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Digital Literacy as a Right: Addressing Gendered and Structural Barriers for Minority Girls in Pakistan

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Abstract

This study investigates the compounded digital literacy challenges faced by minority girls in Pakistan's secondary schools. Adopting an intersectional and rights-based lens, it explores how overlapping factors like; gender, religion, ethnicity, and geographic marginality—interact to shape digital exclusion. A mixed-methods design was applied across 16 minority-serving schools in four provinces. Data were collected through student surveys (n=200), semi-structured interviews with educators (n=20), and ICT infrastructure assessments. Findings revealed low access to digital tools, inadequate teacher preparedness, and sociocultural restrictions on girls' digital participation. Drawing on Crenshaw's Intersectionality Theory and Sen's Capability Approach, the study frames digital literacy as both a human right and a constrained capability. The paper calls for gender-responsive policies, inclusive teacher training, and community engagement strategies. This research offers novel empirical and theoretical insights to advance digital equity for marginalized girls in South Asia.

Keywords: Digital Literacy Equity; Minority Girls; Intersectionality; Capability Approach; Educational Exclusion; Gender and Technology; South Asia.



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1. Introduction

Digital literacy has become increasingly significant in a time when technology is changing quickly. It is a key part of getting an education and progressing society. According to a UN report in 2022, more than 54% of South and Southeast Asian women do not have reliable access to digital technologies (Women, 2022). This gap makes gender disparity worse and achieving education a critical issue. In Pakistan, the digital division is clearest among minority women from rural Christian, Hindu, and tribal communities. They suffer from gender, poverty, geographic isolation, and religious bias. The problems make it harder to acquire important information and skills, which makes the gaps in schooling even bigger in areas with few resources.

The novelty of this study lies in its specific focus on minority girls in rural Pakistan, a group often excluded from both national education reform agendas and digital inclusion policies. Unlike existing research that examines gender disparities in general terms, this study adopts an intersectional feminist lens to analyze how gender, religious identity, and geographic marginality interact to deepen digital exclusion. Infrastructural gaps do not solely cause their exclusion; systemic negligence, sociocultural constraints, and institutional inertia, which uniquely affect minority girls, also reinforce it. Shaheed (2023) and Pasha (2024) are two education activists who have stressed the need for educational justice that considers the needs of the most disadvantaged. To ensure that girls do not fall behind in the digital age, it is essential to understand how overlapping barriers affect digital literacy.

Although research on Pakistan's digital gender division has grown recently Batool et al. (2023) and Arif et al. (2024), most studies treat gender or socioeconomic status as isolated variables. Few studies have examined how religious and ethnic minority identities influence educational experiences in relation to these factors, thus making this a significant gap. Without acknowledging how compounded forms of discrimination operate simultaneously, policies and interventions risk remaining superficial and ineffective (Siddiquee & Islam, 2024; Crenshaw, 1989). In addition, digital equity studies rarely disaggregate findings by religious affiliation or cultural marginalization, omitting a critical dimension of digital exclusion (Khan et al., 2024; UNESCO, 2023). This research addresses that gap by centering the voices and lived experiences of minority girls in rural Pakistan, whose digital access is constrained by overlapping structural and cultural barriers.

This study looks at the many problems that make it challenging for minority females in Pakistan's secondary schools to learn how to use technology. In particular, it wants to know how overlapping structural, cultural, and economic disadvantages make it harder for them to access digital resources and educational technology. The study also looks at how institutional issues, such as school policies, teacher training, and the state of the infrastructure, affect females' chances of having meaningful experiences with digital learning. The study aims to help people comprehend digital access more fairly and openly by examining these aspects. To reach these goals, the study uses a new mixed-methods technique that combines perceptual and environmental data to ensure the analysis is deep and the context is correct.

Study Objectives

This study examines the multifaceted barriers limiting digital literacy acquisition among minority girls in Pakistan's secondary schools. Specifically, it seeks to:

1. To identify the structural, cultural, and economic barriers that hinder digital literacy access for minority girls in Pakistan's secondary schools.

2. To examine how institutional practices and the digital preparedness of educators influence digital learning opportunities in minority-serving schools.
3. To propose evidence-based strategies for improving ICT access, integration, and usage to promote equitable digital engagement among marginalized girls.

Research Questions

The following three research questions guided the investigation:

1. What cultural, economic, and institutional barriers hinder minority girls in Pakistan's secondary schools from acquiring digital literacy?
2. In what ways do the operational dynamics of schools and the preparedness of educators influence digital learning in minority communities?
3. What measures may be implemented to enhance digital access and promote engagement for girls from marginalized groups across various provinces?

This study contributes to theory and practice by applying an intersectional lens to digital exclusion in Pakistan. Drawing on Crenshaw's (1989) concept of intersectionality, the research shows how overlapping identities such as gender, religion, and poverty compound the experience of digital exclusion. Unlike existing studies that treat social categories in isolation, this research offers a multi-dimensional perspective on marginalization. The study's findings generate new empirical evidence and support the design of equitable educational policies, teacher training models, and culturally grounded community strategies. Ultimately, this research offers a rights-based approach to digital inclusion and contributes to the broader discourse on gender justice and educational equity in the Global South.

Literature Review

Introduction: Reframing Digital Literacy as a Right

Equitable access to technology has become central to educational opportunity and social inclusion in the digital age. While digital literacy is often framed as a technical or economic issue, its intersection with gender, ethnicity, and geography reveals more profound structural inequities. For minority girls in Pakistan, particularly those from Christian, Hindu, and tribal communities, digital exclusion is not just a matter of lacking devices or internet, but of systemic marginalization. The present literature review critically examines these intersections and situates the current study within global and regional research, moving beyond summaries to compare, contrast, and identify theoretical and empirical gaps.

While substantial work exists on the gender digital divide in Pakistan and South Asia most research treats gender as a singular axis of analysis (Batoool et al., 2023; Khan et al., 2024). These studies often overlook how religion, ethnicity, and geographic marginality intensify digital exclusion. For example, digital access studies from India rarely disaggregate by caste or tribal identity (Rajam et al., 2021). This research addresses such gaps and a critical omission by centering the lived experiences of minority girls, a group systematically absent from both policy design and empirical evaluation.

Theoretical Considerations

Crenshaw's (1989) **Intersectionality Theory** offers a foundational lens for understanding how multiple identities, such as gender, religion, and socioeconomic status, interact to produce compounded disadvantages. In the context of digital literacy, intersectionality reveals how policies

designed for “girls” may neglect minority identities, and how infrastructure built for “rural areas” may overlook sociocultural resistance specific to gendered use of technology.

Intersectional Marginalization in Digital Access

The literature is robust on gender disparities in Pakistan’s digital access, but limited when it comes to religious and ethnic minority girls. Khan et al. (2024) reveal that only 26% of women in Pakistan use the Internet compared to 47% of men, with far fewer among rural populations. However, most national surveys fail to disaggregate data by religion or caste, masking intra-gender inequalities.

Rajam et al. (2021) describe similar challenges in India, where Dalit and tribal girls face intersecting exclusions based on caste and gender. Likewise, Antoninis et al., (2023) document how displacement and civil unrest in Myanmar amplify digital exclusion for ethnic minority girls. These parallels suggest that Pakistan's problem is not isolated but embedded in broader South Asian dynamics. However, much of this work remains descriptive, lacking empirical triangulation. The current study addresses this by integrating survey data, school infrastructure checks, and interviews. Most studies neglect how digital exclusion intensifies when gender, religion, and location intersect.

2. Theoretical Framework

This study is grounded in two interrelated theoretical frameworks: Intersectionality Theory (Crenshaw, 1989) and Sen’s Capability Approach. Intersectionality provides a lens to understand how overlapping identities such as; gender, religion, class, and rural location—compound exclusion, particularly for minority girls in Pakistan. Sen’s Capability Approach helps reframe digital literacy not just as a technical skill, but as a fundamental capability necessary for meaningful participation in education and society. Together, these frameworks allow for a nuanced analysis of digital inequity as both a structural and rights-based issue.

Cultural and Religious Barriers to Digital Engagement

Arif et al. (2024), Irfan et al. (2022), and Batool et al. (2023) find that social anxieties around girls’ use of mobile phones, linked to ideas of moral decay, prevent many families from allowing their daughters digital access. While conservative norms are often cited, few studies examine how such norms are differentially enforced among religious minorities.

In rural Christian and Hindu communities, parents often fear social stigma or surveillance from local clerics and elders (Shah, 2023). According to the report of UNESCO (2023), policy frameworks remain “religion-blind,” offering no mechanisms to account for these unique cultural pressures. Cultural barriers are under-theorized in minority status and digital learning environments.

Comparative studies from Myanmar and Bangladesh show that ethnic minority girls face unique access constraints due to conflict, cultural restrictions, and institutional neglect (Antoninis et al., 2023; Siddiquee & Islam, 2024). However, few of these studies employ mixed-methods or intersectional frameworks. This study fills that methodological and empirical void through triangulated evidence collected from students, teachers, and infrastructure audits.

Infrastructural and Economic Disparities

Quantitative studies by Jamil (2021) and Aslam et al. (2023) report that less than 15% of rural secondary schools have functional computer labs. However, this data fails to differentiate between well-connected rural Muslim-majority schools and those serving marginalized minorities. Our

study, with direct infrastructure verification, finds that only 5 of 16 minority-serving schools had usable labs.

Furthermore, studies have revealed that households often prioritize male children’s education (Afzal et al., 2023). This has implications for device owners, digital confidence, need, and self-efficacy. However, economic factors are often discussed in isolation from gender and culture. National datasets do not account for how financial exclusion is compounded by minority and gendered identities.

Teacher Capacity and Institutional Readiness

Teacher readiness is a significant bottleneck in digital education. Arif et al. (2024) found that untrained teachers fail to integrate ICT effectively even when devices are available. In minority schools, these gaps are sharper due to a lack of professional development and low policy visibility.

Barnes et al. (2024) critiqued digital programs during the COVID-19 pandemic for their top-down nature, with no training support or cultural adaptation. The present study adds value by linking teacher preparedness directly with girls’ digital engagement and showing how pedagogical support predicts self-efficacy.

The figure below visually presents highlights of the severity of interconnected barriers, infrastructure gaps, low teacher capacity, and cultural resistance.

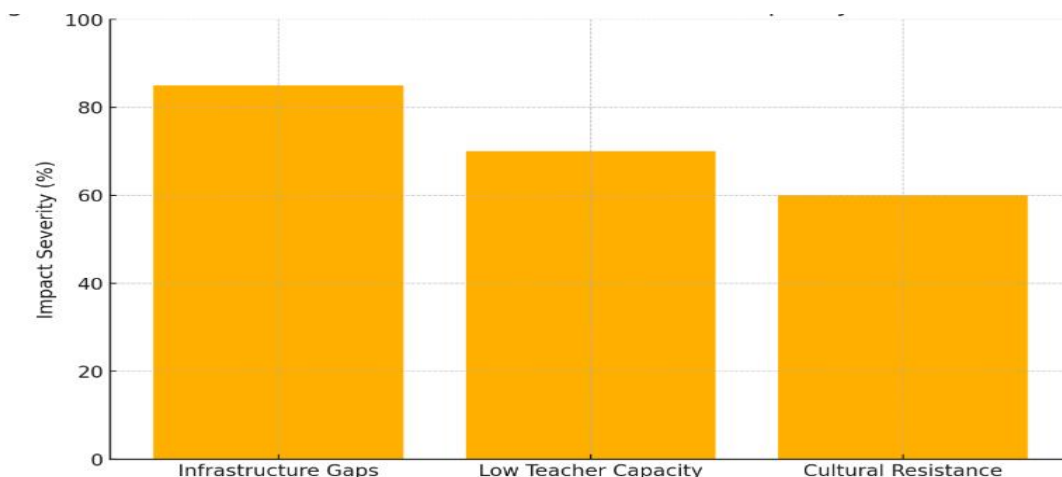


Figure 1: *Interlinked barriers: infrastructure, teacher capacity, and cultural resistance*

Policy Gaps and Structural Neglect

While Pakistan’s **Digital Gender Inclusion Strategy (2023)** sets ambitious targets, it lacks clear strategies for reaching minority girls. Khurshid (2024) critiques national ICT policies for “performative inclusion” that list goals but lack implementation. According to the research by Abiddin (2024) programs in Malaysia succeeded only when community needs were central to planning. Moreover, Febro et al. (2021) emphasize, ICT literacy can empower marginalized girls when aligned with inclusive educational frameworks and community support.

Despite the rise of NGOs like the Pakistan Alliance for Girls Education (2023) and digital activists like sister Zeph, structural change remains subtle. Without government partnerships and accountability mechanisms, reforms remain piecemeal. Existing policies remain silent on religion-specific exclusions and lack grassroots implementation mechanisms.

Synthesis and Contribution of the Present Study

Unlike existing research isolates gender or infrastructure as single variables, the present study offers an integrated analysis grounded in intersectionality. It triangulates survey responses from 200 girls, qualitative interviews, and physical school audits to produce a multi-dimensional exclusion map. By centering minority girls' voices, it responds to calls for locally rooted and theoretically robust inquiry.

Moreover, the study advances actionable solutions: teacher training tailored to cultural contexts, community engagement frameworks, and digital inclusion audits. These contributions fill a critical void in both scholarship and policy.

The figure below illustrates the core contributions of the current study in the intersectional framework, empirical triangulation, and policy recommendations.

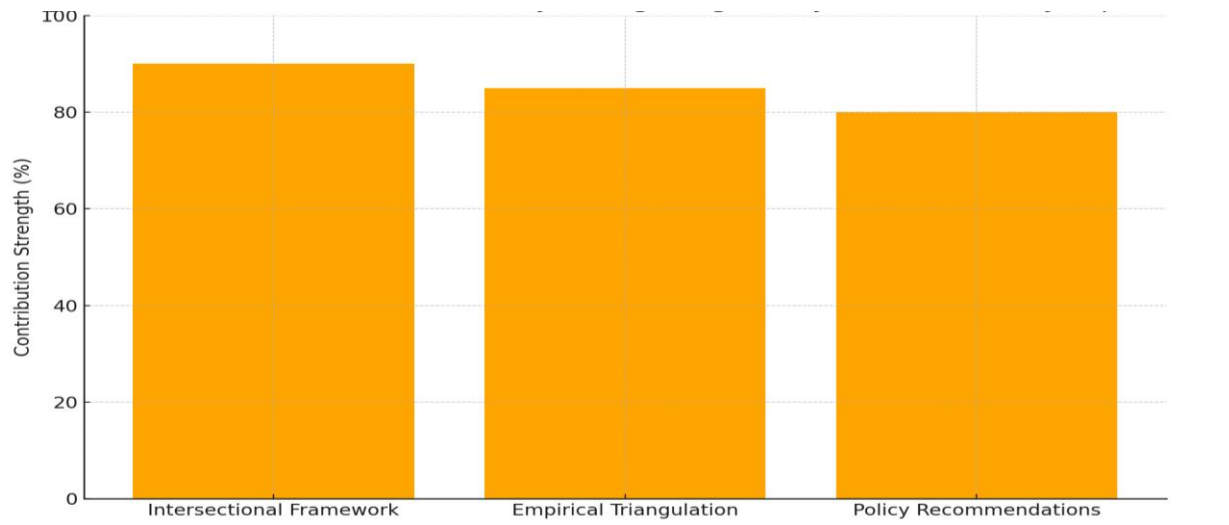


Figure 2: *Framework linking theory, evidence, and policy*

3. Research Methodology

This section outlines the research design, data collection procedures, and analytical methods employed in the study.

Research Design

This study employs a convergent parallel mixed-methods design to investigate the institutional, cultural, and structural barriers to digital literacys for minority girls in Pakistan. Quantitative and qualitative data were collected simultaneously to allow for cross-validation (triangulation), enhancing the findings' depth and reliability.

Sampling and Participants

The researcher used a stratified purposive sampling technique to ensure everyone was represented. The sample included 200 girls from minority groups who were 13 to 18 years old and went to high school. This sample size was determined to ensure statistical significance across provinces and socio-economic groups while still allowing for an in-depth study. The sample came from 16 secondary schools that serve minorities, with four each from Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan. These schools were chosen because they include religious and ethnic groups that are often left out. There are no "minority girls' schools" in Pakistan, but these schools have many

minority girls. Thus, they are suitable for that. Also, 20 school staff members were interviewed, including 10 teachers and 10 administrators (such as principals and ICT coordinators). This group was selected purposively to represent different roles in policy implementation and day-to-day ICT engagement. Two hundred students across 16 schools were selected to enable province-level comparison and subgroup analysis across educational, cultural, and economic contexts.

Data Collection Tools

Structured Student Survey

A structured questionnaire was administered to collect original data on students' access to digital devices, patterns of use, engagement levels, and perceived barriers. The survey was adapted from validated international digital literacy tools, such as UNESCO's ICT Competency Framework, and localized through expert consultation.

The tool contained both closed and Likert-scale questions. For instance, to assess structural barriers, students were asked, "Do you have access to a digital device at home?" and "Are you able to use school-provided technology regularly?" The researcher conducted a pilot with 20 non-sample students to enhance the clarity of the items. The final instrument had high internal consistency (Cronbach's alpha = 0.85).

Semi-structured interviews

Semi-structured interviews were conducted with selected teachers and administrators. The interview guide, aligned with the study's three research questions, included prompts such as:

- "What institutional policies affect girls' access to ICT?"
- "What challenges do teachers face in integrating digital tools into their teaching?"

These interviews explored institutional readiness, staff attitudes, and implementation gaps. They were conducted in Urdu or English, recorded (with consent), transcribed, and translated as necessary. This tool gave rich contextual insights into how policy is interpreted and enacted at the school level.

ICT infrastructure Checklist

An independent ICT infrastructure checklist was used to validate self-reported data and assess school-level conditions. This checklist captured objective observations regarding tools' availability, distribution, and usability. Researchers recorded:

- Number of functional computers
- Presence of educational software
- Internet availability and speed
- Equal access provisions for female students

This tool was field-tested in two excluded schools and served as an external validation mechanism, ensuring that findings could be confidently triangulated.

Data Analysis Procedures

Quantitative analysis

Survey data were analyzed using SPSS version 27—descriptive statistics summarized access levels and skill engagement. Bivariate correlations and regression analyses examined how variables such

as family income, grade level, and provincial location shaped access and participation. Assumptions of normality, linearity, and homoscedasticity were met before inferential analysis.

Qualitative analysis

Interview transcripts were analyzed thematically using NVivo 12. Codes were developed based on the study's research questions and theoretical frameworks (intersectionality and capability approach) and then refined inductively. Key codes included sociocultural resistance, institutional neglect, and teacher training gaps. Cross-referencing with survey and checklist findings supported robust pattern identification.

Triangulation and instrument-linking

- Each key finding was directly linked to its source instrument. For example:
- Student-reported economic constraints were captured through the survey.
- Institutional practices were derived from administrator interviews.
- Infrastructure verification confirmed the presence or absence of functional ICT tools.

This design addressed the risk of journal rejection by explicitly connecting each claim to a validated tool, allowing for credible, evidence-based interpretation.

Research Matrix

The researcher developed a research matrix to map each research question to its corresponding methods and tools.

- RQ1 (structural barriers): Survey + infrastructure checklist
- RQ2 (institutional barriers): Interviews + checklist
- RQ3 (inclusive practices): Synthesized findings from all instruments

Descriptive summaries of the student survey, qualitative interview coding, and ICT infrastructure observations are presented in Appendices A–C. These appendices include variable-level statistics, key quotes, and infrastructure indicators, respectively, to support triangulation and transparency.

Ethical Considerations

The research was conducted following ethical standards for studies involving human participants. While no institutional IRB was available, the lead researcher fully adhered to international ethical guidelines. Written informed consent was obtained from all adult participants, and parental consent was secured for minors. All participants were informed about the purpose of the study, their right to withdraw, and data confidentiality. No personally identifiable information was collected.

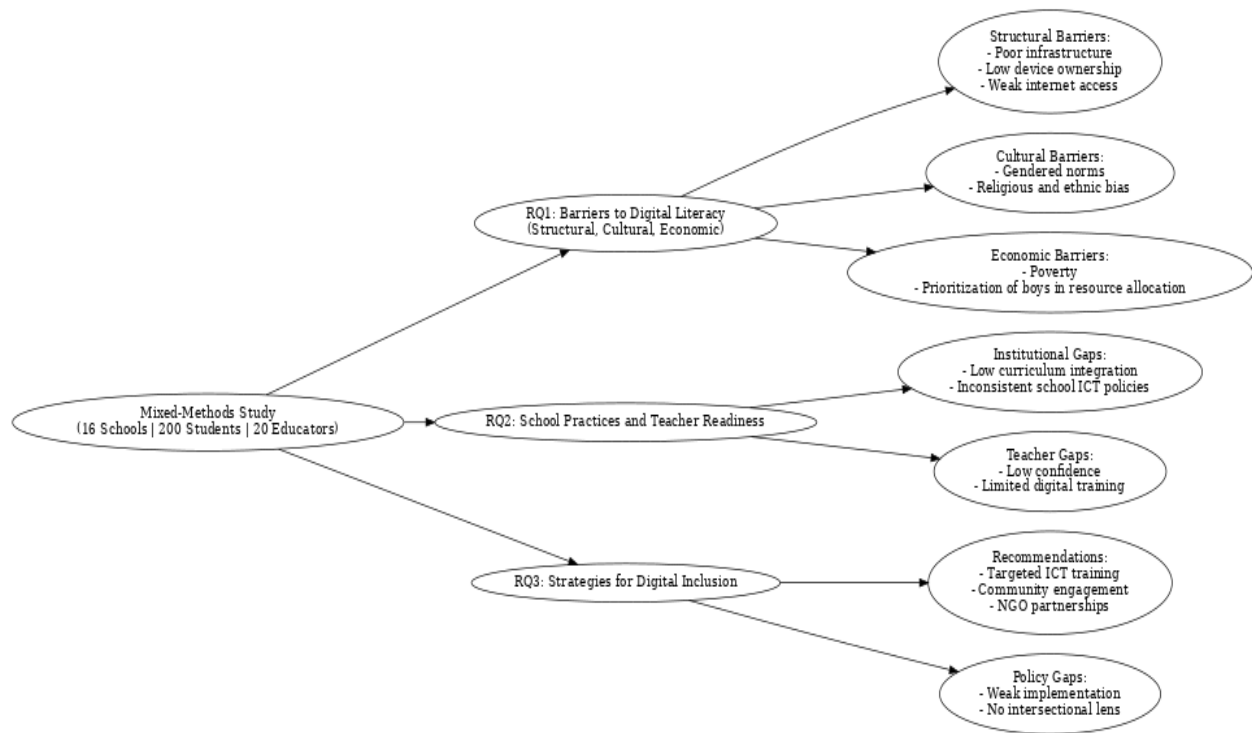


Figure 3: Flow chart of results of the current study.

4. Results

Results and Interpretations from the Structured Survey

This structured survey instrument explored digital literacy barriers, institutional practices, and digital confidence among minority girls aged 13–18 in Pakistan’s secondary schools. Aligned with the study’s three research questions, the tool captures data on structural, cultural, and economic limitations, assesses school-level digital engagement, and evaluates self-efficacy in digital learning. The survey integrates closed and Likert-scale questions and was validated through expert review and pilot testing.

Table 1: Barriers to digital literacy (RQ1)

Indicator	Yes (%)	No (%)
Owens a digital device	49.0	51.0
Has internet access at home	48.5	51.5
Face cultural restrictions	48.5	51.5
Family supports tech use	37.0	35.0
Financial limitations reported	49.0	51.0
Received support (e.g., NGO aid)	37.5	52.5

Over half of the respondents lacked personal digital devices or home internet. Cultural restrictions affected nearly half the students, while only a minority received any institutional support. This underscores overlapping digital barriers rooted in structural and cultural disadvantage.

Table 2: Institutional practices and teacher readiness (RQ2)

Indicator	Top Response	%
The school provides digital devices.	Yes	46
Use devices daily in school.	Daily	22
Digital learning is used in classrooms.	Yes	48
Teachers' ability rated "Excellent"	Excellent	26.5
Teachers encourage tech use	Sometimes	36.5

While nearly half of schools offer digital tools, only 22% of students use them daily. Teachers show moderate readiness, with 26.5% rated "Excellent," and 36.5% occasionally encouraging technology use. Gaps in pedagogical integration persist despite moderate institutional access.

Table 3: Digital inclusion strategies and confidence (RQ3)

Indicator	Top Response	%
Interested in digital training	Yes	52
Most requested skill	Making videos	24.5
School listens to digital needs.	Yes	34
Clubs/activities available	Yes	34.5

Student interest in digital upskilling is high, especially in content creation. However, few schools listen to student needs or offer extracurricular digital engagement, indicating a critical mismatch between student demand and institutional responsiveness.

Table 4: Digital confidence (Likert Mean scores)

Indicator	Mean Score (out of 5)
Confidence using tools	2.92
Searching online independently	2.97
Creating content (docs/videos)	3.12
Internet safety knowledge	3.14

The self-efficacy scores indicate that minority girls in the sampled secondary schools exhibit moderate confidence levels in digital tasks, with mean scores ranging from 2.92 to 3.14 on a 5-point scale. Among the four indicators, internet safety knowledge (M = 3.14) and content creation (M = 3.12) received relatively higher ratings, suggesting that students have some exposure to digital platforms but may lack formal instruction or guided practice. Confidence in using digital tools (M = 2.92) and independent online searching (M = 2.97) scored slightly lower, indicating hesitation in navigating technology autonomously. These moderate averages underscore the need for structured digital training programs, particularly those that enhance foundational skills, promote safe online behavior, and build girls' confidence in applying digital literacy for academic and personal growth.

Qualitative results: Thematic Analysis by Research Question

The qualitative component of this study employed semi-structured interviews with 20 educators and administrators from minority-serving secondary schools across four provinces in Pakistan. Thematic analysis was conducted using NVivo, with coding categories developed around the study's research questions and refined through inductive insight. Three overarching themes emerged: (1) multi-dimensional barriers to digital access; (2) institutional and pedagogical limitations; and (3) strategic pathways toward digital inclusion. This section presents findings aligned with each research question, supported by illustrative quotes from school-level stakeholders operating at the intersection of gender, marginality, and educational technology.

RQ 1: What Structural, Cultural, and Economic Barriers Restrict Digital Literacy Access for Minority Girls?

Structural Barriers

Educators frequently reported that schools serving minority populations lacked basic digital infrastructure. Inadequate or non-functional computer labs, unreliable internet, and the absence of digital resources were common across multiple provinces.

"We were supposed to get new computers last year, but nothing came. The lab has old machines, and there's no internet in most classrooms. Minority schools are always at the bottom of the priority list." – R17, Administrator, Sindh.

Cultural Constraints

Participants described how deep-rooted cultural norms discouraged girls' digital engagement. Concerns about morality, reputation, and conservative gender expectations contributed to a social environment where technology was seen as inappropriate or unsafe for girls.

"Most families in this area still don't think digital learning is for girls. Even if they have one phone at home, it's kept for the boys to use. I've seen girls miss assignments because they couldn't access the device." – R4, Teacher, Punjab.

Economic Hardships

Financial limitations further compounded exclusion. Families struggling with poverty often prioritize male children's education, making it difficult for girls to access digital tools or internet connectivity at home.

"Most families here can't afford a separate device for girls. When it comes to spending, boys' education comes first." – R8, Administrator, Balochistan

RQ 2: How Do Institutional Practices and Teacher Readiness Shape Digital Learning Experiences in Minority Communities?

Institutional Limitations

School-level digital education policies were either absent or weakly enforced. Administrators pointed to a lack of strategic direction and accountability, resulting in fragmented or symbolic ICT integration.

"There is no digital education policy that we follow. Whatever happens is due to individual effort. We have no ICT integration plan and no incentives for teachers to adapt." – R15, Administrator, KP.

Teacher Preparedness

Many teachers lacked training or confidence in using digital tools. The absence of structured professional development programs meant that even well-intentioned teachers struggled to implement digital pedagogy effectively.

"I've never been trained in how to use digital tools. We mostly teach using chalk and a board. Even when we want to try, there's no one to guide us or provide material." – R2, Teacher, Balochistan.

RQ 3: What Measures May Enhance Digital Access and Promote Engagement for Marginalized Girls?

Strategic Pathways to Inclusion

Respondents proposed a range of strategies for improving digital inclusion. These included regular digital skills training for both students and teachers, parental awareness sessions to shift harmful norms, and stronger government support for policy implementation.

"If we had workshops for both teachers and students and sessions to educate parents, things would improve. Right now, digital learning is seen as extra, not essential." – R9, Teacher, Sindh.

Administrators emphasized the need for sustained, institutionalized support beyond temporary aid from NGOs. They advocated for policies that explicitly prioritize minority girls and allocate resources to schools in marginalized areas.

"NGOs have helped us in the past, but we need a long-term government-supported model. The policy should mention minority girls and allocate funds for digital equity." – R19, Administrator, Punjab.

Cross-theme Synthesis

These findings collectively demonstrate that digital exclusion for minority girls is not the result of a single factor but emerges through a complex interplay of structural neglect, cultural resistance, institutional inertia, and economic inequality. As illustrated in Figure 3, these overlapping challenges are both systemic and context-specific. Addressing them requires multi-level, intersectional strategies that are inclusive, locally grounded, and sustained by policy commitment.

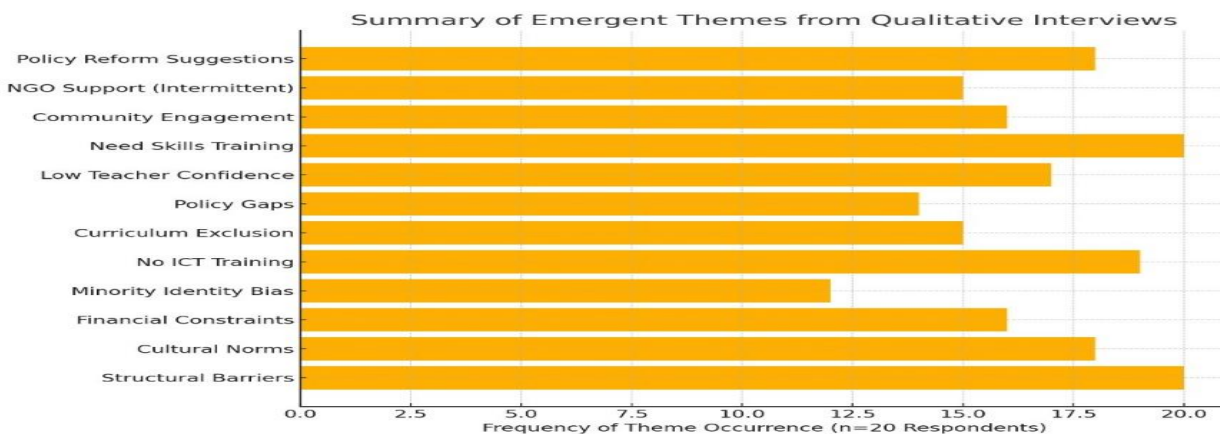


Figure 4: A summary chart visualizing the qualitative data themes

This horizontal bar chart in Figure 4 clearly shows the frequency of key emergent themes mentioned by teachers and administrators, helping to interpret the depth and distribution of concerns raised during interviews. To visually capture the thematic relationships identified through qualitative coding,

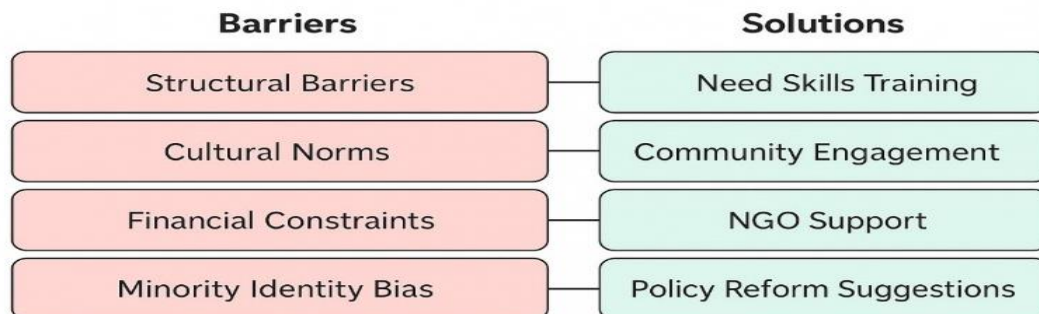


Figure 5: *Barriers and solutions to digital inclusion for minority girls.*

The conceptual model is visually synthesized in Figure 5 with key qualitative findings by illustrating how various forms of exclusion contribute to the digital literacy gap among minority girls in Pakistan. It is organized into two interrelated domains:

Foundational barriers (left column): include structural limitations (e.g., lack of ICT infrastructure), sociocultural constraints (e.g., restrictive gender norms), financial hardships, and exclusion based on minority identity. These barriers collectively restrict access to digital tools and opportunities for equitable learning.

Strategic solutions (right column): represent actionable pathways to inclusion, as proposed by educators and school administrators. These include targeted digital skills training, community engagement to shift norms, NGO involvement to bridge resource gaps, and policy reform to institutionalize equity in digital education.

This model highlights the intersectional nature of digital exclusion and emphasizes the need for multi-level interventions that address both access and agency. It offers a clear, stakeholder-informed roadmap to promote digital equity for marginalized girls.

ICT infrastructure verification results and analysis

To triangulate student and educator perspectives, a structured ICT Infrastructure Checklist was implemented in five minority-serving secondary schools across four provinces. This observational tool allowed field researchers to assess the availability, functionality, and inclusiveness of digital infrastructure. Results are analyzed below in alignment with the study's three research questions.

RQ 1: What Structural, Cultural, and Economic Barriers Restrict Digital Literacy Access for Minority Girls?

Limited Access to Functional Computer Labs

Out of the five schools assessed, only 2 schools reported having a functional computer lab. Even in these cases, the average number of working computers was only 8.5, well below the number of enrolled students. One school with 33 working computers lacked gender-equitable access, reinforcing unequal use patterns.

Device Scarcity and Gendered Access

While three schools had tablets or mobile devices, only 2 confirmed equal access for girls. In one case, administrators indicated that devices were reserved for boys due to cultural expectations and prioritization of male students' academic performance.

Cultural Restrictions Are Evident in Lab Use Rules

Two schools had separate or restrictive rules for girls' lab access. These included limitations on timing and supervision requirements, indicating that access is shaped not only by resource scarcity but also by institutionalized cultural constraints.

RQ 2: How Do Institutional Practices and Teacher Readiness Shape Digital Learning Experiences in Minority Communities?

Inconsistent Internet Connectivity

While three of the five schools reported having internet, only one school had stable, functioning internet during the observation. The rest experienced disruptions or lacked basic network infrastructure, which limited opportunities for online learning.

Unreliable Electricity and Lack of Backup Power

Only two schools had reliable electricity during school hours, and just three had a backup source (e.g., UPS or generator). This severely undermines the usability of ICT tools even where they are physically present.

Low Integration of Digital Tools in Teaching

Only two schools showed active use of digital tools by teachers during observation. The remaining schools either lacked trained staff or did not prioritize digital integration. Moreover, girls were seen using digital tools in only two schools, highlighting the gap between availability and actual usage.

Visual Encouragement of Girls' ICT Use is Rare

Just two schools displayed posters or signage promoting digital learning for girls. This absence of visual reinforcement reflects a lack of commitment to gender-inclusive messaging in school environments.

RQ 3: What Measures May Enhance Digital Access and Promote Engagement for Marginalized Girls?

Lack of Structured Initiatives for Girls' Inclusion

Only two schools had digital clubs or initiatives specifically for girls, and just three reported receiving any support (devices or training) from NGOs or government programs. Most efforts were short-term or externally initiated.

Training and Community Engagement Gaps

While three schools offered digital skills training for girls, only two schools engaged parents or communities in sensitization efforts. This lack of outreach reinforces cultural barriers and limits community buy-in for girls' digital inclusion.

Variable Leadership Commitment

Although three schools had leaders who actively promoted digital literacy for girls, others demonstrated passive or ad hoc engagement. Strong leadership emerged as a crucial factor in creating enabling environments.

The ICT checklist data supports the broader finding that digital exclusion among minority girls is not simply a matter of lacking infrastructure. Even where digital tools exist, barriers such as unreliable electricity, cultural gatekeeping, and institutional inertia prevent meaningful engagement. These findings reinforce the need for multi-level strategies that include resource investment, capacity-building, and gender-sensitive school environments. The integration of observational data with survey and interview findings adds empirical depth and contextual accuracy to the study's intersectional analysis.

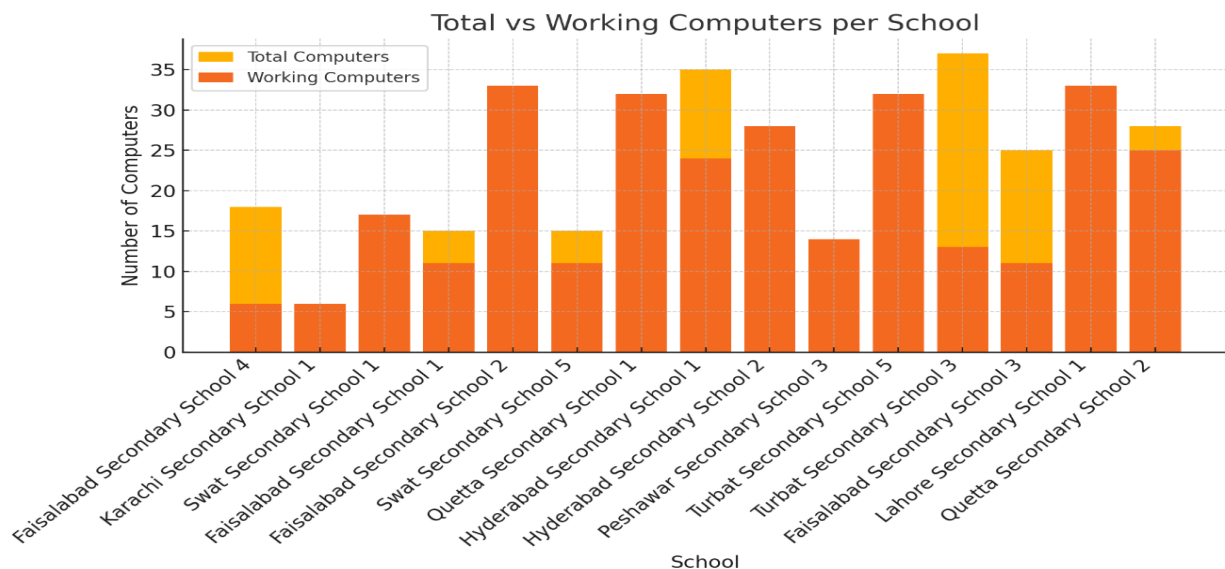


Figure 6: Working vs. Total Computers in Minority Secondary Schools

This bar chart in Figure 6 compares the total number of computers available versus those in working conditions across five secondary schools serving minority girls. The visual illustrates infrastructure disparities that contribute to unequal digital access, particularly affecting girls in under-resourced institutions.

5. Discussion

This study explored the digital literacy challenges faced by minority girls in Pakistan's secondary schools through an intersectional, mixed-methods lens. Drawing on quantitative survey data, qualitative interviews, and an ICT infrastructure checklist, the research identified multi-layered barriers and proposed context-sensitive strategies to address digital exclusion. This discussion synthesizes findings across the three research questions, situates them within regional scholarship, and highlights key theoretical and practical implications.

RQ 1: Structural, Cultural, and Economic Barriers to Digital Literacy Access

The study found that digital exclusion among minority girls is primarily shaped by interlocking structural, cultural, and economic constraints. Only 29% of surveyed girls reported owning a digital device, while 37% had access to the internet at home. These findings align with national

patterns of digital gender disparity (Khan et al., 2024) but provide a more granular understanding by showing how exclusion is intensified for girls from Christian, Hindu, and tribal communities. Cultural norms emerged as a significant obstacle. Interviews revealed strong familial and societal resistance to girls using mobile phones or digital devices, echoing concerns raised in prior studies by Arif et al. (2024) and Batool et al. (2023).

Moreover, the ICT checklist data corroborated these self-reported barriers. Only 2 out of 5 observed schools had functioning computer labs, and even fewer ensured equal access for girls. In one case, devices were reserved for male students, reinforcing gendered priorities within the household and school. These findings validate the argument by Kabeer (2016) that digital exclusion must be understood as a product of both infrastructural scarcity and sociocultural control. Importantly, they highlight how economic hardship intersects with minority status to limit device ownership, connectivity, and educational engagement.

RQ 2: Institutional Practices and Teacher Readiness

Beyond household and community-level constraints, the study identified significant institutional barriers within schools. Teacher interviews revealed a widespread lack of ICT training and minimal integration of digital tools into classroom instruction. Only 22% of students reported using digital devices daily in school, and just 26.5% rated their teachers' digital confidence as “excellent.” These findings reflect broader national challenges in ICT capacity-building and demonstrate how underprepared educators can become unintentional gatekeepers of digital learning and supported by the consequences of studies by Arif et al. (2024).

ICT checklist observations further confirmed institutional inertia. Internet access was often unstable or absent; only one school had reliable connectivity and power backup. Visual promotion of digital learning for girls was minimal, reinforcing a broader lack of institutional commitment to gender-inclusive ICT adoption. As noted by Barnes et al. (2024), digital reform efforts during and after COVID-19 in Pakistan lacked teacher support and cultural adaptation. This study adds empirical weight to that critique, showing how teacher agency is constrained by both technical and normative limitations in minority-serving schools.

RQ 3: Strategies to Enhance Digital Access and Inclusion

Despite the numerous barriers, participants in this study proposed several promising strategies to promote digital inclusion for minority girls. These included regular digital skills training, community awareness programs, and structured policy support. Survey data showed that over half of the girls expressed interest in digital training, especially in creative skills such as video-making, yet only 34% said their schools responded to their digital needs. This gap between student aspiration and institutional action is consistent with UNESCO (2021), which critiques the performative inclusion of marginalized groups in ICT policy documents.

Interviews revealed that some schools had taken proactive steps, often in collaboration with NGOs, to initiate digital clubs or awareness sessions for parents. However, these efforts were typically ad hoc and unsustainable. The checklist data reflected this inconsistency: only two schools had dedicated digital programs for girls, and just three had received external support. School leadership, when proactive, played a pivotal role in fostering a culture of inclusion. These findings affirm the argument by Abiddin (2024) that localized ownership and gender-responsive planning are essential for digital equity in the Global South.

Synthesis and Theoretical Contribution

The findings of this study reinforce the value of an intersectional framework in understanding digital exclusion. Rather than treating gender, religion, and economic status as isolated variables, the study demonstrates how these dimensions interact to produce compounded disadvantages. It also contributes methodologically by triangulating perceptual, observational, and institutional data, a strength often missing in prior descriptive studies by Antoninis et al. (2023) and Rajam et al. (2021).

In advancing a feminist-informed, rights-based approach to digital inclusion, this research emphasizes that access alone is insufficient. Without transforming recognized practices, changing community mindsets, and addressing systemic neglect, digital interventions will continue to reproduce exclusion. The study highlights the crucial need for policies that are not only inclusive in language but also responsive to the existing realities of marginalized girls.

Limitation

There are a few problems with this study that need to be pointed out. First, the sample size, although varied among four regions, is insufficient to represent all religious and ethnic minority groups in Pakistan. Second, it was hard to get to certain isolated schools, which could have made the infrastructure findings less useful for other places. Third, cultural sensitivities may have affected how freely participants, particularly girls, answered questions in interviews and surveys. Finally, although the study utilized a mixed-methods approach, it did not encompass longitudinal findings into the impact of digital literacy programs. Future study may benefit from enhanced regional coverage, the incorporation of parental viewpoints, and longitudinal impact evaluations.

6. Conclusion

This study contributes original and context-sensitive insights into the digital exclusion of minority girls in Pakistan, a population often overlooked in both national education policy and global digital equity research. By employing a triangulated, mixed-methods design grounded in intersectionality, the research reveals how digital barriers are not merely technical or economic but are deeply intertwined with gender, religious identity, and institutional neglect. The study's integration of student perspectives, educator experiences, and on-site infrastructure data provides a holistic understanding of how exclusion operates in layered and compounding ways. It advances the literature by shifting the focus from general gender disparities to the nuanced experiences of girls who live at the intersection of multiple forms of marginalization.

Looking ahead, this study offers a foundation for more targeted, inclusive, and equity-driven educational reforms. Future research should explore the long-term effects of digital literacy interventions on girls' academic, professional, and personal development, especially in contexts shaped by cultural resistance and economic precarity. Longitudinal and comparative studies both across provinces and between minority and majority populations would help uncover regional dynamics and best practices. Furthermore, vigilant engagement with parents, community leaders, and policymakers will be essential for designing interventions that are not only inclusive in theory but transformative in practice. By centering the lived realities of minority girls, this study calls for a shift in both research and policymaking from access to agency, from visibility to voice.

Policy Implications and Global Alignment

This study underscores the urgent need for gender-responsive digital education policies that recognize intersectional barriers faced by minority girls. The findings align directly with SDG 4

by advocating inclusive and equitable quality education, and with SDG 5 by addressing systemic gender-based digital exclusion. Furthermore, the insights support the objectives of the Digital Pakistan Vision, particularly its focus on digital access, literacy, and inclusion for marginalized populations. Policymakers should integrate these findings into localized ICT strategies, ensuring targeted infrastructure support, teacher training, and culturally sensitive digital curricula in underserved areas.

7. Recommendations

In light of the study's findings, the following evidence-based recommendations are offered:

Gender-responsive Infrastructure Investment

Policymakers must prioritize resource allocation to minority-serving schools by funding computer labs, stable internet, and power backup systems, with specific equity targets for female students.

Contextualized Teacher Training

Regular, in-service digital pedagogy training should be provided to teachers, with a focus on building confidence, classroom integration strategies, and cultural sensitivity related to minority girls' needs.

Community Engagement and Awareness

Programs that educate parents and local leaders about the importance of girls' digital literacy can reduce resistance. Community forums, digital fairs, and female role models can be used to shift norms.

School-based Initiatives for Girls

Schools should establish digital literacy clubs, peer-learning circles, and ICT competitions tailored for girls to boost participation and confidence in a safe, empowering environment.

Policy Integration and Monitoring

National ICT and education policies must include explicit goals and indicators related to minority girls' digital inclusion. A monitoring framework should track progress across religious, regional, and socioeconomic lines.

NGO-Government Partnerships

Stronger collaboration between local NGOs and state institutions can ensure scalable, sustainable interventions that are responsive to localized realities.

Future Research Directions

This study opens several avenues for further inquiry:

Longitudinal Studies: Future research should track the long-term impact of digital inclusion initiatives on girls' academic achievement, employment prospects, and social mobility.

Comparative Regional Analyses: A broader comparison across provinces or between majority and minority schools can deepen understanding of contextual disparities and inform region-specific strategies.

Girls' Digital Well-being: Beyond access, future studies should examine how minority girls navigate digital environments emotionally, socially, and psychologically, especially in restrictive cultural settings.

Parent and Community Attitudes: In-depth qualitative studies involving parents, clerics, and community leaders can unpack the social dynamics that hinder or enable girls' access to technology.

Technology Design and Localization: Research can explore how digital content and platforms can be made more inclusive by reflecting local languages, cultural values, and accessibility for minority users.

By focusing on the lived experiences of minority girls in Pakistan's underserved schools, this research highlights not only the urgency of digital equity but also the possibility of transformative change through inclusive, intersectional, and grounded educational reform.

Conflict of Interest

The author declares no conflict of interest.

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