Educators' Perspectives on Technology Integration in Classrooms through Teaching Platform: A Multi-level Qualitative Case Study

Sehrish Rehman
sehrishcancerean86@gmail.com
MPhil Scholar and Lecturer, BAMM PECHS Government College for Women, Karachi.

Dr. Huma Mustafa
Teaching Assistant, Faculty of Arts and Social Science, University of Karachi

Dr. Habib Ahmed Khan
Assistant Professor (Retired), Government College of Education Federal B Area Karachi.

Areesh Sultana
MPhil Scholar and Educationist, Sindh Education and Literacy Department
Corresponding Author: * Sehrish Rehman sehrishcancerean86@gmail.com

ABSTRACT

The views of public-school instructors in Karachi's primary, secondary, and higher education levels about the use of teaching platforms and technology integration are examined in this qualitative case study. Understanding how instructors view and adapt to educational technologies is essential for good policy and practice as digital learning tools developed in response to the COVID-19 outbreak. Purposive sampling was used selecting participants based on the lived experience. 9 teachers were selected from public sector 3 from primary and 3 from secondary and 3 from tertiary level. trustworthiness as checked through the credibility by member check and triangulation of data means data gathered from different level. Also focus on moral consideration to keep the information of participants confidential. Themes were found through thematic analysis by Braun and Clarke (2006). The analysis revealed three major themes: (1) unequal access to digital platforms and infrastructure discrepancies across educational levels; (2) the necessity for continuous professional development and digital literacy among educators; and (3) the perceived advantages and challenges of educational technologies. The results show that instructors are both enthusiastic and frustrated about digital integration, underscoring the ongoing digital divide in accessibility and readiness. The study ends with policy suggestions meant to promote a technology-driven, inclusive, and sustainable educational system in Pakistan.

Keywords: Incorporation of technology, instructional platforms, public schooling, qualitative case study, digital teaching techniques.

INTRODUCTION

Technology is now a major factor in the global transformation of educational systems in the twenty-first century. The COVID-19 epidemic has expedited the digitalization of teaching and learning processes, which has changed curriculum delivery, assessment techniques, and pedagogical approaches at all educational levels (Bozkurt & Sharma, 2020; Trust & Whalen, 2020). During this time, educational institutions were forced to implement online or hybrid learning technologies like Zoom, Microsoft Teams, and Google Classroom, frequently with little planning and inconsistent institutional support. (Bond et al., 2021). While digital learning offers opportunities for flexible, student-centered instruction, it also exposes structural inequities in access, preparedness, and teacher capacity.

These differences are especially noticeable in emerging nations like Pakistan. Digital literacy and access are still restricted in the public school sector, notwithstanding slow regulatory advancements. Only 19% of public schools have internet connection, and only 17% have computer labs, according to the Pakistan Education Statistics Report 2022 as cited in (Gitnux, 2023). Furthermore, just 25% of rural households and 53% of urban households have dependable internet connections, according to national connectivity indices (International Telecommunication Union, 2024). Individual pupils are also affected by the digital divide; only 45% of students say they have access to desktop or laptop computers at home (Centre for Aerospace & Security Studies CASS, 2024). This disparity is further exacerbated by geography and gender differences; female and rural pupils are still disproportionately underrepresented in digital learning environments (UNICEF, 2023).

Teacher readiness further complicates technology integration. An Asian Development Bank survey found that fewer than 30% of teachers at primary, secondary, and tertiary levels regularly used educational technology platforms, particularly in public institutions (Dawn, 2023). Although government initiatives such as the Digital Pakistan Policy (2018) and the Tele School program during the pandemic aimed to address these challenges, implementation has been inconsistent and often focused on short-term access rather than long-term capacity building (UNICEF, 2020; World Bank, 2021).

Despite this context, research in Pakistan has largely examined technology integration in isolation either at a single educational level (secondary or tertiary), or within private schools, or from students' perspectives (Malik & Zaman, 2020; Ullah, Bashir, & Shah, 2021). Limited attention has been given to how public-sector educators across multiple levels perceive and adapt to teaching platforms such as Google Classroom, Microsoft Teams, Zoom, or Learning Management Systems (LMS). Since teachers are the frontline implementers of technology policies, their experiences and perceptions provide essential insights for sustainable digital transformation (Ertmer & Ottenbreit-Leftwich, 2010; Koehler & Mishra, 2009).

The present study investigates educators' perspectives on technology integration in classrooms at the primary, secondary, and tertiary levels of Karachi's public education sector.

The research aims to:

- Discover teachers' perceptions and experiences with using digital learning systems.
- Research and analyse changes in technology adoption at the primary, secondary, and tertiary levels.
- Acknowledge the structural and academic obstacles faced by public school instructors.

LITERATURE REVIEW

Three complementary frameworks are frequently used in research on technology integration: organizational/implementation theories (which emphasize school-level support, leadership, and resources), constructivist learning theory (learning as active construction), and TPACK (Technological Pedagogical Content Knowledge) for teacher competence in integrating tech with pedagogy. Together, these frameworks clarify how teaching platforms and digital tools are employed in practice and what outcomes result from the attitudes and abilities of teachers as well as institutional support. (Fabian *et al* 2024)

Although instructors typically acknowledge the pedagogical potential of digital tools (engagement, customized instruction, access to resources), their actual classroom practices varied greatly, according to

numerous recent research and systematic reviews. Positive attitudes frequently coexist with frustration brought on by time constraints, technical difficulties, and inadequate training; this pattern was seen worldwide following the COVID-19 emergency move to online modalities. Research from a variety of settings (K–12 and higher education) presents a mixed picture: teachers are enthusiastic about blended and hybrid approaches, but their uptake and confidence levels are varied. (Akram et al 202

Integration of information and communication technologies (ICT) into teaching and learning is widely recognized as a transformative force in education. Rather than being confined to the provision of devices and internet connectivity, effective ICT integration requires teachers to adopt pedagogically purposeful approaches that enhance learning outcomes (Ertmer & Ottenbreit-Leftwich, 2010). This distinction between mere access and meaningful integration has been emphasized in global scholarship, as access alone does not guarantee improved pedagogy.

The Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009) is central in this discussion. TPACK highlights that successful integration depends on the dynamic interaction between teachers' content knowledge, pedagogical knowledge, and technological knowledge. Teachers must not only know their subject and pedagogy but also understand how technology can reshape the delivery of content in ways that promote engagement and deeper learning. Without this balance, technology risks being used as a substitute for traditional methods rather than as a transformative tool.

Laurillard (2013) adds another dimension by framing education as a design discipline, where technology allows for richer feedback, iterative learning cycles, and more flexible learning pathways. These frameworks emphasize that teachers' beliefs, readiness, and professional confidence shape whether ICT use leads to innovation or remains limited to replication of lecture-based teaching. Thus, at a theoretical level, the literature consistently positions teachers as the critical mediators of technology's potential in classrooms.

The COVID-19 pandemic acted as a catalyst for large-scale digital adoption in education, bringing both opportunities and challenges. Scholars distinguish between planned online learning, which involves careful design, and Emergency Remote Teaching (ERT), which was implemented globally during school closures (Bozkurt & Sharma, 2020). ERT was characterized by rapid improvisation and limited support, highlighting weaknesses in both teacher readiness and institutional preparedness.

Globally, platforms such as Google Classroom, Moodle, Microsoft Teams, and Zoom became essential for maintaining continuity. However, research shows that their use was often limited to administrative tasks and one-way content delivery, rather than interactive, constructivist teaching (Trust & Whalen, 2020). Teachers faced steep learning curves, often relying on self-directed exploration or peer support to adapt.

The pandemic thus illuminated the importance of professional development that prepares teachers not only for normal digital integration but also for unexpected disruptions. Flexible assessment methods, alternative assignments, and strategies for maintaining engagement under constrained conditions emerged as critical elements of resilient teaching practice. This experience emphasized that technology integration cannot be viewed only as a long-term modernization goal but also as a necessity for educational continuity in times of crisis.

In developing countries, technology integration is shaped by persistent resource and equity constraints. According to the World Bank (2021), Pakistan and other middle-income countries lag significantly in

broadband access, device ownership, and infrastructure reliability. For example, unreliable electricity supply and limited ICT budgets often undermine efforts at school-level digital adoption. Even where devices exist, large class sizes and weak internet connectivity hinder effective classroom use.

Teacher-related factors are equally important. Research shows that teachers' self-efficacy, willingness to innovate, and openness to pedagogical change often outweigh the presence of infrastructure in determining the success of ICT adoption (Ertmer & Ottenbreit-Leftwich, 2010). In low-resource contexts, studies consistently find that sustained, job-embedded professional development—such as peer mentoring, lesson co-planning, and collaborative content creation—is more effective than short-term workshops (Tondeur et al., 2017).

Another challenge lies in assessment. Low-resource systems often lack validated, low-bandwidth formative assessment tools. Academic integrity is also a concern, with teachers reporting difficulties in preventing plagiarism and ensuring fairness in remote tests. This has led to calls for context-specific tools and approaches that preserve integrity while being feasible in low-connectivity environments (Bozkurt & Sharma, 2020).

Pakistan has made notable attempts to institutionalize ICT in education through policy and reform initiatives. The Digital Pakistan Policy (2018) highlighted ICT as a cornerstone of socio-economic development, with education identified as a critical sector. It called for public-private partnerships, capacity building, and integration of digital content into the curriculum. However, actual implementation has been uneven and underfunded.

The Single National Curriculum (SNC), introduced in 2020, further emphasized digital resources as a tool for achieving standardized learning outcomes across provinces. In principle, the SNC acknowledges the role of ICT in reducing inequalities in access to quality content. However, scholars argue that without parallel investment in teacher training, connectivity, and monitoring systems, such policies risk remaining aspirational (Khan, Shahid, & Rizvi, 2023).

At the higher education level, the Higher Education Commission (HEC, 2020) spearheaded the rollout of Learning Management Systems (LMS) and digital libraries across universities. These measures enabled relatively smoother transitions to online learning during the pandemic. Nonetheless, research indicates that many faculty members lacked training in online pedagogy and assessment, reducing LMS use to lecture uploads rather than interactive or student-centered practices (Naseer, Zahid, & Ali, 2022).

During the pandemic, the federal government launched the TeleSchool program, while provinces introduced initiatives like Punjab's Taleem Ghar, offering televised lessons, digital content, and mobile applications (UNICEF, 2020; World Bank, 2021). While these extended basic access to millions of students, they were criticized for being non-interactive, lacking teacher-student feedback loops, and failing to maintain engagement over time.

Empirical research shows significant variation in how technology is integrated across Pakistan's education system. In public schools, particularly in underprivileged areas, shortages of devices, unstable electricity, and limited teacher training remain persistent barriers (Malik & Zaman, 2020). As a result, technology is often used for administrative tasks or basic content delivery rather than interactive learning.

In higher education, HEC-supported universities demonstrated greater infrastructure and adoption of LMS platforms during COVID-19. However, due to inadequate training, most faculty used these platforms

primarily for posting lecture notes, with limited use of discussion forums, collaborative assignments, or formative assessments (Naseer et al., 2022).

Teachers' perceptions of digital teaching vary. Some reported positive experiences, noting that online platforms facilitated faster assessments, expanded access to resources, and sometimes encouraged greater student participation than face-to-face classrooms (Ullah, Bashir, & Shah, 2021). Others described negative experiences, including increased workload, digital fatigue, reduced student engagement, and concerns about assessment integrity (Jamil, Khan, & Rashid, 2021).

Recent scholarship highlights Pakistan's emerging blended learning practices. Khan, Shahid, and Rizvi (2023) documented early experiments with flipped classrooms, modular online assignments, and hybrid delivery in Karachi and Lahore. These efforts show promise but also underline systemic challenges, such as teacher workload, curriculum alignment, and institutional incentives for innovation.

Equity remains a central challenge for ICT adoption in Pakistan. Access to digital tools is strongly influenced by family income, rural-urban divides, and parental education levels (Qureshi & Arif, 2022). Students from low-income households are less likely to have reliable internet connections or multiple devices, limiting their participation in online classes.

Gender adds another dimension to inequality. Female teachers and students face socio-cultural restrictions, reduced mobility, and fewer opportunities for professional development, limiting their digital participation (Ali & Batool, 2022). These challenges are compounded by domestic responsibilities, which disproportionately affect women. Without explicit policies to address these barriers, digital initiatives risk reinforcing existing inequities rather than mitigating them.

Research gaps and future directions

Despite a growing literature, several gaps remain:

1. Numerous studies portray "teachers" as a single, homogenous group, however research indicates that the factors that influence and limit technology use vary depending on the educational level (roles, expectations, curricular needs). Comparative, multi-level qualitative research that specifically contrast attitudes among primary, secondary, and university teachers are scarce (Shen *et al* 2024). It is suggested to create comparative multi-site qualitative case studies (or multi-case designs) using deliberate teacher sampling at every level. Map level-specific affordances and restrictions using semi-structured interviews, classroom observations, and policy document analysis. To determine convergent and divergent themes, use cross-case synthesis.

2. While recent syntheses demonstrate the importance of professional development, there is conflicting data regarding whether aspects of PD such as duration, coaching, and classroom-integrated follow-up lead to long-lasting changes in teacher practice and viewpoints (Amemasor 2025) It is suggested to conduct small-scale action research or quasi-experimental professional development interventions that compare different forms, such as one-time workshops, continuing coaching, and professional learning communities. Gather quantitative pre/post measures of self-efficacy, TPACK, and observed classroom activities as well as qualitative data on teachers' sense-making.

1. **Longitudinal evidence on learning outcomes.** Much of the pandemic literature examines access and immediate reactions; fewer studies provide robust longitudinal analyses linking technology use to learning gains, particularly in primary grades and in marginalized communities.
2. **Contextualized teacher development models.** Research comparing different PD models (workshop vs coaching vs peer-led) in Pakistan's provinces is limited; comparative trials could clarify cost-effective approaches.
3. **Assessment innovation in low-resource settings.** There is a need for validated, low-bandwidth formative assessment tools and integrity-preserving summative assessments suited to hybrid classrooms.
4. **Gendered impacts and mitigation strategies.** While gender constraints are documented, systematic evaluations of interventions that reduce female teachers' and learners' digital exclusion are lacking.
5. **Costed implementation pathways.** Policymakers require evidence on the unit costs of sustainable ICT integration devices, connectivity, PD, and content development to plan realistic scale-up.

Addressing these gaps will require mixed-methods research, partnerships between universities and education departments, and investments in data systems that track participation and outcomes.

RESEARCH METHODOLOGY

This study used a qualitative case study design to investigate the nuanced and context-dependent viewpoints of educators regarding technology integration in public-sector classrooms in Karachi. Because it enables a thorough comprehension of complex topics within their actual educational settings, the case study technique was deemed appropriate (Yin, 2018; Merriam & Tisdell, 2016). A comprehensive investigation of how educators view, use, and adjust to digital teaching platforms in various institutional contexts was made possible by this approach.

The study was guided by an **interpretivist paradigm**, which aligns with the aim of understanding participants' lived experiences and the meanings they ascribe to technology integration in their teaching practices (Creswell & Poth, 2018; Denzin & Lincoln, 2018). Interpretivism acknowledges that reality is socially constructed and that individuals interpret their experiences based on personal, cultural, and institutional contexts. This philosophical stance was crucial for exploring educators' subjective viewpoints and the contextual factors influencing their engagement with teaching technologies.

Nine (9) teachers from public schools in Karachi's Central and East districts made up the participants. Three (3) teachers from each of the primary, secondary, and postsecondary levels were included in the sample. Purposive sampling, a method frequently used in qualitative research to choose instances with a wealth of information and profound insights into the topic being studied, was applied in this study (Palinkas et al., 2015).

The investigation was conducted with careful adherence to ethical guidelines. The goal of the study and their ability to withdraw at any time were explained to the participants. In compliance with qualitative research ethics, participants' identities and institutional affiliations were anonymized to preserve confidentiality (Miles, Huberman, & Saldaña, 2014). In order to ensure that participants could offer well-informed observations on the potential and challenges associated with digital teaching platforms, teachers were chosen based on their prior experience integrating technology both during and after the COVID-19 epidemic.

To examine the complex and contextual perspectives of teachers on the inclusion of technology in public sector classrooms in Karachi, this study used a qualitative case study strategy. The case study approach was regarded as appropriate because it enables a complete analysis of complex problems in real-world settings (Yin, 2018). The study sought to understand how teachers view and interact with the use of technical tools in their classroom practices.

Scientific Structure and Fundamental Philosophical Views

Based on the interpretivist approach, which matches the goal of collecting participants' own interpretations and real experiences (Creswell & Poth, 2018), the study was This Model Honors the socially constructed nature of reality as well as the importance of context in shaping personal perceptions.

Participants and Sample

Among the participants were 9 teachers working in public schools, universities, and a Karachi Central and East district institution (3 from primary, secondary, and tertiary levels). With a focus on teachers that had prior experience with technology integration during and after the COVID-19 pandemic, purposive sampling was used to choose participants.

S#	Participants	Educational Level	Location	Sector
1	Female	Primary	Central	Public
2	Female	Primary	Central	Public
3	Female	Primary	Central	Public
4	Female	Secondary	East	Public
5	Female	Secondary	East	Public
6	Female	Secondary	East	Public
7	Female	Tertiary (College)	Central	Public
8	Female	Tertiary (College)	Central	Public
9	Male	Tertiary (University)	East	Public

Methods for Gathering Data

Semi-structured interviews were the main means of gathering data for this study. Depending on the participants' availability and preferences, these interviews might be conducted in person or over WhatsApp. Because they enable both consistency in asking and flexibility to thoroughly examine new ideas, semi-structured interviews are especially useful for qualitative research (Kvale & Brinkmann, 2009; Creswell & Poth, 2016). All participants gave their informed consent before to data collection, guaranteeing ethical compliance and voluntary participation. In order to assure accuracy throughout transcription and analysis, each interview was audio recorded with participants' consent and lasted roughly 35 to 40 minutes.

Open-ended questions centered on important topics like educators' opinions of technology integration, obstacles and enablers to its adoption, the efficacy of online platforms (like Zoom, Google Classroom, Microsoft Teams, and Learning Management Systems), and the accessibility of expert or technical support for educators were all part of the interview protocol. This method made it easier to comprehend participants' real-world experiences and the contextual difficulties associated with integrating digital technology in public schools (Patton, 2015).

Semi-structured interviews, either in person or via WhatsApp, based on availability and preference, were the primary method for collecting data. Participants' agreement was obtained before the 35–40 minutes interviews were recorded. Important issues like perspectives on technology, barriers and facilitators for its application, platform efficiency (e.g., Zoom, Google Classroom, LMS) and the expert assistance given.

DATA ANALYSIS

Using thematic analysis, data were transcribed and examined following Braun and Clarke's (2006) six-step method:

1. Getting acquainted with information
2. Making of first codes
3. Looking for patterns
4. Revising Ideas
5. Identifying and labelling topics
6. Making of the report

Hand coding produced patterns that were found to have major themes responding to the research questions.

Credibility and Trustworthiness

Member checking providing participants with transcribed data for confirmation was employed to boost credibility. Gathering data from teachers throughout many academic levels helped to achieve triangulation. Reliability and verifiability were guaranteed by constant documentation of the process and reflective journaling.

Moral Considerations

The host university gave the research ethical approval. All participants gave their informed agreement. Anonymizing data guaranteed confidentiality; participants were informed of their right to withdraw at any point.

RESULTS AND ANALYSIS

Three main themes that capture the viewpoints of nine educators from Karachi's public elementary, secondary, and tertiary institutions about the use of technology in the classroom were identified through a thematic analysis of semi-structured interviews. The following discussion of these subjects is accompanied by quotes from participants and pertinent literature.

Thematic analysis of conversations with nine Karachi-based educators from public primary, secondary, and higher education institutions revealed three main themes. which encapsulate their opinions on the integration of technology in the classroom.

Theme 1: Inequitable platform accessibility and infrastructural constraints

The unequal access to digital infrastructure and technology resources across educational levels was one of the most commonly mentioned issues among participants. While some universities had started putting in place structured learning management systems (LMS) like Google Classroom or Moodle, a number of

elementary and secondary schools were still having trouble meeting even the most basic needs, including dependable internet access and electricity.

"In our public school, even the power supply is unreliable; how can we regularly use Google Meet or any online tool?"

T-01 East District Secondary Teacher

"At the college level, we now use a Learning Management System; it was introduced following COVID—prior to that, WhatsApp and emails were the primary means of correspondence."

(T-05, College Lecturer, Central District)

These observations are consistent with Zheng et al. (2020), who noted that the digital divide in developing nations, especially in public-sector organizations, is made worse by differences in infrastructure and unequal access to digital resources. These differences make it more difficult for digital learning platforms to be adopted fairly, widening the divide between urban and rural or resource-rich and resource-poor educational environments (ITU, 2021; UNESCO, 2022).

Teachers' main worry expressed was the uneven availability of infrastructure and reliable digital systems inside government organizations. While some colleges and universities had adopted programs like Moodle, LMS, or Google Classroom, many primary and secondary schools were still struggling with basic internet access.

These results highlight the urgent need for infrastructural assistance, especially in underprivileged elementary schools, and match the digital divide in the governmental sector (Zheng et al., 2020).

Theme 2: Need for Career Development and Digital Literacy of Educators

Participants highlighted the vital necessity for continual professional development to improve instructors' technology proficiency and digital literacy across all educational levels. During the COVID-19 pandemic, the majority of teachers reported learning technology skills on their own, frequently without formal institutional support or training.

"Initially it was quite irritating, especially when it came to managing pupils; we were given access to Zoom overnight with no instruction."

(T-03, Central District Primary Teacher)

"Working, I felt myself growing experience; I still do not quite know how to use some Google Classroom capabilities."

(T-07, University Lecturer East District)

This is consistent with research showing that inadequate teacher readiness often impedes the use of technology (Ertmer & Ottenbreit-Leftwich, 2010; Koehler et al., 2014).

These results are consistent with research indicating that a key component of successful technology integration is teacher confidence and preparedness (Ertmer & Ottenbreit-Leftwich, 2010; Koehler, Mishra, & Cain, 2014). Effective digital education necessitates not just technological proficiency but also the integration of pedagogical and subject knowledge, as further demonstrated by the Technological Pedagogical subject Knowledge (TPACK) framework (Mishra & Koehler, 2006). Teachers may continue to be reluctant or inconsistent in implementing educational technologies in the absence of organized capacity-building activities (Bozkurt & Sharma, 2020).

Teachers at every level emphasized how continuous training is necessary to use technology appropriately. Many developed limited or self-acquired skills throughout the pandemic and found themselves overwhelmed with alien platforms.

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This is consistent with research showing that inadequate teacher readiness often impedes the use of technology (Ertmer & Ottenbreit-Leftwich, 2010; Koehler et al., 2014).

Theme 3: Noted Benefits and Disadvantages of Educational Platforms

Teachers emphasized the benefits of technology integration, like as flexibility, resource availability, and increased student participation, while also highlighting pedagogical and infrastructure limitations. Platforms like Zoom, Google types, and Google Classroom were seen as instruments that enhanced the effectiveness of assessments and enabled new types of communication.

"Google Forms let me assess students quickly; some of them actually participated more in online discussions than they did in the classroom."

(T-02, East District Secondary Teacher)

However, teachers expressed worries about decreased student focus, assessment integrity, and technological issues, especially at the primary level.

"Keeping the focus of younger students in an online environment is difficult; many just log in and go away."

(T-04, Central Primary Teacher)

These conflicting viewpoints are consistent with the findings of Al-Awidi and Aldhafeeri (2017), who pointed out that although technology-enhanced learning can foster autonomy and participation, it also presents new difficulties with regard to student motivation, classroom management, and evaluation integrity. The results, which represent the continuous process of digital adaption within Pakistan's public education system, thus show a conflict between excitement for innovation and annoyance over constraints.

Although teachers recognized obstacles, they also found advantages of platforms like adaptability, availability of several resources, and increased student-teacher communication.

"Google Forms let me assess students quickly; some of them actually participated more in online discussions than they did in the classroom."
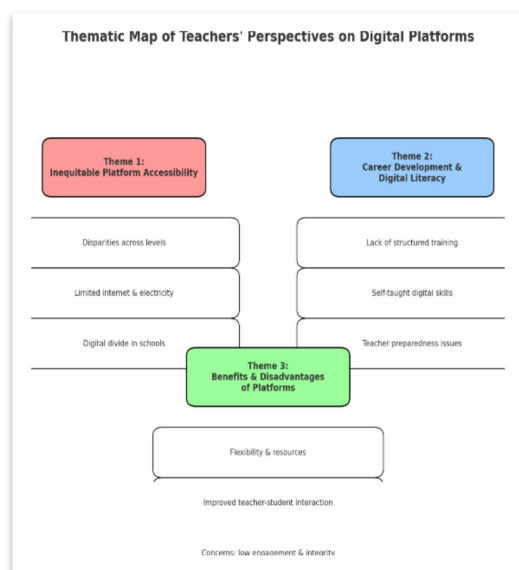
(T-02, East District Secondary Teacher)

There were worries regarding decreased student involvement, assessment integrity, and technological issues particularly at the primary level, nevertheless.

"Keeping the focus of younger students in an online environment is difficult; many just log in and go away."

(T-04, Central Primary Teacher)

These points of view represent conflicting opinions about the efficacy of digital platforms in teaching, particularly in developing countries (Al-Awidi & Aldhafeeri, 2017).

Thematic Map of Teachers' Perspectives on Digital Platforms

Cross-Level Perspectives: Elementary, Secondary, Postsecondary

Surprisingly, primary school instructors battled the most while higher education instructors showed more confidence using platforms. Frequently using informal channels (e.g., WhatsApp) during the transition, secondary teachers were in the middle.

This multi-dimensional experience highlights the need of tier and resource availability in policymaking and capacity-building initiatives. Hew and Brush (2007) claim institutional support critical for properly including technology

CONCLUSION AND SUGGESTIONS

This study investigated how instructors in Karachi's public elementary, secondary, and higher education sectors felt about using technology in the classroom. The results demonstrated the multifaceted character of technology adoption in educational settings with limited resources, based on data collected from nine teachers using a qualitative case study methodology.

The findings show that although educators generally recognize the pedagogical potential of educational technology such as better communication, increased access to resources, and flexible learning, a number of institutional and structural issues still stand in the way of its successful application. These include unequal institutional support, inadequate professional training, and inequities in infrastructure. These obstacles are consistent with previous research that highlights how teacher competency, school culture, and policy commitment all influence the success of technology integration in addition to device or internet connectivity (Ertmer & Ottenbreit-Leftwich, 2010; Tondeur et al., 2017;)

The opinions of instructors in Karachi from the primary, secondary, and higher education levels on the integration of technology in public sector classrooms were investigated in this study. Nine teachers' findings using a qualitative case study approach emphasized the many-faceted and complex elements of integrating digital teaching tools into resource-restricted classrooms.

The results show that while teachers recognize the promise of educational technology, their ability to successfully integrate it is hampered by infrastructural inequalities, lack of training, and different degrees of institutional support. Though the embrace of technology was stimulated by the pandemic, the change exposed major readiness gaps, especially in the primary and secondary school levels.

Public primary and secondary schools struggled with constraints brought on by limited digital access, whereas colleges showed increased integration of tools including LMS, Google Classroom, and Zoom. accessibility, inconsistent power supply, and poor ICT support. Educators at all levels of education expressed a clear desire for more coordinated and continuous professional development tailored to their teaching ability and technical know-how.

Ultimately, the success of including technology in public education depends not only on the availability of digital resources but also on an overarching framework involving policies. reform, ability development, inclusive digital infrastructure.

SUGGESTIONS AND FUTURE DIRECTION

- Equitable digital infrastructure in public schools should be given top priority by the government, guaranteeing dependable internet access, power supplies, and gadget availability. To reduce institutional and regional differences, long-term policy initiatives should be in line with UNESCO's ICT in Education Framework (21022) and Pakistan's Digital Pakistan Policy (2018).

- It is crucial to institutionalize ongoing, practical professional development programs in digital pedagogy. The integration of technology with online assessment techniques, active learning tactics, and classroom management tools should be the main focus of teacher training.

- Local settings, resource availability, and student demands should all be taken into consideration while integrating technology. Access gaps may be filled by hybrid models that combine high-tech and low-tech resources, especially in rural or resource-constrained schools.

- Initiatives for digital integration should be regularly evaluated to gauge platform efficacy, student outcomes, and teacher preparedness. Policymakers and educators can receive continuous input from mixed-method research.

- To investigate how educators' perspectives, develop over time, how institutional leadership facilitates digital transformation, and how students perceive these changes at various educational levels, future research could use longitudinal or comparative methodologies.

The results show that the following suggestions are put forward:

Level-Specific Professional Development Schemes

Develop ongoing professional development for teachers that varies by educational level, emphasizing teaching techniques customized to platforms and classroom dynamics management.

- Offer in-service, hands-on workshops tailored to Google Classroom, LMS, and Zoom as well as to other platforms.

Advanced Digital Infrastructure in Schools of Primary and Secondary Education

Government ought to support public schools by giving them dependable internet, gadgets, and energy.

- Promote public-private alliances to support digital resource centres in impoverished schools.

Build a Single Educational Platform for Public Sector Workers

- Provide a unified national digital education gateway for public institutions to ensure access to consistent materials and teacher resources.

Encourage integration of multilingual and culturally pertinent information for a variety of students.

Give teacher-centered projects top priority.

- Long-term professional development, coaching, and instructional design support should be paired with purchases; else, equipment will not be fully utilized.

Adopt several forms of Delivery Methods.

- While increasing interactivity where connectivity permits, employ low-bandwidth, asynchronous resources for reinforcement and broadcast media for coverage**.**

Specifically, Target Equity.

- Policies should include device access, connectivity subsidies, community learning centers, and gendered limitations to prevent worsening injustices.

Give capacity in Instructional Design Institutionalization.

- Whether in colleges or district education offices, instructional designers and pedagogical coaches are required to transform policy into successful digital curricula**.**

Observe and Assess Regularly.

- To help iterative policy, create data systems to track longitudinal access, teacher behavior, and student achievement.

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