IN INTEGRATING TECHNOLOGY AT HIGHER EDUCATION

1. Analyse policy documents with reference to technology integration.

2. Examine the perception of teachers and chairperson about technology integration in classroom.

3. Explore the perceived challenges hindering the adoption of technology in higher education among educational leaders.

4. Reconnoitre the prospects identified by educational leader to overcome barriers of technology integration in higher education

1. What are the targets/ provisions/ proposed in the National Education Policy (2017) regarding integrating technology at higher education institutions?

2. Which type of provision have been proposed in the HEC vision 2025 regarding technology integration?

3. What are the current practices of teachers and chairpersons about technology integration in classroom?

4. Which kind of the challenges faced by teachers and chairpersons in technology integration in classroom?

5. Which kind of challenges hindering the adoption of technology in higher education among educational leader?

6. What are the prospects identified by educational leader to overcome challenges to technology integration in higher education?

It does not mention the targets or provisions regarding the integration of technology at higher education level. But it mention HEC vision 2025 policy document for detail targets.

- Most respondents support and use technology in classrooms, recognizing its role in student learning.
- Teachers have access to technology and integrate it into teaching strategies.
- Adequate training for technology integration remains a concern.

- Unavailability of Required Equipment
- Unstable and Slow Internet Connection
- Outdated and Dysfunctional Equipment.
- Lack of Funds for Technological Infrastructure
- Students from Poor Technological Backgrounds
- Lack of Basic Facilities
- Inadequate Technological Infrastructure
- Insufficient Administrative Support
- Limited Technological Facilities vs. High Student
- No or Limited Access to Legal Databases and Licensed Software
- Poorly Maintained and Outdated Lab.
- Lack of Assistance and Training

- Limited Budget and Resources
- Lack of Facilities
- Insufficient Training
- Resistance from Senior Staff
- Unstable Internet Connection
- Inadequate Infrastructure
- Preference for Traditional Teaching Methods
- Administrative Goals vs. Practical Challenges.

- Signing MOUs with Private Companies or NGOs
- Utilizing University Resources for Revenue Generation
- Investment in a Solar Power Plant
- Constructing and Renting Out Houses for Staff
- Establishing a School within the University
- Encourage Commercialisation in Three Key Sectors.

HEC VISION 2025

- Smart universities
- Educational Cloud and Services
- Higher Education Management Educational System
- Pakistan Educational and Research Network
- Promoting of ICT R and D and innovation at HEIs
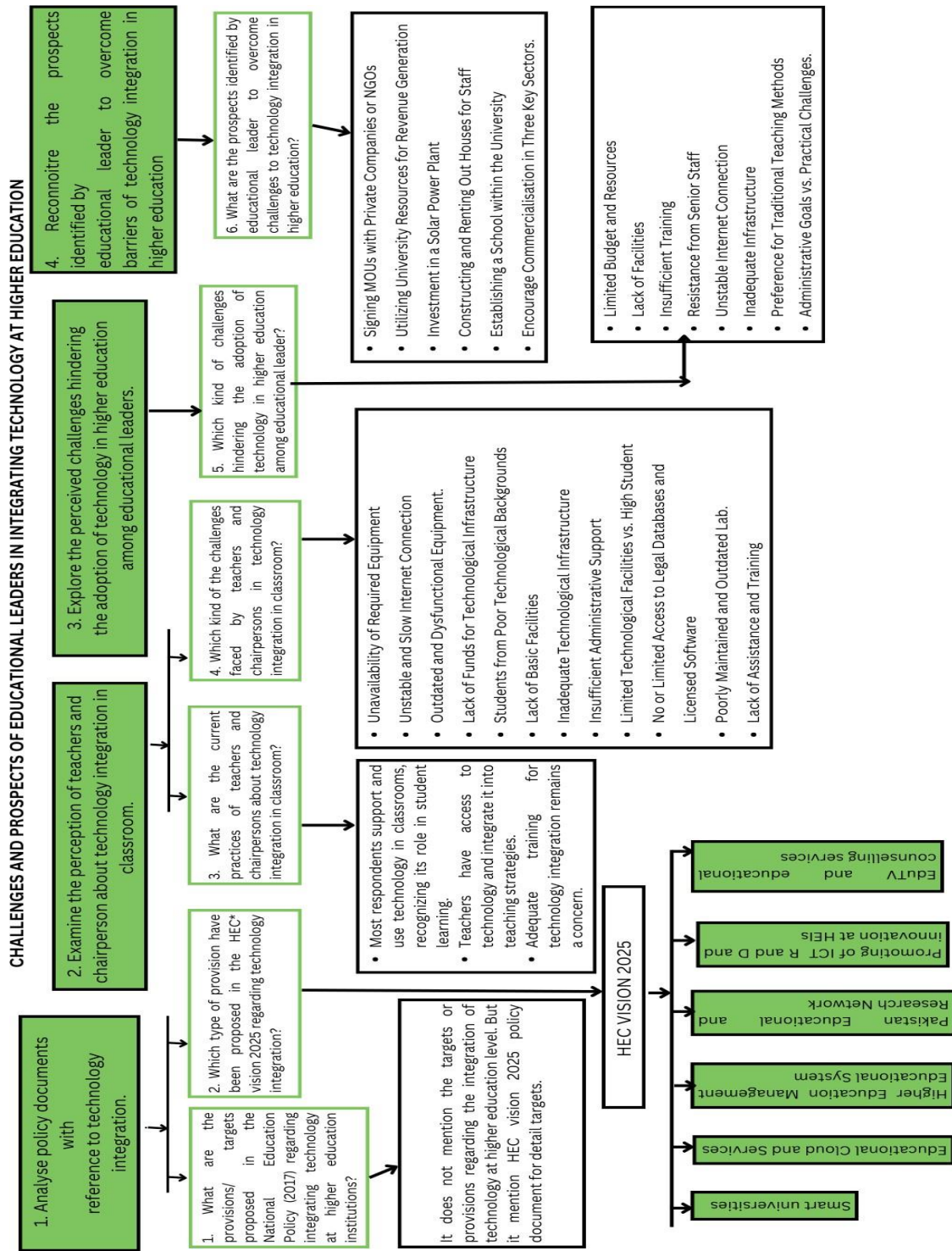- EduTV and educational counselling services

Fig 4.2 Analysis and Interpretation of Study

CHAPTER 5

SUMMERY, FINDINGS, CONCLUSIONS, DISCUSSIONS, RECOMMENDATION, RECOMMENDATION FOR THE FUTURE RESEARCHERS

5.1   Summery

The use of technology into education in this dynamic digital age serves as a key catalyst for empowerment and transformation, not just an enhancement tool. Technology have made so many advancement in the field of education also. Technology have so many advantages but technology integrating is the task in under developing countries like Pakistan. This study explore the perception of educational leader (deans, chairpersons and teachers) about the technological integration. Further it analyzed the policy document HEC Vision 2025 and NEP 2017. This study also explored the barriers of educational leaders, teachers and chairpersons in integrating technology also possible prospects to overcome these barriers. Population of the study was selected in to two categories. Category 1 included all deans (11 from the 11 faculties) of International Islamic University and category 2 included 142 educational leaders (12 Chairpersons and 130 Teachers) from 3 faculties of International Islamic University. 11 deans were selected as sample for interviews be using universal sampling technique and 104 educational leaders were selected as sample for population from group 2 according to the Adam (2020). Proportionate random sampling technique was used for data collection. 1st objective was achieved by document analysis of HEC vision 2025 and NEP 2017. For 2nd objective a closed ended instrument was designed by researcher having 25 items. 3rd and 4th objectives has achieved by a semi structure interview that was conducted by researcher. Interview guide was created by researcher. Data was analyzed by thematic analysis technique and SPSS. Findings of study revels both prospects and challenges of integration of technology in higher education. Most of respondent support the use of technology in class but challenges like outdated equipment, limited budget and infrastructure, ineffective trainings are hindering the adoption of technology. It is suggested by the experts that opportunities, like collaboration with private or non-governmental institutes and using university

Resources fully can help in generating funds to overcome the challenges. It is recommended that Plans for integrating technology into higher education should be part of the updated National Education Policy. Timelines must be recognized, ongoing assessment must be guaranteed, and Institutional Technology strategies must be created by HEC. , licensed software, IT-equipped classrooms, cybersecurity safeguards, and dependable internet should all be provided by institute. Programs for student digital literacy, ongoing technical assistance, and required instructor training are the demand of time. While frequent evaluations and input should direct advancements in technology integration, institutions should raise money by using their resources.

5.2 Findings

The findings of the research are given below:

1. Focus of National Educational Policy of Pakistan (2017) is on the general setup of Higher Education. It does not explains the provisions or target regarding the integration of technology at higher education level. But it clearly mention HEC vision 2025 policy document for detail targets.

2. Policy emphasis on the initiatives be the HEC of Pakistan for the integration of the technology into universities aiming to increase research output, cost-effectiveness, and enhance productivity. Different initiatives like smart university with different project including smart campus, smart bag initiative, and smart classrooms, guarantees digital convenience with free laptops and Wi-Fi that must be campus wide, classrooms that must be equipped technologically. For security enhancement safe campus system will use. The LMS (learning management system regulate online education, assessment and evaluation on the other hand EduCloud enhances organizational collaboration. PERN-III ensure the high speed internet connection, mainly in remote areas, connecting the digital divide. For the encouragement of data driven decision making approach the HEMIS (Higher Education Management Information System). For the support of research and innovation HEC initiate knowledge incubation center, PiNet, and the Huawei R&D center which foster industry. The open- source research labs and local manufacturing of IT equipment

strengthen country's tech sector. The students' ID system, aims to modernize administrative efficiency. For academic guidance and career counseling an educational broadcasting service that is internet based called EduTV.

3. It was found that respondents strongly agreed with the usage of technologies in their classrooms, as the mean score was 4.17, falling under the "High" category. (Table 4.2)

4. It was found that respondents strongly agreed with the usage of technologies in their classrooms, as the mean score was 4.37, falling under the "High" category. (Table 4.3)

5. It was found that respondents very strongly agreed with the role of technology in boosting student learning outcomes, as the mean score was 4.47, falling under the "Very High" category. (Table 4.4)

6. It was found that respondents were using technology in the classroom, as the mean score was 4.19, falling under the "High" category. (Table 4.5)

7. It was found that most respondents had access to necessary technological resources, with a mean score of 3.94, falling under the "High" category. (Table 4.6)

8. It was found that most teachers agreed with strategic teaching that includes technology-based activities, as the mean score was 4.05, falling under the "High" category. (Table 4.7)

9. It was found that most respondents involved students in technology-based tasks and projects, with a mean score of 3.98, falling under the "High" category. (Table 4.8)

10. It was found that most respondents were neutral about the provision of ample training for technology integration, with a mean score of 3.20, falling under the "Moderate" category. (Table 4.9)

11. It was found that most respondents were neutral about the accessibility of technological devices in the classroom, with a mean score of 3.30, falling under the "Moderate" category. (Table 4.10)

12. It was found that most respondents were neutral about institutional cooperation in purchasing and maintaining technological devices, with a mean score of 3.21, falling under the "Moderate" category. (Table 4.11)

13. It was found that most respondents disagreed about the institution's reliable internet connection for educational purposes, with a mean score of 2.40, falling under the "low" category. (Table 4.12)

14. It was found that most respondents were neutral about access to necessary software and licenses without financial problems, with a mean score of 3.06, falling under the "Moderate" category. (Table 4.13)

15. It was found that most respondents disagreed about the provision of up-to-date and functional technological equipment, with a mean score of 2.46, falling under the "low" category. (Table 4.14)

16. It was found that most respondents disagreed about the provision of adequate training for technology usage, with a mean score of 2.33, falling under the "Low" category. (Table 4.15)

17. It was found that most respondents disagreed about the provision of adequate training for technology usage, with a mean score of 2.44, falling under the "Low" category. (Table 4.16)

18. It was found that most respondents agreed with the integration of technology into the current curriculum, with a mean score of 3.74, falling under the "High" category. (Table 4.17)

19. It was found that most respondents were neutral about students possessing necessary digital literacy skills, with a mean score of 3.21, falling under the "Moderate" category. (Table 4.18)

20. It was found that most respondents were neutral about the institution's clear policies for technological integration, with a mean score of 2.88, falling under the "Moderate" category. (Table 4.19)

21. It was found that most respondents were neutral about the statement, with a mean score of 2.38, falling under the "low" category. (Table 4.20)

22. It was found that most respondents were neutral about institutional cultural support for technology use in education, with a mean score of 3.08, falling under the "Moderate" category. (Table 4.21)

23. It was found that most respondents agreed about gender-related barriers in accessing technology, with a mean score of 3.52, falling under the "high" category. (Table 4.22)

24. It was found that most respondents agreed with the provision of access to assessment methods through technology, with a mean score of 3.41, falling under the "Moderate" category (but near "High"). (Table 4.23)

25. It was found that most respondents were neutral about effective ways to measure the impact of technology integration on student outcomes, with a mean score of 3.00, falling under the "moderate" category. (Table 4.24)

26. It was found that most respondents were neutral about adequate measures for data privacy and security, with a mean score of 3.03, falling under the "Moderate" category. (Table 4.25)

27. It was found that most respondents disagreed about the institution having a strong cybersecurity system, with a mean score of 2.44, falling under the "Low" category. (Table 4.26

28. Findings about the overall challenges do faced in the integration of technology in Islamic International University are several including unavailability of required equipment by institutes, unstable and slow internet connection, and dysfunction and outdated equipment, lack of funds for technological infrastructure, some student's poor technological background, lack of basic facilities like no multimedia, lack of well-equipped technological classrooms (smart boards, proper internet connection, multimedia, updated systems etc.). Students are more in number while provided technological facilities are very limited. No access or limited access to different subscriptions of legal databases and up-to-date licensed software. Labs are in poor conditions and outdated. Lack of assistance (limited trainings regarding to technology usage) also no ongoing assistance available.

29. Findings about the prospects shows that With a goal of expanding virtual and distance education, deans encourage the use of technology through flipped classes, smart classrooms, tech-literate faculty and students, and hybrid learning. Although the administration supports these initiatives, there are several obstacles, including subpar facilities, limited funding, and tremendous student demand. Forming MOUs with

private businesses and NGOs for finance and industrial engagement is suggested as a solution to these problems. Technology integration in higher education can also be maintained and improved with the support of revenue creation from solar power investments, staff housing rents, an on-campus school, and commercial prospects.

5.3   Discussion

The study was conducted to find the challenges and prospects of educational leader in integrating technology at higher educational level. The main objectives of the study was to analyze policy documents with reference to technology integration, to examine the perception of teachers and chairperson about technology integration in classroom, explore the perceived challenges hindering the adoption of technology in higher education among educational leaders, reconnoiter the prospects identified by educational leader to overcome barriers of technology integration in higher education.

Technology has transformed education, transmuting how we learn and teach. Its integration has conveyed creativity, innovation, and efficiency to the field. From e-classes and e-book to online class and flipped learning, every part of education is impacted by technology. Teachers are getting advantage by personalizing learning, effective lesson planning, and plan strategy to achieve student-teacher shared educational goals. Students gain access to engaging and interactive learning skills, making difficult concepts easier to understand through tools like animations, videos, and virtual reality. Modern education system relies on technology heavily. Advancement in Technology have introduced tools, systems, and platforms that are used to boost productivity, efficiency, communication. The main reasons for technology integration into education are to enhance accessibility, teaching and learning experience, and prepare students for the digital world. Technology makes learning process effective and interactive through simulations, gamification, and multimedia content, promoting understanding and engagement. Despite potential draw back and challenges, its advantages outweigh the negatives, transforming skills and empowering educators. Technology has redesigned education by building it more personalized, dynamic, and accessible. It prepares students with digital skills. It also enhances teaching methods, and produces effective learning experiences, ensuring

teaching learning process remains relevant in this evolving world.

Johnson et al,. (2022) also concluded in their study that traditional teaching and learning trends has been expired and outdated because of the integration of technology in education. Because of this advancement access to vast resources, collaborative learning, facilities approach to modern world educational. Digital tools and platforms change the definition of classroom. Modern classrooms have are more focus on personalized learning and more interaction. Integration of E-learning resources, virtual classroom and learning management systems (LMS) demonstrate the thoughtful effect of technology in education.

Enhancement of technology and advancement in teaching learning process because of technology cannot questioned but challenges that are hindering the integration of technology cannot be ignored. This study concluded that the overall challenges do faced in the integration of technology in Islamic International University are several including unavailability of required equipment by institutes, unstable and slow internet connection, and dysfunction and outdated equipment, lack of funds for technological infrastructure, some student's poor technological background, lack of basic facilities like no multimedia, lack of well-equipped technological classrooms (smart boards, proper internet connection, multimedia, updated systems etc.). Students are more in number while provided technological facilities are very limited. No access or limited access to different subscriptions of legal databases and up-to-date licensed software. Labs are in poor conditions and outdated. Lack of assistance (limited trainings regarding to technology usage) also no ongoing assistance available.

Alam concluded in his study in 2019 that effective technological integration is depended on infrastructure. Infrastructure boost the effectiveness of technology. Technology is the base of effective integration of technology. Awan et al concluded in 2020 that problems like Limited infrastructure facilities including electricity supply, unstable internet signals are present in Pakistan. According to the Bećirović and Dervić stress that uneven technology adoption causes gaps in accessibility and efficacy due to a lack of clear laws and strategic planning (Bećirović, 2022). Furthermore, (Al-Emran et al., 2021) institutional and governmental regulations frequently lag behind technological developments, making it challenging for educational leaders to adopt modern solutions.

Hussain et al., concluded in his study in 2018 that marginalized area have more stable and effective technological facilities than rural areas. This divide effects the smooth and equitable execution of technological integration. AI Lily et al concluded in 2018 that there are some staff and faculty members who resist to adopt new technology. This hinder the smooth execution of technology integration. According Pusey & Sadera to Inadequate teacher and administrator training is a major challenge for educational leaders. Many teachers are not digitally literate enough to successfully incorporate technology into the classroom. According to studies, teachers find it difficult to adjust to new platforms in the absence of ongoing professional development programs, which leads to inefficient implementation and annoyance among teachers and pupils. Regular training sessions must be promoted and led by educational leaders, but this is challenging due to time and budget constraints (Pusey et al., 2021).

This study also emphasizes how crucial it is to embrace a variety of strategies in order to overcome these obstacles. These include building university-industry cooperation, cultivating public-private partnerships, and partnering with non-governmental organizations. Universities can also make the most of their current resources by, for example, using land for initiatives that will generate income. Installing solar energy systems can contribute to cost-cutting initiatives by lowering electricity prices. Additionally, effective facilitation of teacher training is crucial, and this can be accomplished by using university personnel to train other educators, guaranteeing sustainability and efficiency. Edan et al., concluded in his study in 2024 that by refining technology integration strategies, investing in professional development, and advocating for policies prioritizing digital equity, we can create more inclusive learning environments. A shared vision of inclusive education that embraces technology's transformative power is essential (Eden et al., 2024).Data analytics tools, learning management systems (LMS) and online communication platforms enable educational leaders to manage their resource effectively. It can be helpful in tracking student progress, and make data-driven decisions (Bichel et al., 2019).Teachers, students, and stakeholders can communicate more easily because to technology. More flexible and inclusive learning environments are produced by digital tools including virtual classrooms, cloud-based collaboration platforms, and video conferencing. These resources can be used by

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educational leaders to support teachers' knowledge sharing and collaborative professional development. Technology integration propose promising prospects for increasing improving learning outcomes and student engagement. Multimedia resources, personalized learning experiences and online platforms have the likely to strengthen student motivation and academic achievements of student (Dziuban et al., 2018). In conclusion, (Patrinos, 2023) there are encouraging opportunities for improving educational systems' efficiency, quality, and accessibility through public-private partnerships. Public Private Partnerships can solve current issues and aid in the creation of more resilient and adaptable educational frameworks by utilizing the assets.

5.4   Conclusions

Conclusions of this study are given below:

1. It is concluded by the analysis of national educational policy 2017 that it did not propose any specific prospects for technology integration in higher education.

2. Higher Education vision 2025 concluded the important initiatives that has to take by 2025 to meet the demands of digital skills of 21st century. Smart University, Smart Bag Initiative, Smart Campuses, and Smart Classrooms, Learning Management System (LMS) ,EduCloud , PERN-III ,Higher Education Management Information System (HEMIS) ,research and innovation , Knowledge Incubation Centers, Huawei R&D Center, PiNet, local manufacturing of IT equipment, open-source research labs, EduCard, EduTV, delays, resource constraints, and the digital divide, sustainable funding, effective execution, and continuous policy evaluation , technology-driven learning ecosystem are the programs and projects suggested by the policy.

3. It is concluded that most of the teachers use technology in their teaching practices and they are satisfied with the integration also that basic and necessary technological tools like LMS, Educational assessment tools, computers and software are accessible for teachers but not provided by institutes.

4. Conclusion shows that most of the teachers are trying their best to teach technological skills related to their degree demands to students by assigning them collaborative task and technological based activities, and curriculum definitely support the integration of technology.

5. It is concluded that administration is lacking in providing policies and guidelines about technology usage. Also Institute needs to work on cyber security because there is the need to take appropriate measure to ensure the privacy of the teachers and students data.

6. By combining qualitative and quantitative data it is concluded that Unavailability of required equipment by institutes, unstable and slow internet connection that, outdated equipment that are also dysfunctions, lack of funds for technological infrastructure, some students comes from poor technological background, lack of basic facilities like No multimedia, and well equipped classrooms (smart boards, proper internet connection, multimedia, updated systems etc.), not proper facilitation from the administration are the major challenges in the adoption and integration of the technology in the international Islamic university furthermore Students are more in number while provided technological facilities are very limited, No access or limited access to different subscriptions of legal databases and up-to-date licensed software, labs are in poor conditions and outdated, lack of assistance (limited trainings regarding to technology usage) also no ongoing assistance available are also creating the fuss. Conclusion also shows that Universities must look for outside alliances, make the most use of their resources, and investigate money-generating projects like solar energy investments, staff housing rentals, and business opportunities in order to overcome these challenges. Successful technological integration in higher education requires a well-thought-out plan, a strong institutional commitment and more funds.

5.5 Limitations:

1. 2 participants from category 2 did not respond to the E mail and massages for interview.

2. 1 Participant from category 2 refused to give interview.

5.6 Recommendations:

a. Recommendations of the study

1. Analysis of HEC vision 2025 suggest ambitious goals but those are not met by mid of 2025 so it is suggested to Higher Education Commission Pakistan for the

forthcoming vision or policies, ensure to set clear timeline to responsible authorities, and embed a continuous monitoring and evaluation mechanism. The institutions may be advised to develop institutional technology integration plan aligned with national digital transformation strategies and share the progress periodically.

2. Basic technological tools like and software are accessible for teachers but not provided by institutes. Furthermore there is neutral response about the provision of effective trainings on how to use and integrate technology in classroom so it is recommended to the university authorities to provide teachers with IT equipped learning spaces, Multimedia tools, smart classrooms, licensed software, assessment tools and stable and fast internet connections.

3. As there are concerns about cyber security so the institutions may develop policies related to it to protect the data of students and teachers. Firewalls, encrypted storage, multi factor authentication etc may be utilized. Awareness sessions may also be arranged for teachers, staff and students.

4. There is no proper setup for updated trainings, however curriculum supports the integration of technology. So, it is recommended to execute mandatory training programs for faculty members on technology integration in the classroom which can focus on basics and advanced tools along with follow up on its utilization.

5. Cultural environment of institute for the use of technology is not satisfactory. So, it is recommended to encourage knowledge sharing and collaboration among faculty members through technology forums and peer learning programs.

6. Mixed response has been showed by the respondents about the student's ability to have digital literacy skills to efficiently use technology for learning. So, it is suggested that Digital literacy programs can be offered to the students who have weak digital background for the effective integration of technology. The university can ensure the access to the databases and educational software by facilitating institutional subscription to learning platforms and essential researches.

7. Significant challenges were identified in terms of funding, obsolete equipment, and administrative delays. University leadership may explore alternative funding models like Public-private partnerships with ed-tech companies to solve these problems.

b. Recommendations for future researchers:

1. It is recommended to the future researchers to extend this topic to all faculties of International Islamic university, Islamabad

2. Future researcher are also recommended to do a study on topic challenges and prospects of integrating technology at private universities.

3. It is suggested for the future researchers to study the effect of Leadership Styles in integration of Technology at Higher Education.

4. It is also suggested to the forthcoming researchers to investigate the Role of Professional Development in strengthen Digital Competency of Educationalists.

5. It is recommendation to inquire the Challenges in adopting Learning Management Systems (LMS) in Public Universities of Pakistan

6. Future researchers can also explore the Governance and Policy Challenges in technology integration at Higher Education

7. Future researchers are suggested to compare the infrastructural and Financial Constraints in Technology Integration at private and Public Universities

8. It is suggested to explore about Cybersecurity and Data Privacy Distresses in Higher Education Institutions because of technology integration

9. It is recommended that A Longitudinal Study on the Sustainability of Technology Integration in Higher Education should be made.

10. Future researchers are recommended to examine how institutional funding limitations, uneven access to devices, and insufficient teacher training collectively hinder effective technology integration.

11. Researchers can conduct studies on the real-world impact of tech-based assessment methods, including their validity, efficiency, and alignment with data privacy measures.

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APPENDIX-A

QUANTITATIVE QUESTIONNAIRE

Challenges and Prospects of Educational Leaders in the Technology Integration at Higher Educational Level

Objective: Examine the perception of teachers about technology integration in classroom.

Technology:

"The systematic application of knowledge, tools, and techniques such as digital gadgets, software programmers, communication platforms, hardware and software tools and instructional material to improve and facilitate teaching, learning, administrative, and research processes, in higher education institutions is referred to as technology."

Key For Questionnaire

Strongly Disagree	SD
Disagree	D
Neutral	N
Agree	A
Strongly Agree	SA

Faculty: _____

Department: _____

1. **What are the current practices of teachers about technology integration in classroom?**

Sr.No	Items	SD	D	N	A	SA
1	I regularly use technology in my Teaching practices.					

Sr. No	Items	SD	D	N	A	SA
2	I have confidence in my capability to integrate technology into my lectures.					
3	I consider that technology boosts student learning outcomes.					
4	Necessary technology resources (e.g., software, computer) are in my access for effective teaching learning process.					
5	I regularly integrate digital tools (e.g. Educational assessment tools, educational apps, LMS etc) into my teaching.					
6	I frequently assign technology based collaborative task and projects to my students.					
7	My teaching strategies includes technology-activities.					
8	I have received ample trainings on how to use and integrate technology in the classroom.					

2. **Which kind of the challenges faced by teachers in technology integration in classroom?**

Sr. No	Items	SD	D	N	A	SA

1	I have sufficient access to technological devices (e.g., computers, tablets) for classroom use.					
2	My institution provides adequate funding for purchasing and maintaining technological resources.					
3	The internet connection in my institution is reliable and fast enough for educational purposes					
4	The technological equipment available to me is up-to-date and functional.					
5	I have access to necessary educational software and licenses without financial constraints.					
6	I receive adequate training to effectively integrate technology into my teaching.					
7	Technological equipment is repaired or replaced promptly when it malfunctions.					
8	The current curriculum supports and encourages the integration of technology.					
9	My students possess the necessary digital literacy skills to effectively use technology for learning.					
10	There are clear policies and guidelines in place for technology integration in my institution.					

11	Administrative processes do not hinder the implementation of technology initiatives.					
12	The cultural environment in my institution supports the use of technology in education.					
13	There are no gender-related barriers to accessing technology for both male and female students and educators.					
14	I have access to appropriate assessment methods to evaluate students' learning through technology.					
15	There are effective ways to measure the impact of technology integration on student outcomes.					
16	There are adequate measures in place to ensure the privacy and security of student and teacher data.					
17	My institution has robust security measures to protect against cyber threats.					

1.   What are the overall challenges do you faced in the adoption and integration of technology in international Islamic university?

_____

_____

_____

_____

APPENDIX-B

INTERVIEW GUIDE

Technology Integration:

The systematic application of knowledge, tools, and techniques such as digital gadgets, software programmers, communication platforms, hardware and software tools and instructional material to improve and facilitate teaching, learning, administrative, and research processes, in higher education institutions is referred to as technology.

5.   Which kind of challenges hindering the adoption of technology in higher education among educational leader?

- How long have you been in this position?
- What is the current situation of the technological integration in your faculty?
- Sir/Madam kindly tell me are these facilities are enough for your faculty?
- Your university or faculty have any technology related policy?
- Will you please tell me the particular technological facilities your faculty have?
- Kindly share with me about the technology related facilities your faculty is lacking on?
- Are you satisfied with the effective use of available technological gadgets?
- What are the institutional level challenges in the adoption of technology?
- What challenges faced by staff\faculty in the adoption and integration of technology?
- What kind of technical challenges faced by university leadership in the integration of technology?
- Kindly tell us about the support system who guide deans, faculty and student about technological related problems?
- What kind of challenges are u facing as the dean of faculty in effective integration of the technology?

6. What are the prospects identified by educational leader to overcome challenges to technology integration in higher education?

- What are visions does you have for technology integration for your faculty as a dean?
- Do you have any strategic plans to integrate technology in your faculty as a dean?
- To what extent university administration can facilitate you in this planning?
- Tell us about the policies that have been developed to support technology integration at your institution? What can be the source of funding for technology initiatives?
- What are available opportunities for professional development of faculty and staff to enhance their technological competencies?
- How effective are the technical support services in assisting faculty, staff, and students with technology-related issues?
- How is technology being integrated into the curriculum to enhance teaching and learning experiences?
- How does your institution collaborate with government bodies, private sector partners, and other stakeholders to support technology integration?
- Can you provide examples of successful partnerships that have contributed to overcoming challenge?
- How do you assess the effectiveness of technology integration initiatives at your institution?
- What metrics or indicators are used to measure success and identify areas for improvement?
- What future prospects do you see for overcoming the challenges of technology integration in higher education?

APPENDIX-C

Certificate of Validation

It is certified that instruments for the thesis *Challenges and Prospects of Educational Leaders in Technology Integration at Higher Education Level* developed by researcher Ms. Sabahat Waqar to address the objectives:

1. Analyze policy documents with reference to technology integration.

2. Examine the perception of teachers and chairperson about technology integration in classroom.

3. Explore the perceived challenges hindering the adoption of technology in higher education among educational leaders.

4. Reconnoiter the prospects identified by educational leader to overcome barriers of integration in higher education.

Instrument was given to experts for review, seeking feedback and validation purpose. It been reviewed and validated by following experts:

Expert 1: Dr Fatima Batool

Assistant Professor

Signature:

Expert 2: Dr Fatima Maqsood

Assistant Professor

Signature:

Expert 3: Dr Humaira Akram

Assistant Professor

Signature:

APPENDIX-D

Population and sample

Faculty	Departments	Population	Sample
Education	Educational Leadership and management	11	8
	Teacher Education	10	7
Language and literature	English	37	29
	Urdu	18	15
	Persian	2	1
Social Sciences	Anthropology	1	1
	Islamic art and architecture	2	1
	Politics and IR	13	9
	Media and communication	16	12
	Psychology	15	11
	History and Pakistan studies	07	5
	Sociology	11	8
Total		142	106

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