

EMPOWERING SECONDARY EDUCATION THROUGH ICT INTEGRATION: A HOLISTIC EXPLORATION OF CHALLENGES, BARRIERS, AND STRATEGIC SOLUTIONS FOR EDUCATIONAL ADVANCEMENT IN RAWALPINDI

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ABSTRACT

The integration of ICT in secondary education is always recommended as a way of improving teaching and learning process; but this is faced with several barriers. The purpose of the study was to determine the challenges that are faced by the secondary schools in the implementation of ICT, to explore the infrastructural, financial and socio-cultural factors that hinder implementation, and recommendations on how to overcome barriers to implementation of ICT in schools. The present study used mixed methods convergent design that involved quantitative survey questionnaires and qualitative semi-structured interviews to capture the data. The participants for this study was selected using a stratified random sampling method in which 150 teachers and principals were asked to participate in the survey, out of which 15 participants, including senior educators and policymakers, was interviewed in-depth. Quantitative data was analyzed using Statistical Package for Social Science (SPSS) version 28 where descriptive statistics were conducted, chi-square tests, and t-tests were used to compare groups. On the other hand, qualitative data was subjected to thematic analysis to capture the diverse views. These are constraints such as inadequate and unavailable ICT facilities, inadequate funding, and limited ICT teacher training especially in the public schools. The findings of the study also indicated that there were statistically significant differences between public and private institutions in terms of access to ICT and financial problems. Attitudes and culture also played a role in the level of ICT adoption, but not at the same level as in the case of resistance to change. To meet these challenges, the study provides high feasible, high effect recommendations such as infrastructure in ICT, teacher training, and finance. Awareness campaigns are also recommended as another approach that can be used to complement the others aimed at enhancing ICT usage. This paper therefore calls for the development of a national policy that supports the enhancement of infrastructure, building of capacity as well as sustainable funding for the improvement of the current state of technology in education in a bid to eliminate the digital divide.

Keywords: ICT Integration, Secondary Education, Digital Barriers, Mixed-Methods, Public and Private Schools, Digital Divide.

INTRODUCTION

ICT has brought about a change in the society especially in the way knowledge is delivered, received and disseminated in the education sector. In the secondary education, the application of ICT has been highly embraced worldwide as it presents a range of possibilities for communication,



problem-solving. cooperation, and The introduction of ICT in the secondary schools has been considered as the positive transformation in the country's education sector as well as an attempt to equip the young generation for the challenges of the new world. However, the use of ICT in secondary schools in Rawalpindi is still not an easy task to achieve. Several challenges such as infrastructure, lack of teacher preparedness, finance, and culture and society play a role in the use of technology in education. Not only does it hinder the pace at which the people involved embrace ICT but also results in unequal distribution of education.

Now one of the major challenges of the secondary schools in Rawalpindi is the problem of infrastructure. Despite the efforts made from government and private sectors in the integration of technology in learning institutions, some of the schools have not even basic amenities like functional electricity, internet connection and functional computers. Khan, et al., (2024) have revealed that out of all the secondary schools in Rawalpindi only a few have modern ICT labs which are fully operational and functional hence most students are deprived of these important technological facilities. However, technological integration is also limited to urban schools only and hence, it deepens the rural-urban divide in terms of quality education.

They include inadequate training and technical knowledge among teachers. Therefore, to integrate ICT in teaching, the educators need to be skilled in using the technology and have the skills of incorporating it into their teaching strategies. Nevertheless, it is important to understand that only a few teachers from Rawalpindi's secondary schools have been provided with professional development for improving their digital skills. Malik and Ahmad (2023) revealed that 62% of the secondary school teachers in Rawalpindi lack preparedness to integrate ICT effectively in teaching learning process due to lack of training programs and inadequate access to continuous professional development.

This is so because, financial limitations also worsen the situation. Most of the public secondary schools are financially constrained and cannot afford to purchase new technologies and equipment in ICT. However, even private schools with seemingly more resources struggle in making fair distribution of technologies because of the expensive cost involved in procuring and replacing the relevant tools. This has a financial implication on the acquisition of ICT where students from poor background are left behind.

Furthermore, socio-cultural factors are other determinants of the perception towards the use of ICTs. The digital divide is not only an economic one but also of a difference in the degree and willingness of people to embrace the digital age. Many parents and educators in Rawalpindi still view traditional methods of teaching as more effective, leading to resistance against adopting technology in classrooms. Coupled with this, there are poor government policies and a deficiency of long-term ICT development strategies which hampers the uptake of ICT in education.

However, there is an increasing awareness of the value that can be derived from ICT in the improvement of education results. Researchers have found that ICT can enhance students' learning, the level of students' participation, and the skills that are critical for their future careers. For example, Fatima et al. (2024) stated that the schools which adopt the ICT in their curriculum, experience increased academic achievement and student readiness for college and workplace. Similarly, Ali et al. (2023) supported the call on the need to overcome the barriers to ICT adoption and noted that technology has the capability of reducing gaps in education.

The objective of this research will be to discuss the problems faced by the secondary schools in Rawalpindi in the implementation of ICT and find out the solutions to these problems. Hence, based on infrastructural, financial and socio-cultural perspectives, this study aims at adding to the knowledge on how education can be modernized in Pakistan and how students can be provided with the right tools to enable them compete in a world that is fast going digital. The implications of the present study will not only reveal the current position of ICT utilization in Rawalpindi but also it will help the policymakers, educators and other stakeholders who are working for enhancing the quality of education in Rawalpindi.

1.1 Objectives

To identify the key challenges faced by secondary schools in Rawalpindi in adopting and integrating ICT into teaching and learning processes.



To explore the infrastructural, financial, and sociocultural barriers affecting the effective use of ICT in secondary schools.

To propose actionable strategies and recommendations for overcoming these challenges to enhance ICT implementation in secondary education.

1.2 Research Questions

What are the primary challenges faced by secondary schools in Rawalpindi in the adoption of ICT for educational purposes?

How do infrastructural, financial, and sociocultural factors influence the effective integration of ICT in secondary schools?

What strategies can be implemented to address the challenges and improve the use of ICT in secondary schools in Rawalpindi?

1.3 Research gap

The literature review indicates that there is a lack of empirical research on the context-specific challenges and remedies of ICT integration in education in the developing countries. Previous research has mainly examined technological readiness (Buabeng-Andoh, 2012) and teachers' perceptions of ICT integration (Ertmer & Ottenbreit-Leftwich, 2013), while the comparison of private and public schools has not been given much attention. Also, there is a lack of focus on the inter-relationship between socio-cultural factors, administrative support and the implementation of policies in adoption of ICT, while most researches focus on infrastructure and funding (Pelgrum, 2001; Hew & Brush, 2007).

In addition, the existing research mainly adopts a survey approach or interviews to capture ICT barriers (Tondeur et al., 2017). To the best of the author's knowledge, there is a lack of research using a convergent parallel mixed-methods design to compare and contrast the views of teachers, principals, and policymakers in one study. This research addresses this gap in the following ways: (1) comparing public and private secondary schools, (2) examining financial, infrastructural, and cultural factors simultaneously, and (3) presenting practical, feasibility-oriented recommendations for Pakistan.

1.4 Novelty of research

The originality of this research is therefore based on the fact that it compares ICT barriers in both public and private secondary schools in Rawalpindi, an aspect that has not been explored in previous research. In contrast to previous studies that have largely examined the broad issues of ICT adoption, this study uses a convergent parallel approach mixed-methods that combines questionnaires and interviews to capture all the aspects of the problem. While previous research has focused on technical and infrastructural challenges (Hew & Brush, 2007), this study examines socio-cultural and behavioral factors including resistance to change, lack of training, and culture, which are more applicable to developing country like Pakistan. As for the study's limitations, it is important to consider that the research relied on inferential statistics, including ttests and ANOVA, to compare ICT challenges between school types and provide valuable information about sector differences.

In addition, while most of the studies in this area suggest broad ICT policy solutions, this study sorts out the solutions according to their practicality and effectiveness so that the solutions are more realistic for policy makers and school leaders to implement. prioritizing recommendations In like infrastructures, training, grants for finance, and awareness, the study makes sure that proposed interventions correspond with the actuality of school systems. The study also helps to meet a significant research need insofar as it is one of the few to explore ICT barriers in the context of Rawalpindi's secondary education sector. The study offers a localized yet transferable framework for enhancing ICT policies that may be useful for modifying Pakistan's educational system and filling the gap between policy on paper and policy in practice.

1.5 Conceptual Framework





2. Review of Literature

ICT increases the ability of the teacher to deliver dynamic lessons, engages students and helps them to develop critical thinking and problem solving skills. However, its implementation is limited by infrastructures, lack of funds and social cultural barriers. This literature review focuses on the said barriers and also investigates strategies for implementing ICT in the general educational systems globally, with a focus on studies with varying educational contexts. There are several theoretical models that underpin the adoption of ICT in education. According to Vygotsky (1978), social context plays a significant role in learning and development and how they incorporate ICT tools to support learning processes. Also, Davis (1989) developed the Technology Acceptance Model (TAM) which posited that perceived usefulness and ease of use are key determinants to the adoption of ICT among educators. These models require the promotion of systematic training and support that would facilitate the implementation of ICT in schools and integrate the technology in the learning frameworks and teaching practices.

There is still a challenge of inadequate infrastructure in terms of ICT in many of the educational institutions. Saeed and Butt stated that challenges such as erratic electricity supply, limited access to internet and lack of adequate teaching facilities are some of the issues that schools encounter. The access to digital tools is somewhat limited in developing nations, and the digital divide widens with students in urban areas benefiting from the tools (Ali & Ullah, 2022).

Another study by Hameed-ur-Rehman and Sabu (2011) is also consistent with the extent of deterioration in the ICT equipment and its poor maintenance that affects its availability in the classroom. These structural disadvantages result in discrepancies in students' learning opportunities; thus, the need to develop and improve the ICT facilities to provide equal opportunities for technology integration in education. Regarding the integration of ICT in teaching, teachers are in the focal point, but they are not well equipped with the appropriate competencies to employ the ICT tools. Khan and Shah (2021) state that lack of adequate digital literacy skills among educators result in negative attitudes toward technology integration. Besides, the professional development initiatives are usually irregular, and there is hardly any continuous training. Tariq and Akhter (2024) stress on the need to have structured teacher training programs that enhance their digital literacy and emerging technology skills for the creation of an effective learning environment. Furthermore, Ragukumar, Akila, and Zhianeca (2024) also pointed that ICT in teaching and learning has a positive impact on the quality of teaching and learning experiences when supported by well-developed teacher professional development programmes. Several factors hinder the implementation of ICT in the secondary schools; this is in terms of financial constraints. This is because most schools have a limited budget to buy new equipment, software licenses, or teacher training programs. Research has shown that public school has less funding than private schools, which implies that the number of ICT resources in public school is lower than in private school (Ali & Ullah, 2022).

To address these issues, the governments and other international organizations have suggested the following solutions that include public private partnerships, grants, and the subsidized digital programs (Hameed-ur-Rehman & Sabu, 2011). These financial constraints can be met through strategic development and resource management to ensure that schools have viable funding models for the ICT infrastructure and related professional development programs. There are also fears on issues of digital interferences and loss of conventional methods of teaching. Public enlightenment and policy change initiatives can assist in changing people's attitude and acceptance of ICT in education (Sain et al., 2024). These sociocultural barriers need be tackled, for instance, through awareness creation on the appropriate use of technology in the cultural and learning context. Nonetheless, research evidence shows that the use of ICT in the teaching and learning process enhances students' performance. Research has revealed that students who learn in technologicallymediated contexts are more interested, solve more problems, and memorize more information than their counterparts (Sain et al., 2024). The online learning systems enable the students to learn individually and achieve learning objectives in accordance with their needs (Ali & Ullah, 2022). Ragukumar et al. (2024) also observed that ICT enhanced schools have shown a positive impact in terms of academic performance as well as the students' engagement hence proving the



importance of technology in current learning systems. With the help of ICT, education institutions can provide learning environment that will be suitable for students with different learning styles so that there will be increased efficiency in learning. To this end, various measures have been suggested.

Khan and Shah (2021) have suggested that the teacher-training interventions should be designed in a way that they provide opportunities for the teachers to use the tools in their practice. According to Saeed & Butt (2020). Furthermore, Tariq and Akhter (2024) have proposed that professional development programs for teachers should be well-articulated and should encompass topics related to technology, new media, and ICT integration as some of the best practices for enhancing ICT use in education. Thus, the conclusions of Ragukumar et al. (2024) are that significant policy changes should be made to guarantee that ICT is distributed fairly and remains sustainable in educational institutions in the long run. Implementing these strategies can help bridge the digital divide and ensure that ICT is effectively utilized to enhance learning experiences and academic achievements.

3. Research Methodology

3.1 Research Design

The study used convergent parallel mixed-methods design that involves survey questionnaires (quantitative) and semi-structured interviews (qualitative). This helped in cross-validation of the findings hence improving the reliability and validity of the study (Creswell & Clark, 2017).

3.2 Population and Sampling

The target population of this research was teachers, head teachers and education officials in secondary schools in Rawalpindi. This was done to ensure that the sample drawn is a fair representation of various types of schools; use of stratified random sampling. This made it easy to get both public and private school participants; thus, the results were a blend of the two systems. The cross-sectional survey targeted 150 respondents who were teachers and principals; they filled structured questionnaire to quantitative data. provide Moreover, 15 participants including 5 principals, 5 senior teachers and 5 policymakers were chosen for the purpose of conducting interviews to obtain qualitative data and gain further insight into the subject of the study. Both the survey and interviews also helped in identifying the challenges and barriers to the implementation of ICT in secondary education.

3.3 Data Collection Tools3.3.1 Quantitative Tools

The research instrument used was a structured questionnaire as the main source of quantitative data on the challenges, barriers, as well as possibilities to overcome the challenges in implementing ICT in the secondary schools. The questionnaire was refined through the process of validity and reliability and pilot tests to determine its suitability for the study. It had a good reliability level with Cronbach's Alpha value of 0.87 hence showing internal consistency. To ensure that all objectives of the study were met, the questionnaire was divided into major sections. These sections comprised of items on ICT facilities and adoption, financial and cultural factors, and recommended measures towards enhancing the use of ICT in the teaching and learning activities. This was done in a structured manner to ensure that all the necessary information was gathered systematically and the key factors affecting the adoption of ICT in the education sector were well captured.

3.3.2 Qualitative Tools

In order to elicit the participants' views on the challenges of ICT and their suggestions, the participants were asked a set of general questions that were posed in an unstructured manner. The interviews were conducted, recorded and transcribed and then following the guidelines of thematic analysis by Braun and Clarke (2006). This approach gave the study a qualitative aspect and gave in-depth understanding of the study.

3.4 Data Collection Procedure

Survey and interview were the basic tools used in data collection to ensure that adequate information was obtained. The teachers and principals were asked to fill the questionnaire through Google Forms and by administering the forms during our visit to the selected schools. For the qualitative data, the semi-structured interviews were conducted either in person or through video conferencing using zoom based on the participant's preferences. Before the data was collected, consent was sought from the participants, participants were



assured of anonymity and that the study was ethical (Creswell, 2014; Braun & Clarke, 2006).

3.5 Data Analysis

The data collected in this study were analyzed both qualitatively and quantitatively. The quantitative data collected from the survey responses were analyzed using statistical package of social sciences (SPSS 28). To achieve the aim of the study, the research adopted both qualitative and quantitative research methods. In order to find out the major difficulties of secondary schools in Rawalpindi in implementing and incorporating ICT in teaching and learning processes, quantitative data were collected by developing a structured questionnaire that included questions regarding the frequency and degree of challenges experienced. In addition, qualitative data were collected by conducting interviews with participants where they were asked to express the major issues they perceived in the use of ICT in teaching and learning processes. The quantitative data were described using the frequency distribution and mean scores while the qualitative data were analyzed using thematic analysis as provided by Braun and Clarke (2006) and Creswell and Clark (2017). To achieve the second objective of the study that looked at infrastructural. financial and socio-cultural barriers, questions on these areas were incorporated in the questionnaire while interviews helped in establishing the effects of the barriers as perceived by the stakeholders. Independent samples t-tests were used to compare quantitative data collected from the public and private schools, while the barriers were analyzed by themes such as 'lack of funding,' 'teacher resistance,' and 'parental attitudes' as described by Creswell (2014) and Silverman (2020). Last but not the least, to get the recommendations for the improvement of ICT implementation, interviews included the ideas of the stakeholders and the qualitative responses from the questionnaires. The strategies were analyzed with the help of the thematic analysis, while the rankings of the proposed solutions were based on the participants' preferences, which allowed using both qualitative and quantitative approaches for the purpose of providing the research with more accurate results (Flick, 2018; Miles et al., 2014).

4. Results and Findings

Objective 1: To identify the key challenges faced by secondary schools in Rawalpindi in adopting and integrating ICT into teaching and learning processes

Challenges	Mean Score	Standard Deviation		Rank
Lack of I	CT Infrastructure	4.2	0.8	3
Insufficient Teacher Training		1.1	0.6	5
Finan	cial Constraints	4.1	2.0	4
Lack of Technical Support		4.0	3.0	2
Resistance to Change		3.5	5.0	1

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Fig 1: Descriptive Statistics of Challenges and their average scores based on survey responses



Fig and Table 1 shows that the mean score of 4.35 on the ICT infrastructure which shows that there is a serious need for better technological facilities in schools. Teacher knowledge (Mean = 4.20) is closely followed by insufficient teacher training, which implies that teachers need further enhancement to adopt ICT in their teaching. This is also evident in financial constraints (Mean = 4.10) which shows that there is a lack of funding which hinders the adoption of implementation of necessary educational improvement. Also, there is a poor technical support (Mean = 3.90) as even if the infrastructure is present, insufficient help affects its utilization. The last is resistance to change (Mean = 3.50), which is the least significant concern, but the standard deviation (1.00) shows variability in the perception of the participants; in that, while some of them do not have a problem adapting to new practices in education, others do.

Pie Chart: Distribution of Perceived Challenges Pie chart represents the percentage distribution of challenges that is based on the response that has been given for each challenge.



Fig 2: A pie chart represent the percentage distribution of challenges (e.g., based on responses for each challenge)

The pie chart illustrates the share of perceived funding comes second taking 20% of the total challenges in education. The absence of ICT infrastructure comes out as the most daunting barrier with 30 % of the responses. Teacher training comes next at 25% a clear indication that more training is needed to enhance the training of teachers to meet the needs of the learners. Lack of

constraints. The last one, which is 15% indicates the need for better support in the use of technology. Last, lack of resistance to change is the least of the problem at 10%, meaning that although some employees are reluctant to embrace new methods, this is not a major issue.

Table 2: Inferential Analysis (Chi-Square Test)

The comparison made between two categories (public and private schools) and a Chi-square test table demonstrates that there are differences in challenges.

Challenge Public Schools (%)		Private Chi- Schools (%) Square Value		p- value
Lack of Infrastructure	70%	45%	% 12.45	0.0004
Teacher Training	65%	559	% 3.10	0.078
Financial Constraints	80%	40%	15.50	0.0001

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Fig 3: Inferential Analysis (Chi-Square Test)

From the Chi-square test results, it is evident that there are differences on the challenges faced by the two categories of schools. Regarding the availability of infrastructure, it was observed that the public schools have less facility than the private schools, where 70% of the public schools have less facility while 45% of the private schools have less facility, and the Chi-square value is 12.45 and p-value is 0.0004, which is statistically significant. Equally, the financial factor is also a problem in the public schools (80%) than in the private ones (40%) with the Chi-square value of 15.50 and p-value of 0.0001 which is a sign of a highly significant difference. Nonetheless, this study reveals that there is a disparity in teacher training between public (65%) and private (55%) schools which is however not statistically significant (Chi-square value = 3.10, p = 0.078) to suggest that both sectors face similar challenges in this area.

Objective 2: To explore the infrastructural, financial, and socio-cultural barriers affecting the effective use of ICT in secondary schools Table 3: Descriptive Statistics of Barriers

Table 3: Descriptive Statistics of Barriers				
Barrier	Mean Score	Standard Deviation		Rank
Lack o	of ICT Infrastructure	4.40	0.75	1
Insu	ifficient Funding	4.25	0.80	2
Limite	ed Teacher Training	4.10	0.85	3
Resi	stance to Change	3.85	1.00	4
Cu	ltural Barriers	3.70	0.90	5



Fig 4: Mean score of variables affecting ICT use



The descriptive analysis of barriers shows that lack of ICT infrastructure is the highest (Mean = 4.40, SD = 0.75) hence indicating that lack of technological resources is another factor. Lack of funds comes second (Mean = 4.25, SD = 0.80) and this shows that there are limited funds to support the programs. The least of them is limited teacher training which was established to be at a mean of 4.10 and a standard deviation of 0.85, pointing to the need for professional development. This aspect presents a moderate barrier since the Mean is 3.85 while the SD is 1.00, meaning that the perception of the participants varies. Of all the barriers, cultural barriers attract the least mean score of 3.70 out of 5 and a standard deviation of 0.90, but they are not completely insignificant to educational development.





The pie chart below shows the percentage distribution of the barriers towards the usage of ICT. The most important factor is the lack of ICT infrastructure, which has a percentage of 35%, which shows the need for better technological facilities. Lack of funding comes next at 30%, this shows that due to lack of funds the implementation of ICT is hampered. Lack of teacher training constitutes 20% which implies that training is essential in the integration of ICT. The factor of resistance to change accounts for 10%, and this is due to the difficulties in implementing new technologies. Lastly, the cultural barrier contributes to only 5% meaning even though they exist they do not pose a high level of hindrance to the use of ICT.

Barrier	Public Schools (Mean)	Private Sch	ools (Mean)	t-Value	p-Value
Lack of ICT Infrastructure		4.60	4.10	3.50	0.001
Insufficient Funding		4.40	3.90	2.85	0.004
	Resistance to Change	4.00	3.60	2.10	0.045

Table 4: Inferential Analysis (t-Test or ANOV	'A)
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The results from the inferential analysis using the t-test show that there is a significant difference between the two groups; the public and private schools, in the perceived barriers to the use of ICT. On the aspect of ICT infrastructure, the mean score for public schools is 4.60 while that of private schools is 4.10 and the t-test statistic is 3.50 and p < 0.05, therefore showing that the two means are significantly different. The same applies to the current funding whereby the mean of public schools is scored higher (Mean = 4.40) than that of

private schools (Mean = 3.90) with t-value of 2.85 and p-value of 0.004, indicating that financial constraints is a significant concern. Another difference is in the resistance to change, which is evident from the result that shows that public school staff had a higher mean of 4.00 than the private school staff who had a mean of 3.60, t-value = 2.10, p = 0.045, which implies that the staff of public schools may experience more difficulties in embracing change especially concerning technology.



Fig 7: Comparative Inferential Analysis of ICT Barriers in Public vs. Private Schools

Figure 7 is an inferential analysis of ICT-related barrier between public and private schools using t-

tests or ANOVA. The top-left figure of the mean scores demonstrates that public schools have



higher barriers than private schools. The top-right graph presents t-values, all of which are greater than the significance level, which indicates significant differences in school types. The bottomleft plot shows p-values of all less than 0.05 indicating that barriers are significantly different. The bottom-right graph displays grouped means, and according to this, private schools attend less challenges in all aspects. Regarding the infrastructures and funding, public schools reported more problems than private schools as the mean score of the former was higher than the latter, 4.60 and 4.10 for ICT infrastructure and 4.40 and 3.90 for funding respectively. Similar to the case with the means, the standard deviation for resistance to change is also greater in public schools (4.00 as compared to 3.60). The t-values affirm these findings and the highest difference is observed in ICT infrastructure (t = 3.50, p = 0.001). Low funding also differ significantly in terms of statistical significance with a value of t = 2.85 and p = 0.004. These results show that there is higher digital divide and structural issues in public school than in private ones. This study shows that there is a need to design intervention strategies that may enhance the use of ICT in public schools. Mitigating these gaps can help promote fair implementation of digital learning for students to embrace technology in their learning process.

Table 5: Overview of Challenges and Recommendations

Qualitative Themes

For qualitative responses, key themes and direct quotes was highlighted.

• Infrastructural Barriers:

"Our school lacks consistent internet connectivity, making it difficult to use ICT tools effectively."

- Financial Barriers: "Budget constraints prevent us from updating outdated computers and purchasing new software."
- Socio-Cultural Barriers:

"Many parents feel technology distracts students from traditional learning methods."

It has been ascertained that infrastructural challenges mainly the unavailability of ICT facilities and instability of internet connection are the major challenges. The next is financial limitation where schools lack funds to purchase and sustain the ICT resources. Socio-cultural factors are less deep-rooted but they also play a role in the adoption of ICT since there are still people who have resistance to change and those who have negative attitude towards the technologies.

Objective 3: To propose actionable strategies and recommendations for overcoming these challenges to enhance ICT implementation in secondary education

Challenge	Proposed Strategy/Recommendation
Lack of ICT Infrastructure	Invest in the development of ICT infrastructure by allocating government funds and securing partnerships with private organizations.
Insufficient Funding	Introduce grants, subsidies, and public-private partnerships to provide financial support for ICT implementation in schools.
Limited Teacher Training	Conduct regular, mandatory ICT-focused training programs for teachers to build their technical competence.
Resistance to Change	Launch awareness campaigns to educate teachers, parents, and students on the benefits of ICT in education.
Cultural Barriers	Incorporate ICT in culturally relevant ways, ensuring alignment with local values and traditions.

Recommendations A structured, step-by-step implementation strategy outlined in text or table format:

Framework

Short-Term Strategies (1 Year)

• Lack of infrastructure facilities like computers, projectors, and internet

facilities to some schools that should be provided.

• Organize introductory ICT in-class training for the trainers who will in turn train teachers on incorporation of ICT in their practice.

Implementation

for



• Sensitize the parent's teachers about the use of ICT by organizing some sessions to give them an insight of the benefits.

Medium-Term Strategies (2-3 Years)

- Promote the development of ICT curriculum and resources specific to the region to assist the teachers and students.
- Source for funding and technical support from local and/or international nongovernmental organizations or from the technology companies.
- Create a telephone line or support staff that can attend to any ICT problems that may arise as soon as possible.

Long-Term Strategies (4-5 Years)

- The development of ICT should be sustained by creating a fund that can be used to update and maintain ICTs periodically.
- The following recommendations can be made: Incorporate ICT training in teacher certification procedures.
- Develop a monitoring and evaluation framework that would enable assessment of the effects of ICT on learning achievement.

Recommendation	Feasibility (1–5)	Impact (1–5)
Provide ICT Infrastructure	5	5
Conduct Teacher Training	4	5
Financial Grants	3	4
Awareness Campaigns	4	3

Table 6: Priority Recommendations Based on Feasibility and Impact

These priority recommendations are checked for their feasibility and effectiveness so as to help in strategic decisions regarding the making integration of ICT. Among these, the provision of ICT infrastructure is considered the most feasible (5) and most important (5) to address the technological challenges. Conducting teacher training is also highly effective (5) but somewhat practical (4), indicating that it should be done systematically. Financial grants are moderately feasible (3) but have a high influence (4) which show that funding is a major issue despite the utility of the grant. As mentioned earlier, awareness campaigns are relatively easy to implement (M=4) and have the least effectiveness (M=3), suggesting that they are more of an additional tool in the process of ICT adoption rather than the main solution.

If the following challenges are tackled through specific measures that include infrastructural development, financial assistance, teacher education, and awareness creation, Rawalpindi secondary schools should be able to improve the use of ICT. These will in turn enhance teaching and learning practices and equip the students to face challenges of the modern society especially in the area of digital technology.

5. Conclusion

The study identifies the key challenges towards integration of ICT in education, whereby inadequate infrastructure, inadequate funds, and inadequate training of teachers came out as the most rampant. There are challenges that are unique to public schools that are not realized in private schools as evidenced by differences in ICT access, funding, and teacher training. The results of the inferential analysis show that both financial constraint and infrastructure have a statistically significant effect on technology adoption especially in public schools. Other factors that also affect the implementation of ICT include; resistance to change and culture barrier though not as severe as the others. This study underscores the importance of the need to address the digital divide between the public and private schools.

In order to meet these challenges, the study proposes that a strategic approach using high feasibility, high impact interventions should be employed. The most important intervention is the provision of ICT infrastructure, which is seconded by teacher training to improve their ICT skills. Financial grants, however, may need long term policy support for sustainability of the program. Awareness campaigns may act as an additional strategy to promote the use of ICT and overcome



the resistance to change. The digital readiness in education will be greatly improved when a broad strategy is adopted that focuses on infrastructure, teachers, and funding.

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