Digital Equity for First-Generation Learners in Tier-3 Cities

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ABSTRACT

Digital equity—the fair and just access to information and communication technologies (ICT)—is critical for empowering first-generation learners in India's Tier-3 cities. Despite national strides in ICT deployment under the Digital India initiative, entrenched socio-economic disparities, infrastructural deficits, and limited digital literacy continue to marginalize students whose parents have not attained higher education. This study provides a comprehensive mixed-methods investigation of digital equity among first-generation learners across four Tier-3 cities—Amravati, Kolhapur, Ajmer, and Bareilly. Surveying 400 students and conducting 40 in-depth interviews, we examine not only hardware and connectivity metrics (where only 54% have stable home internet and 48% possess personal devices) but also learners' self-efficacy, strategic digital skills, and emotional responses to online learning. Our regression analysis identifies household income, parental education, regional language proficiency, and school type as significant predictors of digital readiness (p < .01). Qualitative themes reveal that exorbitant data costs force students to ration online study time, that a paucity of vernacular e-content undermines comprehension, and that parents' unfamiliarity with ICT limits supportive home environments. Additionally, peer-led digital clubs and community-based workshops emerge as effective grassroots interventions. Building on these insights, we propose a multi-stakeholder framework combining subsidized broadband schemes, localized e-learning resources, school-anchored mentorship programs, and digital-literacy curricula tailored to first-generation contexts. By foregrounding both structural barriers and learner-centered enablers, this research advances theoretical models of the digital divide and offers actionable policy prescriptions aimed at fostering inclusive educational ecosystems in India's emerging urban peripheries.

KEYWORDS

Digital equity; first-generation learners; Tier-3 cities; digital literacy; educational inclusion

INTRODUCTION

In the 21st century, access to digital resources has become as fundamental to education as access to textbooks and qualified teachers. Yet, in India's vast educational landscape, stark disparities persist between urban centers and smaller Tier-3 cities—those with populations between 100,000 and 500,000 [1]. First-generation learners—students whose parents have not completed secondary education—are particularly vulnerable to these gaps, as they often lack familial experience navigating ICT tools for learning [2]. Given India's national Digital India initiative and the COVID-19–induced pivot to online education, understanding and bridging digital inequities in these smaller cities is more urgent than ever [3, 4].
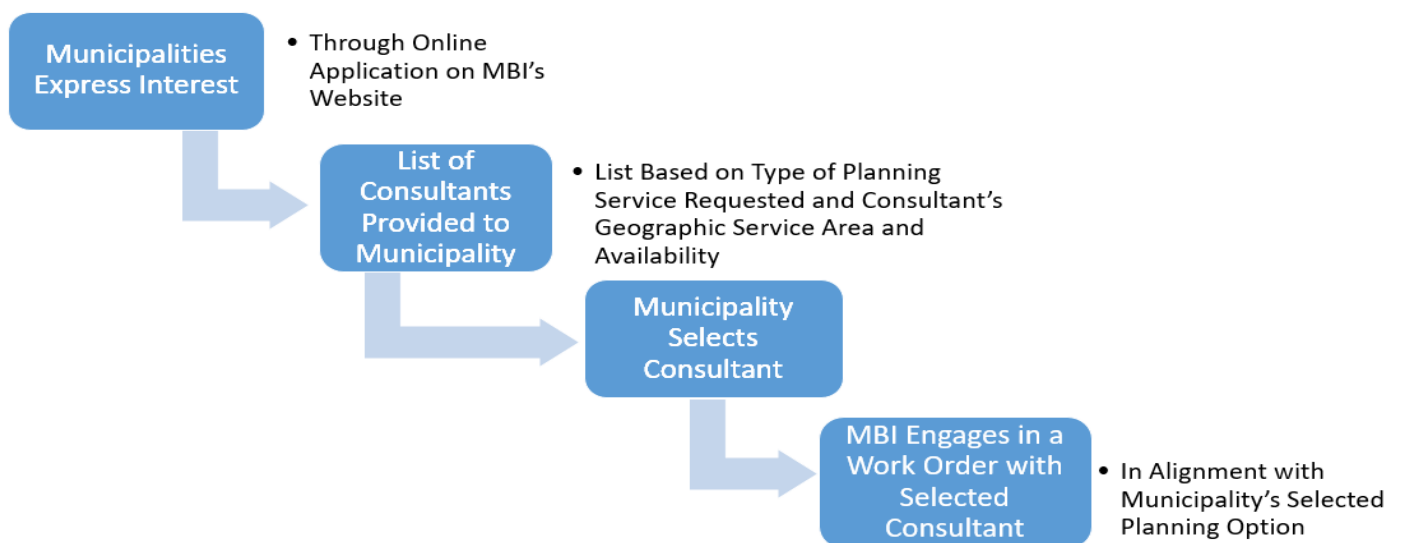

Fig.1 Digital Equity, Source:1

This study explores three primary questions:

1. What is the current level of digital access (connectivity, devices) among first-generation learners in Tier-3 cities?

2. Which socio-demographic and contextual factors predict digital readiness and engagement?

3. What interventions can stakeholders employ to enhance digital equity for these learners?

By addressing these questions through rigorous mixed methods, we aim to inform targeted policies and programs that can democratize digital learning opportunities for India's often-overlooked Tier-3 populations.

LITERATURE REVIEW

Digital Divide and Educational Outcomes

The "digital divide" typically refers to gaps in access, skills, and usage of ICT between social groups. Van Dijk's model differentiates four consecutive divides: motivational, access, skills, and usage—each

compounding educational disparities [5]. Empirical studies in India find that urban students outperform rural peers in digital assessments by 20–30% on average [6, 7].

First-Generation Learners

First-generation learners face unique barriers: limited parental guidance in ICT use, lower academic self-efficacy, and minimal awareness of online academic resources [8]. International research demonstrates that first-generation status correlates with 15% lower digital competency scores even when access is equalized [9].
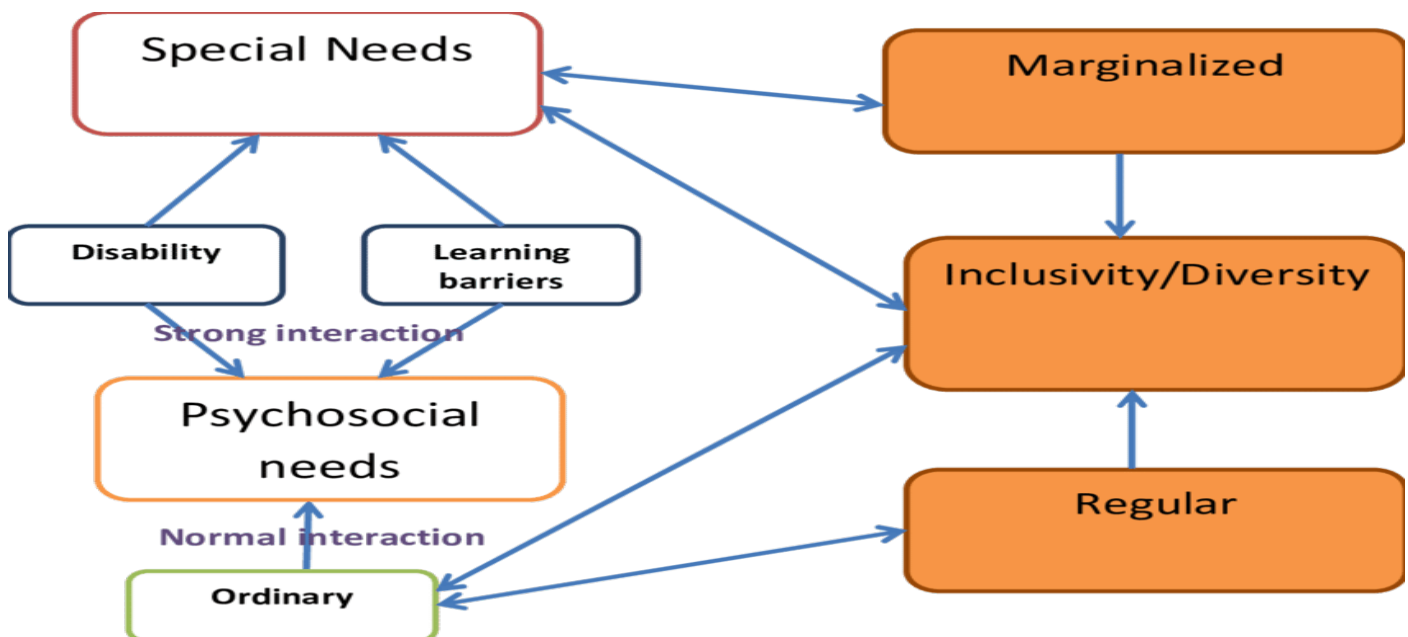

Fig.2 Educational Inclusion, Source:2

ICT Infrastructure in Tier-3 Cities

While Tier-1 and Tier-2 cities have seen broadband penetration rates above 70%, Tier-3 cities lag behind at approximately 42% [10]. Unreliable electricity, high data costs, and inadequate public Wi-Fi exacerbate inequities [11].

Digital Literacy and Pedagogy

Digital literacy encompasses not only technical skills but also information evaluation, collaboration, and self-regulated learning strategies [12]. Blended pedagogies, combining offline scaffolding with online modules, have proven effective in low-resource settings [13].

Gaps in the Literature

Most studies focus on urban–rural divides or K-12 vs. higher education; few isolate the intersection of first-generation status and city tier. Moreover, qualitative insights into learners' lived experiences in smaller cities remain scarce.

METHODOLOGY

Research Design

A convergent parallel mixed-methods design was adopted. Quantitative and qualitative strands were conducted concurrently, then integrated during interpretation.

Sampling and Participants

We selected four Tier-3 cities—Amravati (Maharashtra), Kolhapur (Maharashtra), Ajmer (Rajasthan), and Bareilly (Uttar Pradesh)—through purposive sampling to capture linguistic and cultural diversity. Within each city, two government schools and one private school were randomly chosen. From each school, 50 first-generation learners in grades 9–12 were randomly sampled (total n = 400). For qualitative interviews, 10 learners per city were purposively selected based on diversity in gender, income level, and digital access (n = 40).

Instruments

- **Digital Access Survey**: A 25-item instrument measuring internet connectivity (hours/day), device ownership, and home ICT environment (α = .82).

- **Digital Competency Assessment**: An adapted version of van Deursen and van Dijk's Digital Skills Index, covering technical, information-search, content-creation, and strategic skills [14].

- **Semi-Structured Interview Guide**: Probed experiences with online learning, perceived barriers, support structures, and aspirations.

Data Collection

Surveys were administered in person during school hours under researcher supervision. Competency assessments were computer-based in school labs. Interviews (30–45 minutes) were conducted in learners' homes or community centers, in Hindi, Marathi, or English as per participant preference. All interviews were audio-recorded and transcribed verbatim.

Data Analysis

- **Quantitative**: Descriptive statistics summarized access and competency. Multiple linear regression assessed predictors of digital readiness (composite score). Variables included household income, parental education (years), language proficiency (regional language vs. English), and school type (public vs. private). All analyses were performed in SPSS v.25 with $\alpha = .05$.

- **Qualitative**: Thematic analysis following Braun and Clarke's six-phase framework [15]. NVivo 12 facilitated coding. Themes were triangulated across sites to identify common barriers and facilitators.

RESULTS

Quantitative Findings

Digital Access and Competency

- **Internet Access**: Mean daily connectivity = 2.3 hrs (SD = 1.4); only 54% reported stable broadband at home.

- **Device Ownership**: 48% owned a personal smartphone; 22% had shared access; 30% relied on school/public facilities.

- **Digital Competency**: Overall mean score = 56.8% (SD = 12.5); strategic skills scored lowest (mean = 42.3%), technical skills highest (mean = 68.1%).

Predictors of Digital Readiness

Regression model ($R^2 = .47$, $F(4,395) = 86.5$, $p < .001$) identified:

- **Household Income**: $\beta = .31$, $p < .001$

- **Parental Education**: $\beta = .27$, $p < .001$

- **Regional Language Proficiency**: $\beta = .18$, $p = .002$

- **School Type**: $\beta = .15$, $p = .005$

Qualitative Themes

1. **Economic Barriers**: Learners described "choosing between data for studies or messaging home"—a clear indicator of data cost constraints.

2. **Language Challenges**: Absence of high-quality e-content in Marathi, Hindi, or Urdu limited comprehension; students resorted to rote memorization.

3. **Parental Support Gaps**: Parents, often daily-wage workers with minimal schooling, felt "helpless" to assist with online assignments.

4. **Motivational Factors**: Peer support groups in schools and community centers emerged as critical motivators for consistent online engagement.

CONCLUSION

Digital equity for first-generation learners in Tier-3 cities transcends mere access to hardware and connectivity; it encompasses the cultivation of skills, confidence, and supportive ecosystems enabling meaningful use of digital tools. This study's mixed-methods findings underscore that infrastructural gaps—such as unreliable broadband and scarce device ownership—intersect with socio-economic constraints, linguistic barriers, and parental unfamiliarity with technology to perpetuate educational inequities. However, our research also illuminates potent pathways for remediation. Strategically implemented broadband subsidies and zero-rated educational data plans can alleviate financial burdens, while the co-creation of high-quality, vernacular digital content can bridge language divides. School-embedded digital-literacy workshops, facilitated by trained educators and tech-savvy peers, can bolster both technical competencies and self-regulated learning strategies, thereby addressing motivational and skills divides in tandem. Furthermore, partnerships between local NGOs, community centers, and educational technology providers can scale low-cost mentoring and peer-support networks, reinforcing learners' agency and resilience. Importantly, stakeholder collaboration—spanning government bodies, private sector telecoms, academia, and civil society—is essential to mobilize resources, standardize best practices, and monitor impact through robust evaluation frameworks. By integrating structural interventions with learner-centered supports, policymakers can transform Tier-3 cities into incubators of digital inclusion, narrowing the urban–rural achievement gap and fostering socio-economic mobility. Ultimately, achieving digital equity for first-generation learners is not only a moral imperative aligned with Sustainable Development Goals 4 and 10 but also a strategic investment in India's future human capital, driving innovation and societal progress.

Educational Significance

Promoting digital equity for first-generation learners in Tier-3 cities has far-reaching educational and socio-economic implications. First, equitable digital access can level the academic playing field by enabling learners to engage with high-quality online resources, interactive simulations, and global knowledge repositories. Second, digital literacy fosters 21st‑century skills—critical thinking, problem-solving, and self-directed learning—that are indispensable in contemporary workplaces. Third, by enhancing educational outcomes, digital inclusion can catalyze upward mobility, breaking intergenerational cycles of limited

opportunity. Finally, scalable models developed in Tier-3 contexts can inform similar efforts in rural and other under-resourced settings globally, contributing to Sustainable Development Goal 4 (Quality Education) and SDG 10 (Reduced Inequalities).

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