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# Technology Integration in Teaching and Learning: Exploring Prospective Teachers' Perceptions, Practices and Challenges

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**ABSTRACT**

*The current study explores the inclusion of Information and Communication Technology (ICT) in schools in teaching and learning practices in Pakistan. Twelve prospective teachers from public schools of a district in Punjab were chosen using purposive sampling. Semi-structured interviews were used to collect data and thematically analyzed through NVivo 15. The findings revealed five major themes: teachers' perceptions towards ICT, current implementation practices, challenges and implementation barriers, professional development, and support needs, and future perspectives and recommendations. The result of the positive attitude of teachers towards technology was explored as the potential to engage students, but some of the significant barriers were limited infrastructure, inadequate technical support, and insufficient professional development. The study revealed critical gaps between teacher's desire to adopt technology and its effective institutional capacity to implement. Recommendations suggest systemic professional development, improved infrastructure, and institutional support for effectively integrating ICT into Pakistani schools. These findings enhance the understanding of the complexities of technology integration within developing educational contexts and provide insights for policy development and resource allocation.*

## Introduction

The integration of Information and Communication Technology (ICT) in education has been a significant contributor to transforming present teaching and learning practices (Seifu, 2020) all over the world. However, this integration creates challenges and opportunities for educational institutions in developing countries such as Pakistan that have to try to walk alongside contemporary technological advancements in education. ICT has become particularly important to the implementation of ICT in education systems to improve teaching

methodologies, boost student engagement, and prepare students for a digitally driven future (Alenezi et al., 2023).

Recent studies have shown the success of technology adoption in educational settings depends mainly on teachers' perceptions and attitudes toward ICT integration (Lawrence, 2022). As stakeholders in the educational process, teachers play an important role in technological use in classrooms (Szymkowiak et al., 2021), as well as ensuring its successful contribution to the performance of student learning outcomes. In other words, their understanding, acceptance, and implementation of these ICT tools directly affect the quality of technology-enhanced learning environments.

According to research in developing countries, there has been growing recognition of the role ICT plays in education, but various challenges still prevail in the effective implementation of ICT in education (Haleem et al., 2022). Shair et al. (2022) conducted a study to explore factors influencing ICT usage abilities in the Pakistani context. There were significant differences in ICT usage with ICT infrastructure and access to technology emerging as primary factors of the digital divide. However, these challenges are particularly severe in the area of public schools and rural areas since they are limited by resource constraints that inhibit successful implementation of ICT integration (Luo et al., 2022).

In Pakistani schools, ICT integration is a state of play about the complex interplay of government policies, institutional capacities, and individual teacher competencies. Though the Pakistani government has implemented several programs to increase the use of technology in education, these policy objectives still lack implementation at the classroom level (Jamil, 2021). Schenck (2024) examined the relationship between technology and critical thinking. Critical thinking and life skills are among the twenty-first-century skills focused on by national and international literature through the development of higher/order thinking skills regarding policy (Jamil et al., 2020), curriculum (Jamil, Aslam et al., 2024; Jamil, Bokhari et al., 2024), textbook (Jamil, Mehmood et al., 2024), teachers' perceptions and practices (Jamil et al., 2021); life life-sills integration focused by different studies (Jamil, Ain, et al., 2024; Jamil, Arif et al., 2024). ICT has been proven to be important for the younger generation who need to merge technology into their daily life. To address gaps between policy intentions and classroom realities in their ICT integration, it is important to understand teachers' experiences and perspectives with ICT integration.

Educational research has well-documented the relationship between teachers' ICT competencies and their classroom practices. It is acknowledged across international studies that teachers' belief in technology as well as their pedagogical belief profoundly affects their likelihood to embrace ICT within their teaching (Almaiah et al., 2022). Yet in the context of Pakistan literature regarding teacher perceptions, competencies, and classroom practices is very limited at the school level.

Global recent events, such as the COVID-19 pandemic, have brought to light the importance of integrating ICTs into education. Synchronous shift to online learning exposed wide existing technological readiness gaps across educational institutions worldwide (Turnbull et al., 2021), especially in developing countries. The reintroduced focus on this situation reveals the need to clarify and make progress on identifying and addressing the barriers to effective ICT integration in educational settings.

Earlier research suggests that there is a need for more country-specific studies on ICT integration from teachers' perspective in developing countries. Several studies have been conducted to investigate technology integration in education (Akram et al., 2021; Siddiqui et al., 2020) around the world, but few have looked into the special challenges and opportunities (Sajid & Hassan, 2013) of the educational context of Pakistan. It is important to understand these specific contexts as these will inform ways of engineering effective efforts for ICT integration taking into consideration local resources as well as culture and institutional capacities.

Pakistan still has to invest in educational technology and digital infrastructure, and it is, therefore, necessary to explore how such investments can be optimized to maximize their effect on improving teaching and learning outcomes. Therefore, there is a need to investigate current practices, problems, and prospects from the teachers' perspective who are at the forefront of implementing technology in classrooms.

**Research Objectives**

Following are the research objectives of the study.

1. To explore prospective teachers' perceptions and attitudes towards ICT integration in teaching and learning.
2. To find out the current ICT implementation practices and related challenges faced by prospective teachers in integrating technology during their classroom teaching.
3. To explore the professional development needs and support mechanisms for effective ICT integration and develop recommendations for improving technology integration.

## Literature Review

The use of ICT in education has been explored in many contexts, and specifically about teachers' attitudes, practices regarding the use of ICT. The research indicates that teacher perceptions have a major impact on technology integration in schools (Backfisch et al., 2021). A quantitative study by Ahmed and Kazmi (2020) with 133 Pakistani teachers showed a moderate level of positive attitude towards the use of ICT. Another study by Sajid and Hassan (2013) explored teachers' perceptions and barriers to ICT integration were explored in the Punjab province. The participants have positive ICT integration perceptions. Basic infrastructure, upgradation of curriculum, and teachers' training were the areas of focus.

There has been conducted research on ICT integration within the educational sector in Pakistan examining different aspects, from infrastructure to implementation challenges. In a study of the impact of ICT on educational curriculum development, in Lahore's public universities, Sain and Lama (2024) conducted a comprehensive study, involving a survey of 385 respondents. Based on their findings they find ICT availability which is strongly correlated to positive learning outcomes for students as ICT is vastly important in education. Shaikh and Khoja (2013) used a modified Delphi study consisting of 30 participants in urban and rural areas of Pakistan to determine the role of ICT in the future of Pakistani higher education. The implementation challenges they pointed out are associated with those in supply and demand of ICT while stressing the key role of technology in building up a knowledge-based society. To begin with, Ismail et al. (2020) conducted a systematic review of research of the last decade to explore barriers and enablers of ICT integration in Pakistani schools focusing basic education

sector. Pakistani schools lag well behind, with technology integration at an early stage, according to their findings, with developed countries at the forefront in ICT implementation.

Jogezai et al. (2016) investigated the leadership perspective through a qualitative study of eight secondary school head teachers in the Balochistan province to examine the persuasion and constraint functions of the school head teachers' leadership. The research found that school leaders continued to hold positive perceptions toward the use of ICT but also identified several hindrances to its implementation. Effective leadership was revealed to be a critical enabler to successful ICT integration. Alam and Khurshid's (2022) recent research explored secondary school teachers' ICT competencies during the COVID-19 pandemic through surveys with 251 secondary teachers. They found that teachers were well proficient in using technological tools but not so around e-learning implementation.

A comparative study of teachers in early childhood education (public and private school teachers) was conducted by Shah et al. (2021) from Rawalpindi with a sample of 160 teachers. Research findings show that there were huge differences between the perceptions of public and private school teachers towards the effectiveness of ICT, facilities, skills, and practices of teaching using ICT.

The ICT integration literature continues to focus on the importance of ICT in the academic context. There are common themes related to infrastructure limitations; the need or lack of professional development; and the gap between policy intentions and the reality of its implementation. All these studies indicate that ICT can be important in education and yet need to continue the work in removing systemic barriers and putting together a comprehensive support system for technology integration.

This literature review reveals that the integration of ICT in Pakistani education is still in the process of evolution and clearly illustrates the inability of research and development in this area in terms of practical implementation strategies and support mechanisms for educators.

## Research Methodology

This research was conducted through a qualitative research approach to understand the prospective teachers' perceptions, practices, and barriers to integrating ICT in the schools of Punjab, Pakistan. Based on Creswell and Poth's (2016) framework for conducting qualitative research, the study adopted phenomenology to establish the teachers' experience with the use of technology in their teaching. A purposive sampling technique was used to select twelve teachers from a district of Punjab, Pakistan. The data was collected with the use of semi semi-structured interview protocol that consisted of 20 open-ended questions covering four main areas: teachers' knowledge about the concept of ICT; the current status of ICT integration in the students' learning and teaching process; the main difficulties and limitations connected with ICT integration; and the teachers' further training needs and potential views. All interviews were semi-structured and carried out in the national Urdu language. All interviews took approximately 45-60 minutes per participant. The study adopted thematic analysis in light of Braun and Clarke's (2019) six-step procedure for data analysis. In this case, the coding and theme development followed the technological approach by using NVivo 15 software as suggested by Jackson and Bazeley (2019).

## Findings of the Study

The findings of the study have been described based on different aspects as under:

### *Teachers' Perceptions and Attitudes Towards ICT*

There was found positive attitudes among prospective teachers toward the integration of ICTs in the teaching-learning process. Their attitudes show that they embrace the use of technology in increasing content engagement and resulting in student achievement. Some of the participants were of the view that they have changed their perception towards technology in general from a positive teaching experience. They see ICT not only as an additional tool in teaching but as part of the educational process in the choice with which students and teachers can increase productivity in class activities- students' contributions. Teachers especially pointed out that skills that enable the use of technology in presented lessons make the planning process more interesting and engaging when followed by students. Participant 1 narrated the perspective in the following words:

*Using instructional communication technology, I can improve my teaching and now I know that technology adopted with the teaching and learning is useful for the teacher as well as the students.*

Participant 3 described her perspective in the following ways:

*I have noticed that when I use technology in my lessons, it grabs my students' attention and makes learning more exciting for them. It helps them stay engaged and understand the material better.*

### *Current Implementation Practices*

The study found varying levels of technology implementation across different school settings. Teachers are utilizing a range of digital tools and platforms, though the extent and sophistication of use vary significantly. Common practices include using multimedia presentations, educational software, and digital resources for lesson delivery. The analysis shows that teachers are making conscious efforts to integrate technology in ways that enhance their pedagogical practices, despite resource limitations.

Participant 2 provided her perspective in the following words:

*For interactive presentations, I can select digital tools that will effectively enhance my lessons. Frequently used technology helps students become more comfortable with digital tools.*

Participant 4 exclaimed the perspective in the following words:

*I use a laptop or mobile phone; I choose tools for ease of use. I use technology daily to reinforce concepts learned in class.*

### *Challenges and Implementation Barriers*

The analysis identified several significant barriers to effective ICT integration. These include infrastructure limitations, resource constraints, and technical challenges. A major recurring theme was the lack of reliable internet connectivity and insufficient access to computers and other digital devices. Teachers also reported struggling with time management when implementing technology-based lessons and dealing with technical difficulties that disrupt

classroom flow.

Participant 5 described this as under:

*One common challenge I encounter when incorporating technology into my teaching is ensuring that all students have access to the necessary devices or internet connection. It's important to consider the digital divide and make sure that no student is left behind due to a lack of technology resources.*

Participant 6 explained this perspective in the following words:

*Internet problem, if we have limited time so the use of technology saves time and completes the work in less time, lack of resources.*

***Professional Development and Support Needs***

The analysis highlighted a significant need for structured professional development and ongoing support. Teachers expressed a desire for training in both technical skills and pedagogical integration of technology. The findings indicate a gap between available support and teachers' needs for professional growth in technology integration. Participant 9 narrated it as under:

*Digital learning tools lesson plans, using educational software, making online classes, up to date with the latest technologies, and hands-on workshops.*

Participant 12 narrated her perspective as under:

*Training on integrating technology into lesson planning, using interactive tools to engage students, and troubleshooting common technical issues would help improve my use of technology in teaching.*

***Future Perspectives and Recommendations***

Teachers provided several recommendations for improving ICT integration in their schools. These focused on infrastructure development, professional development opportunities, and institutional support. The analysis reveals a clear vision among teachers for what effective technology integration could look like, along with practical suggestions for achieving these goals. Participant 2 described her perspective in the following way:

*Engaging sessions, enhancing infrastructures and professionals, soft integration sessions, offering support materials, and setting up time for planning.*

Participant 11 narrated her perspective in the following words:

*Internet, more devices, new tools training, give proper tech support, digital tools, and internet devices.*

It is explored that implementation of technology in learning environments requires a more integrated approach which not only encompasses the use of the technology but also how this integration is done. It also underscores the continued support and utilization of institutional resources to realize the effective adoption of ICT in Pakistani schools.

## Discussion

The study's findings regarding the positive teachers' attitude toward ICT are in line with Lawrence and Tar (2018) established that the perception of technology by the teachers has a

positive effect on the use of technology. The research results show that the perception–implementation link is more nuanced than portrayed in the literature. Teachers were found to possess a positive attitude toward technology integration in teaching-learning, but their implementation of ICT was limited due to prevailing systemic constraints. It is for this reason that the variation in implementation practices as observed in different school contexts corroborates disparities in ICT integration between urban and rural schools. This research finds that multimedia projectors and mobile devices are the most frequently utilized; however, advanced technology learning aids are not very often incorporated, especially in public schools. The study revealed that the observed implementation strategies are because of practical solutions in the face of scarce resource endowment rather than best practices. This study has confirmed that such barriers are mutually connected. For instance, the study shows how infrastructural challenges affect the availability of professional development. These interrelated barriers are similar to Rodriguez et al. (2023) concepts of the need to integrate ICT in a holistic approach. The analysis highlights how the availability of technical support, or lack, and time in particular works in a circular manner with implications for teaching practice and students' learning gains. However, our results suggest that teachers require more specialized training that addresses both technical skills and pedagogical integration strategies. This extends beyond basic ICT literacy to include advanced digital pedagogy and troubleshooting capabilities. However, this study highlights specific areas where current professional development programs fall short, particularly in addressing the practical challenges of technology integration in resource-limited settings.

## Conclusion

This research offers unique findings regarding the presented state of ICT uses in Pakistani schools as well as the interactions between the teachers' perceptions, implementation practices, challenges they have encountered, and future requirements. This study identifies both enablers and challenges in the process of utilizing technology that supports real classroom learning. The study shows that although teachers overall reported positive and acknowledged the benefits of ICT on teaching and learning, there are significant discrepancies between what they envision and what they can effectively practice. These gaps are most strongly explained by a lack of infrastructure, few professional development activities, and insufficient technical support, especially in public school settings and in rural settings. This present study has revealed that institutional support is an important factor in the process of integrating ICT in schools. The study finds out that just offering the technology support structures is not enough; there are additional ongoing support mechanisms such as professional development, help desk, and provision of support structures for maintenance. This finding gives policy makers and those who decide the distribution of resources critical information that will help shape the future of education. Teachers demonstrate concerns about understanding classroom context and practice in constructing localized strategies of technology integration accompanied by constraints in practice. This flexibility points to the fact that when equipped adequately teachers should be able to harness the potential of technology to improve teaching and learning. However, the research also reveals that such adaptation results in the implementation of other enhanced technical digital learning approaches that might bring about greater learning outcomes. Moreover, the research underscores the importance of a contextually relevant ICT integration approach to capture different needs and difficulties that concern a variety of school contextual places. This implies

that supportive policies and programs should be elastic namely while keeping rigidity on the type and implementation level of technologies across the education systems.

## Recommendations

The following were the recommendations of the study:

- Schools should ensure the proper establishment of organizational technological support with special reference made to adequate internet connectivity and access to authentic computers.
- The Ministry of Education should implement a comprehensive, structured professional development program for teachers, focusing on both technical skills and pedagogical integration of technology.
- Schools should establish dedicated technical support systems with qualified IT personnel to address immediate technical issues and provide ongoing assistance to teachers.
- Educational authorities should develop and implement differentiated ICT integration strategies that account for the specific needs and challenges of urban and rural schools.

## References


1. Ahmed, S., & Kazmi, H. H. (2020). Teacher educators' attitude towards the pedagogical use of ICTs: A study from Karachi, Pakistan. *Journal of Education and Educational Development*, *7*(2), 369-386.
2. Akram, H., Yingxiu, Y., Al-Adwan, A. S., & Alkhalifah, A. (2021). Technology integration in higher education during COVID-19: An assessment of online teaching competencies through technological pedagogical content knowledge model. *Frontiers in Psychology*, *12*, 736522.
3. Alam, A., & Khurshid, F. (2022). Teachers' knowledge of ICT and e-learning in Pakistan: The wave of e-learning during COVID-19. *International Research Journal of Education and Innovation*, *3*(1), 34-46.
4. Alenezi, M., Wardat, S., & Akour, M. (2023). The need of integrating digital education in higher education: Challenges and opportunities. *Sustainability*, *15*(6), 4782.
5. Almaiah, M. A., Alfaisal, R., Salloum, S. A., Al-Otaibi, S., Shishakly, R., Lutfi, A., Alrawad, M., Mulhem, A. A., Awad, A. B., & Al-Maroof, R. S. (2022). Integrating teachers' TPACK levels and students' learning motivation, technology innovativeness, and optimism in an IoT acceptance model. *Electronics*, *11*(19), 3197.
6. Backfisch, I., Lachner, A., Stürmer, K., & Scheiter, K. (2021). Variability of teachers' technology integration in the classroom: A matter of utility! *Computers & Education*, *166*, 104159.
7. Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, *11*(4), 589-597.
8. Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

9. Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275-285.
10. Ismail, S. A. M. M., Jogezai, N. A., & Baloch, F. A. (2020). Hindering and enabling factors towards ICT integration in schools: A developing country perspective. *Elementary Education Online*, *19*(3), 1537-1547.
11. Jackson, K., & Bazeley, P. (2019). Qualitative data analysis with NVivo.
12. Jamil, M., Ain, Q. u., & Chohan, I. R. (2024). Integration of core life skills in Physics textbook grade X: A qualitative content analysis. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(6), 119-131.
13. Jamil, M., Arif, F., & Shahzadi, U. (2024). Integration of core life skills in Pakistan Studies textbook grade IX. *International Journal of Social Science Archives*, *7*(2), 870-876.
14. Jamil, M., Aslam, M., & Ali, S. (2024). Single National Curriculum (SNC) for Social Studies (2020): Document analysis for development of critical thinking skills at the primary level. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(2), 67-74.
15. Jamil, M., Bokhari, T. B., & Iqbal, J. (2024). Incorporation of critical thinking skills development: A case of mathematics curriculum for grades I-XII. *Journal of Asian Development Studies*, *13*(1), 375-382.
16. Jamil, M., Mehmood, W., & Noorani, Z. (2024). An analysis of Physics textbook grade X for critical thinking skills development. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(4), 39-47.
17. Jamil, M., Muhammad, Y., Masood, S., & Habib, Z. (2020). Critical thinking: A qualitative content analysis of education policy and secondary school science curriculum documents. *Journal of Research and Reflections in Education*, *14*(2), 249-258.
18. Jamil, M., Muhammad, Y., & Qureshi, N. (2021). Critical thinking skills development: Secondary school science teachers' perceptions and practices. *Sir Syed Journal of Education & Social Research (SJESR)*, *4*(2), 21-30.
19. Jamil, S. (2021). From digital divide to digital inclusion: Challenges for wide-ranging digitalization in Pakistan. *Telecommunications Policy*, *45*(8), 102206.
20. Jogezai, N. A., Ismail, S., & Ahmed, F. (2016). ICT integration & the role of school leadership: perceptions of head teachers of secondary schools in Quetta Pakistan. *International Journal of Innovation and Scientific*, *27*(1), 155-163.
21. Lawrence, J. E. (2022). The strategic drivers influencing teachers' integration of ICT in teaching and learning environment. *The Educational Review, USA*, *6*(7), 300-311.
22. Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and integration of ICT in teaching/learning process. *Educational Media International*, *55*(1), 79-105.
23. Luo, H., Zuo, M., & Wang, J. (2022). Promise and reality: Using ICTs to bridge China's rural–urban divide in education. *Educational technology research and development*, *70*(3), 1125-1147.
24. Rodriguez, M., Pazmiño, M., López, O., Gómez, J., Mendoza, L., Arteaga, M., Martínez, A., & Iza, C. (2023). Impact of ICT in the tourism sector: Ecuadorian case. *International Journal of Membrane Science and Technology*, *10*(2), 1332-1349.

25. Sain, Z. H., & Lama, A. V. (2024). Bridging knowledge divides: Examining the dynamic landscape of ICT integration in Pakistan's education sector. *American Journal of Education and Learning*, *9*(1), 63-75.
26. Sajid, A. R., & Hassan, T. U. (2013). ICTs in Learning in Pakistan. *Journal of Research and Reflections in Education, 7*(1), 52-64.
27. Schenck, A. (2024). Examining relationships between technology and critical thinking: A study of South Korean EFL learners. *Education Sciences*, *14*(6), 652. https://doi.org/10.3390/educsci14060652.
28. Seifu, K. (2020). Determinants of information and communication technology integration in teaching-learning process at Aksum University. *Cogent Education*, *7*(1), 1824577.
29. Shah, N. H., Nazir, N., & Arshad, M. (2021). Integration of ICT in early childhood education: A comparative study of public and private school teachers of Pakistan. *Pakistan Journal of Educational Research, 4*(4) 553-566.
30. Shaikh, Z. A., & Khoja, S. A. (2013). Higher education in Pakistan: An ICT integration viewpoint. *International Journal of Computer Theory and Engineering*, *5*(3), 410.
31. Shair, W., Waheed, A., Kamran, M. M., & Kubra, N. (2022). Digital divide in Pakistan: Barriers to ICT usage among the individuals of Pakistan. *Journal of Economic Impact*, *4*(3), 196-204.
32. Siddiqui, S., Thomas, M., & Soomro, N. N. (2020). Technology integration in education: Source of intrinsic motivation, self-efficacy and performance. *Journal of E-learning and Knowledge Society*, *16*(1), 11-22.
33. Szymkowiak, A., Melović, B., Dabić, M., Jeganathan, K., & Kundi, G. S. (2021). Information technology and Gen Z: The role of teachers, the internet, and technology in the education of young people. *Technology in Society*, *65*, 101565.
34. Turnbull, D., Chugh, R., & Luck, J. (2021). Transitioning to E-Learning during the COVID-19 pandemic: How have higher education institutions responded to the challenge? *Education and Information Technologies*, *26*(5), 6401-6419.