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Navigating The Obstacles and Complexities of ICT Integration in Pakistan's Education Sector

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ABSTRACT

This research focuses on the main challenges and barriers to adopting information and communication technology (ICT) in educational institutions. The research mainly focused on limited resources, outdated curriculum, and technophobia among educators. Using qualitative methods and a case study approach, the research collected data from various educational institutions through in-depth interviews, observations, and document analysis. A total of 15 interviewees, including teachers, school administrators, and technical staff, were purposively selected to provide deep insights into the issues studied. Data were analyzed using reduction, presentation, and verification techniques to identify key patterns. The results showed that resource limitations, such as lack of ICT devices and minimal budget, are the main barriers to technology integration. In addition, a curriculum that is irrelevant to the demands of the digital era slows the adoption of ICT in the learning process. Technophobia among teachers was also identified as a significant factor, with many educators feeling insecure about using technology due to a lack of relevant training and adequate technical support. The findings imply the need for a holistic strategy that includes providing adequate resources, curriculum reform, and continuous training for educators to support more effective technology integration. This research contributes significantly to understanding the challenges of ICT adoption in developing countries, particularly in Lahore. The results provide important insights for policymakers to design more inclusive and effective technology-based education policies while filling the literature gap in the context of ICT adoption in the education sector.

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INTRODUCTION

The transformation of information and communication technology (ICT) has brought significant changes in various aspects of life, including education (Abulibdeh et al., 2024; Habib et al., 2021; Wang et al., 2024). In the digital era, the application of ICT in education is one of the strategic steps to improve the quality of learning and expand access to knowledge (Díaz-Arancibia et al., 2024; Jianguo & Solangi, 2023; Mushtaque et al., 2022). However, in developing countries like Pakistan, especially in Lahore, implementing ICT in educational institutions still faces many challenges (Arslan et al., 2021; Shahzad et al., 2023; Waqar & Paracha, 2023). Social facts show that many schools in Lahore still rely on conservative, traditional teaching methods while students face a world increasingly dependent on technology (Junaid et al., 2023; Rahimi & Oh, 2024; Shah Bukhari et al., 2022). Schools' unpreparedness to adopt ICT creates a digital divide at the local level and reduces students' competitiveness in an increasingly competitive global job market (Abid et al., 2021; Knight & Morshidi, 2011; Shah Bukhari et al., 2022). Therefore, the urgency of integrating ICT into education is one of the important issues that must be addressed immediately (Javaid et al., 2024, 2024; Qamruzzaman Kor, 2024).

Many studies in the literature show that ICT can significantly improve learning outcomes. For example, research by Farhad, (2024) states that educational institutions that use ICT as an integral part of the curriculum successfully improve student engagement and academic outcomes. On the other hand, some studies identify key barriers to ICT implementation in educational institutions, such as limited resources, lack of training for educators, and resistance to technological change (Ansari, 2024; Jianing et al., 2024; Nehra & Bansode, 2024). Previous research has also shown that the success of ICT implementation is strongly influenced by institutional readiness regarding technological infrastructure and adequate policy support. However, few studies have addressed the social and pedagogical dynamics in educational institutions in Lahore related to ICT adoption, creating a research gap that needs to be bridged.

This study aims to identify the main challenges and barriers to ICT adoption in educational institutions in Lahore, focusing on limited resources, outdated curricula, and technophobia among educators. The problem formulations in this study are: (1) How do resource limitations affect ICT implementation in educational institutions in Lahore? (2) How does an outdated curriculum impact using ICT in learning? (3) How does technophobia among educators affect ICT adoption? By answering these questions, this research is expected to provide relevant recommendations to address the challenges in ICT integration in the education sector, particularly in developing countries.

This research is based on the assumption that the success of ICT integration in education depends not only on the availability of resources but also on the readiness of institutions and educators to adopt technology. This assumption refers to the Technology Acceptance Model (TAM) theory, which states that technology adoption is influenced by perceived ease of use and usefulness. A tentative answer that can be proposed is that limited resources, irrelevant curriculum, and lack of training are the main barriers to ICT adoption in educational institutions in Lahore. By understanding these factors, this research is expected to provide new insights to help overcome these barriers and maximize the potential of ICT in education.

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METHOD

This research uses a qualitative approach with a case study design to explore the challenges and barriers to integrating information and communication technology (ICT) in educational institutions in Lahore, Pakistan. The unit of analysis was educational institutions in Lahore, including secondary schools and universities, focusing on ICT infrastructure, educational policies, and educators' experiences. A case study approach was chosen as it allows the researcher to understand the complexity of the unique educational context in Lahore and the factors that influence the adoption of technology in the learning process (Frazer et al., 2023; Matthew B. Miles, A. Michael Huberman, 2014; Mezmir, 2020). The research aims to provide in-depth insights into how limited resources, outdated curricula, and technophobia affect technology adoption in education.

This study's primary sources of information were educators, school administrators, and technical staff from educational institutions in Lahore. Respondents were selected using a purposive sampling technique, with criteria including work experience in educational institutions and direct involvement with ICT. A total of 15 interviewees were interviewed, comprising 10 teachers, three school administrators, and two technical staff. In addition, documents such as annual reports, inventory of ICT facilities, and curriculum used were also analyzed to support the research data. Information from the interviews and documents was complemented by direct observation of the learning process in the research schools.

Data were collected using three main techniques: in-depth interviews, observation, and document analysis. Interviews were conducted to explore interviewees' perspectives on challenges and opportunities in ICT integration, while observations were made to understand how technology is used in the learning process.

Document analysis involved reviewing reports and inventories of ICT facilities to complement the information obtained from interviews and observations. Data collected was analyzed using data reduction, display, and verification techniques. Interview data was analyzed using a coding process, where interviewees were coded to maintain anonymity and ensure consistency in analysis. The following table shows the coding of interviewees based on data collection techniques:

Table 1. Coding of Interviewees and Data Collection Techniques

Source Code	Type of resource	Data Collection Technique
R1	Teacher	Interview
R2	Teacher	Interview
R3	Teacher	Interview
R4	Teacher	Interview
R5	Teacher	Interview
R6	School Administrator	Interview
R7	School Administrator	Interview
R8	School Administrator	Interview
R9	Technical Staff	Interview
R10	Technical Staff	Interview
R11	Teacher	Observation
R12	Teacher	Observation
R13	Teacher	Observation
R14	School Administrator	Documentation
R15	Technical Staff	Documentation

This table shows how each source is associated with a particular data collection technique. The interviewees' coding was used to maintain anonymity and facilitate data analysis, particularly in data reduction and verification. This analysis provides insights into the barriers and opportunities for ICT integration in educational institutions in Lahore.

FINDINGS AND DISCUSSION

Limited Availability of Crucial ICT Resources

Preliminary Presentation Based on observations of several educational institutions in Lahore, the available ICT resources are very limited. Annual reports and facility inventories show that the majority of schools have only a few computers and adequate networking equipment. Some institutions do not even have computer equipment that can optimally support ICT-based teaching and learning activities. Data from the Google Trends graph also shows that interest in the topic of ICT resources in Lahore is relatively lower compared with other cities in Pakistan, such as Rawalpindi and Faisalabad.

Further elaboration Data from annual reports show that the budget for procurement of ICT equipment is minimal, with some schools in Lahore not even receiving a dedicated budget for maintenance of ICT equipment. For example, the financial report for 2023 shows that only 10% of the education budget is allocated for the procurement of hardware and software that support technology-based learning processes. The trend graph from Google Trends also reflects the relative lack of attention to this topic in Lahore as shown in figure 1.

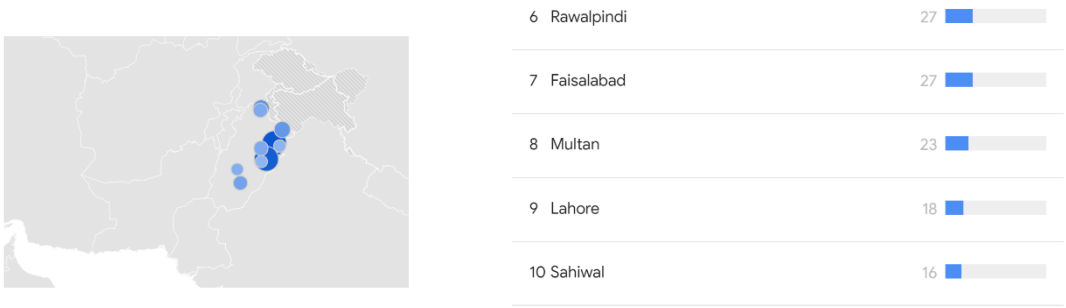

Figure 1. Trend graph from Google Trends

ICT in many educational institutions in Lahore is a major obstacle in the implementation of technology-based learning. Documentation reports and photographs collected indicate that the main problems faced are lack of budget and inadequate maintenance of existing ICT devices. In addition, Google Trends data corroborates these findings by showing a relatively low level of interest in the topic of ICT resources in Lahore compared to other cities in Pakistan.

Based on these findings, it can be concluded that the lack of budget allocation for ICT may hinder the integration of technology in education in Lahore. Theories related to resource management in education (such as the theory of limited resources) suggest that institutions with limited resources will find it difficult to improve the quality of education through technology (Dahri et al., 2024). This data also indicates that strategic measures to allocate funds and raise awareness about the importance of ICT are needed, especially in the city of Lahore, in order to bridge the gap in technology education infrastructure.

Outdated Curriculum and Pedagogical Practices

Observations show that learning in many educational institutions in Lahore still relies heavily on traditional methods and does not utilize ICT to its full potential. Most learning activities focus on direct teaching by teachers, with little or no use of technology. Although some ICT tools are available, teachers tend to prefer conventional methods such as blackboards and textbooks, overlooking the potential of technological tools to improve the quality of learning.

The figure below illustrates a comparison between conservative traditional learning methods and ICT-based methods. The figure highlights the imbalance between the two approaches, with traditional methods still dominating most educational institutions in Lahore. Conservative curricula and limited use of technology are the main barriers to integrating ICT into the teaching and learning process.

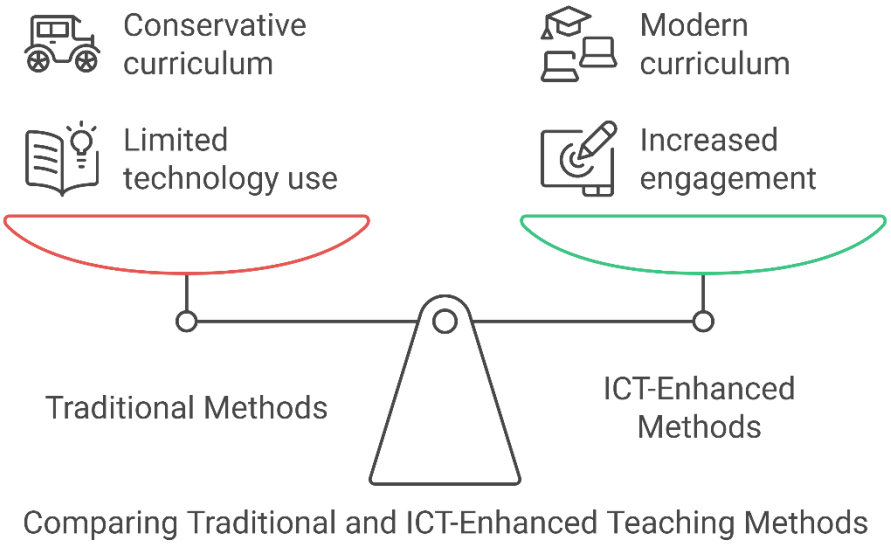

Figure 2: Comparison between traditional and ICT-based learning methods

During the observation, it was found that devices such as projectors, computers and the internet are more often used for administrative purposes than to support the learning process. In contrast, ICT-based methods, such as computer-based learning or blended learning, are rarely applied. This reflects the lack of curriculum reform to accommodate modern technology in education.

In terms of educational theory, the ICT-based learning approach shown on the right side of this figure illustrates the potential for higher student engagement and more dynamic teaching (Durar et al., 2023). However, without significant changes in policy and teacher training, traditional methods will continue to dominate, hindering education's transformation into the digital age.

Inadequate Training and Technophobia Among Educators

The interviews revealed that lack of training and technophobia among educators are significant barriers to the adoption of ICT in educational institutions in Lahore. Most of the teachers interviewed admitted to feeling afraid or uncomfortable using technology due to lack of adequate skills. One teacher said, "I was never taught how to use computers to support classroom learning. I only know the basics, which is not enough to help my students" (R1, 2023).

The ICT training available was also considered irrelevant to the teaching context. One teacher said, "The training materials are too general and do not help me understand how technology can be applied directly in the classroom. In the end, I went back to using traditional methods" (R2, 2023). Another teacher added that the training received did not address the actual challenges faced in the field. "The training is too simple, only about operating the device. We need practical guidance to integrate technology into daily learning" (R3, 2023).

Technophobia is also a big problem among educators. One teacher expressed her fear, "I don't feel confident using technology. The devices are complicated, and I am afraid of making mistakes in front of students" (R4, 2023). Another teacher emphasized the importance of more concrete support, "I think we need more specific training and direct guidance to understand how to use technology in teaching. That would be very helpful" (R5, 2023).

In addition, interviews revealed that technophobia is also exacerbated by the lack of technical support in schools. When ICT devices experience problems, teachers are often left to find solutions on their own without help from trained technical staff. This condition further reinforces their fear and lack of confidence in using technology. The results of the interviews conducted are then presented in a thematic analysis table to provide ease in interpreting the research findings as shown in table 2.

Table 2. Thematic Analysis

Main Theme	Sub-Themes	Supporting Data
Lack of Relevant Training	Training is too basic	"The training is too basic..." (I_Rashid_2023).
No practical guidance	"We were only taught how to turn on the computer, but not how to use it to make learning more interesting for students" (I_Rashid_2023).	
Technophobia among Teachers	Fear of errors in use	"I don't feel confident..." (I_Fatima_2023).
Limited technical support at school	Teachers are often left to find their own solutions without help from trained technical staff.	
Training Needs	More specific and contextualized training	"I think more specific training..." (I_Ali_2023).

The findings show that lack of relevant training and technophobia among teachers are the main barriers to technology adoption in educational institutions in Lahore. The current training provided to educators is insufficient to equip them with the practical skills needed to integrate technology into teaching.

Furthermore, the lack of technical support in schools exacerbates teachers' discomfort with the use of ICT, making many of them reluctant to try using technological devices in the classroom. This finding is in line with the *Technology Acceptance Model (TAM)*, which states that technology acceptance is influenced by perceptions of its ease of use and usefulness. In this context, the teachers found the technology difficult to use (perceived ease of use) and less relevant to their needs (perceived usefulness). To address these issues, the training approach should be changed to be more contextualized, focusing on the practical application of technology in teaching (Ali et al., 2023). In addition, ongoing technical support needs to be provided to help teachers feel more confident in using technology tools.

Discussion

The findings of this study show that limited ICT resources in Lahore schools have a serious impact on the learning process. The question is, to what extent do these limitations affect student learning outcomes? The implications of these limitations are far-reaching, including low access to information and minimal use of innovative learning methods. This creates a huge gap in students' readiness for the digital world. A previous study by Ali et al., (2023) highlighted that educational institutions with limited access to ICT often produce students who are less competitive in the labor market. Therefore, these results reinforce the urgency to increase investment in ICT infrastructure to prepare students for the demands of the future.

One of the main reasons identified was inadequate budget allocation, as shown by the data in this study. This is in line with the findings of a study by SABA et al.,(2022) which revealed that a lack of financial support and policy prioritization is often the root cause of problems in ICT integration in developing countries. In Lahore, this problem is compounded by the lack of strategic planning in the distribution of ICT devices, which makes educational institutions dependent on obsolete devices.

The study also showed that outdated curricula and traditional learning methods dominate most educational institutions. The implication of this result is the stifling of pedagogical innovation and lack of adaptation to the needs of 21st century students. The study by Adnan, (2020) cited inflexible curriculum as a major obstacle in promoting technology-based learning. This finding underscores the importance of curriculum reform that effectively integrates technology to enhance student engagement and learning relevance. Why is this outdated curriculum still being maintained? One reason is the lack of training for teachers to adapt technology in their teaching methods.

Research by Ghani et al., (2024) found that many educators do not feel confident using technology due to the absence of relevant training. In this context, observations in Lahore suggest that teachers tend to opt for traditional methods as they feel more comfortable and familiar with the approach. The last set of findings revealed that lack of training and technophobia among teachers are the main barriers to ICT integration. The implication of this finding is the low level of innovation in teaching and the limitation of students in utilizing technology as a learning tool. The study by Akram et al., (2021) states that lack of relevant training exacerbates teachers' self-confidence, making them reluctant to experiment with new technologies. Thus, these results emphasize the need for a more contextualized and sustainable approach to training.

One of the reasons for this is the lack of technical support in educational institutions, as found in this study. This is consistent with the study by Abulibdeh et al., (2024), which states that inadequate technical support can exacerbate teachers' fear of technology. In Lahore, the lack of experts in the field of educational technology makes teachers feel that they do not have a reliable resource to help them face this challenge.

CONCLUSION

The research revealed that limited ICT resources, outdated curricula and technophobia among educators are the main barriers to integrating technology into the education system in Lahore. The findings suggest that without adequate resources, both in terms of hardware and infrastructure support, educational institutions will find it difficult to adapt to the demands of the 21st century. The dominance of conservative, traditional learning methods reflects the need for more modern curriculum reforms to support technology integration. Irrelevant training and lack of technical support in schools further exacerbate technophobia among teachers, which ultimately results in low levels of technology adoption in teaching. This study emphasizes that efforts to improve the technology-based education system must be holistic, encompassing the provision of adequate resources, curriculum reform and continuous training for educators.

The main contribution of this study lies in confirming the relationship between ICT infrastructure limitations and pedagogical barriers with low technology adoption in educational institutions. This research enriches the literature by providing a new perspective on how resource limitations and psychological factors, such as technophobia, affect the effectiveness of technology-based learning in developing countries. In addition, this study highlights the importance of a more contextualized training approach and continuous technical support as strategic measures to increase technology acceptance among educators.

However, this study has limitations in that its geographical scope is limited to the city of Lahore, so the findings may not fully represent the situation in other regions. Further research is needed to accommodate gender differences, age, and variations in educational institutions, as well as to explore a wider and more diverse range of data collection methods. By doing so, this research can provide a more comprehensive picture and support more effective policy-making to improve the quality of technology-based education in the future.

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