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Women, Higher Education, and Digital Awareness: A Socio-Educational Review with Special Reference to Karimnagar District, Telangana

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Abstract

The spread of digital technology across the globe has reshaped how knowledge is accessed, but this shift has not benefited men and women equally, and the imbalance is especially visible in India's semi-urban and rural belts. This paper offers a conceptual, literature-grounded review of how women's growing presence in higher education relates to their digital awareness, treating Karimnagar district in Telangana as an illustrative regional case. Drawing on secondary evidence from the Census of India, district administrative records, the All India Survey on Higher Education (AISHE), the National Family Health Survey (NFHS-5), and peer-reviewed research on the gender digital divide, the paper brings together existing findings on the disparities women face at the level of access, skills, usage, and outcomes. It reads these disparities through Sen's Capability Approach together with the multi-level (access-skills-usage-outcomes) digital divide framework, and considers how social norms, shared-device arrangements, safety concerns, and thin provision of digital-skill training keep mediating the link between a woman's educational credentials and her actual digital participation. Karimnagar's regional profile - a district where female literacy and higher-education enrolment have climbed steadily even as a rural-urban and gender gap in digital access persists - is used to illustrate patterns already documented in the wider national literature. The paper closes with policy recommendations for building digital-skill components into women-centred higher-education initiatives, and flags the need for primary, field-based research to test these district-level patterns empirically.

Keywords: Women's education; digital divide; digital literacy; higher education; gender; Telangana; Karimnagar; ICT

1. Introduction

Digital infrastructure now sits at the centre of how societies reach information, education, jobs, and public services. India's own push in this direction has been driven by national schemes such as Digital India and the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA), and given further weight by the National Education Policy (NEP) 2020, which requires that information and communication technology (ICT) be woven into teaching, learning, and assessment at every level of education (Ministry of Education, Government of India, 2020). Alongside this digital push, India has also seen women's participation in higher education climb markedly. Telangana illustrates this well: the state's Gross Enrolment Ratio (GER) for women in higher education rose from 34.1 per cent in 2017–18 to 41.6 per cent in 2021–22, moving past the male GER and placing Telangana among the country's top ten states for female enrolment (Telangana Today, 2024).

Even so, a growing body of scholarship warns that higher enrolment figures do not automatically produce equal digital participation. According to NFHS-5 data, mobile phone ownership stood at 46.6 per cent among Indian women against 72.3 per cent among men, and only 24.6 per cent of rural women had ever gone online compared with 48.7 per cent of rural men (as cited in a rural digital-literacy training study; NCBI/PMC, 2024). Several studies further note that owning a device is not the same as using it freely: household restrictions, the need to share phones, safety worries, and low confidence continue to hold back women's practical use of digital tools for learning, civic participation, and earning a livelihood (Islam & Manchanda, 2023). It is this gap — between credentials earned and digital competence actually exercised — that this paper sets out to examine.

Karimnagar district in Telangana serves here as a regional lens onto this larger national issue. The district carries considerable historical weight in Indian education: it is the birthplace of G. Ram Reddy, credited as the founding figure of distance and open education in India (Wikipedia, 2026) — yet it still shows a measurable literacy gap between men and women, and by extension a gap in the digital-skill foundation that higher education today depends on. Rather than a fresh field survey, this paper works from publicly available secondary data: it reviews the conceptual and empirical scholarship on the gender digital divide, sets out Karimnagar's demographic and educational profile, and considers what this profile means for higher-education policy in similarly placed semi-urban districts across India.

2. Rationale and Significance of the Study

Most of the Indian and international scholarship on the gendered digital divide has focused on metropolitan or national samples — Delhi-NCR, Noida, Uttar Pradesh, and Bihar recur often (Islam & Manchanda, 2023; IJRASET, 2025) — while Tier-2 and Tier-3 districts in southern India have received comparatively little attention. Telangana is a distinctive case in point: policies such as residential degree colleges for women and the Kalyana Lakshmi scheme are widely credited with lifting female enrolment in higher education (Telangana Today, 2024), yet there is little district-level evidence in the public domain on whether these educational gains carry through into comparable gains in digital awareness.

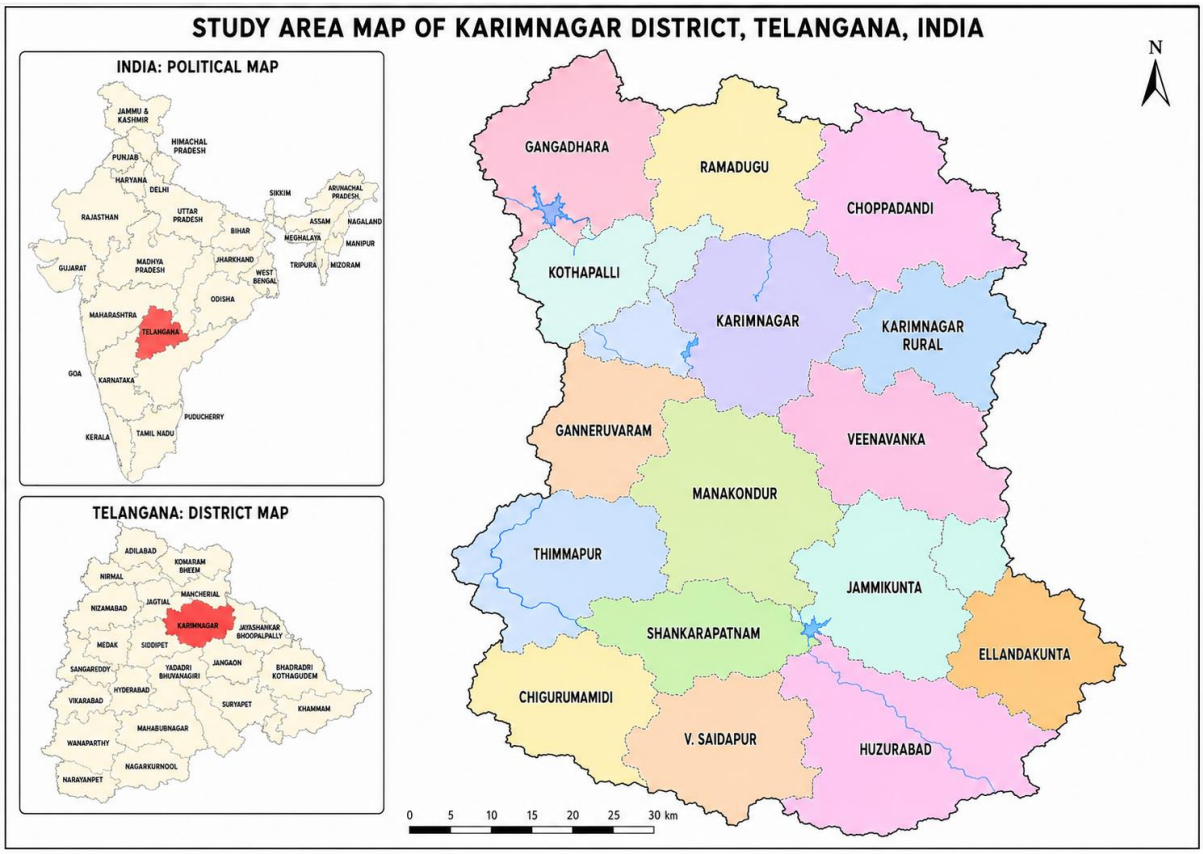

Fig: study area map of the karimnagar district

Karimnagar — a semi-urban, historically agrarian district where roughly three-quarters of the population is rural (74.8 per cent as per the 2011 Census; Census of India, 2011) and female literacy sits below the national average — offers a useful setting in which to probe this question, and to make the case for the primary research needed to test the patterns described here.

3. Objectives of the Study

The specific objectives of this review are to:

1. review the conceptual and empirical literature on the gender digital divide as it relates to women's higher education in India;
2. examine the socio-demographic and educational profile of women in Karimnagar district using secondary data sources;
3. identify the socio-cultural and infrastructural barriers that mediate the translation of formal educational attainment into functional digital awareness among women; and
4. propose policy and institutional recommendations for strengthening digital awareness within women-centred higher-education initiatives in districts such as Karimnagar.

3.1 Hypotheses of the Study

1. Women in Karimnagar district enter higher education with a weaker foundational-literacy and digital-skill base than their urban or male counterparts.

2. The gap between women's educational attainment and functional digital awareness in Karimnagar is driven mainly by socio-cultural barriers rather than by a lack of device or infrastructure access.

3. Embedding structured digital-literacy training within women-centred higher-education institutions will narrow this gap more effectively than expanding device access alone.

4. Research Methodology

The paper follows a descriptive-analytical, review-based design and draws entirely on secondary material: (a) Census of India 2011 figures and district administrative records for demographic and literacy statistics; (b) All India Survey on Higher Education (AISHE) reports and state government press releases for enrolment figures; (c) the National Family Health Survey (NFHS-5); and (d) peer-reviewed articles, systematic reviews, and policy documents on digital literacy, the gender digital divide, and women's higher education, sourced from academic databases and publisher platforms — including Springer, Emerald, and other indexed outlets — published between 2017 and 2026. No household or institutional survey was carried out for this study. The discussion of Karimnagar's situation is therefore indicative rather than statistically confirmed at district level, a limitation taken up explicitly, along with the case for future field research, in Section 9.

5. Literature Review

5.1 Conceptualising the Digital Divide

Scholarship on the digital divide has moved well past a simple 'access versus no access' framing toward multi-level models. The well-known OECD/Van Dijk framework identifies four cumulative levels — access, skills, usage, and outcomes — and argues that narrowing the divide requires attention to all four rather than access alone. A systematic review of the literature on women's digital inclusion finds that cost remains the chief obstacle at the access stage, while the shortage of digital literacy and skills is the tighter bottleneck once usage is considered (Emerald/Digital Transformation and Society, 2025). This distinction matters for understanding why rising female enrolment in higher education — in principle an access- and skills-building institution — does not, on its own, close gendered gaps in digital usage and outcomes.

5.2 Gender Dimensions of the Digital Divide in India

Empirical work repeatedly points to a measurable gender gap at every level of the digital divide in India. NFHS-5 figures show mobile ownership among women (46.6 per cent) well below that of men (72.3 per cent) nationally, with rural women's internet use (24.6 per cent) running at roughly half the rate recorded for rural men (48.7 per cent) (NCBI/PMC, 2024). A multi-state survey spanning Delhi, Uttar Pradesh, and Bihar found that just 18.3 per cent of women, against 26.9 per cent of men, had completed a formal digital literacy course, with the gap widening further among socially disadvantaged groups and in rural Bihar and Uttar Pradesh (Islam & Manchanda, 2023). The same study found women citing family restrictions and time pressure as barriers far more often than men, and reported that most women share their smartphones with other household members, which limits how freely and consistently they can use digital tools (Islam & Manchanda, 2023). A descriptive study of Noida — a well-connected urban area — found a similar pattern: women's smartphone ownership (70 per cent) came close to men's, yet their use of these devices for education (46 per cent) and e-governance (32 per cent) lagged well behind male usage rates (62 per cent and 55 per cent respectively), showing that an access-usage gap can persist even where infrastructure is not the limiting factor (IJRASET, 2025).

5.3 Women, ICT, and Higher Education

Researchers increasingly turn to Sen's Capability Approach and Feminist Technology Theory to explain why owning a device or holding a degree does not reliably translate into empowerment for women; both frameworks stress that individual agency, prevailing social norms, and institutional backing together decide whether a resource — a smartphone, an internet connection — is actually turned into a valued capability, such as being able to learn, communicate safely, or find work

(IJRASET, 2025). Evidence from targeted programmes bears this out: a quasi-experimental study of a structured digital-literacy training initiative in rural India found that basic ICT instruction measurably improved participants' skills and their subsequent educational and employment prospects, and a related evaluation covering more than 11,700 young unemployed women trained under national digital literacy schemes (NDLM/DISHA) reported comparable gains (NCBI/PMC, 2024). Taken together, these findings suggest that it is structured, education-linked digital-skill training — rather than device access by itself — that produces functional digital awareness among women.

5.4 Policy Landscape

India's main digital-inclusion instruments — Digital India and PMGDISHA — work to extend both connectivity and basic digital literacy, while NEP 2020 requires ICT-based teaching across school and higher education (Ministry of Education, Government of India, 2020). Within Telangana, the expansion of residential degree colleges for women — 62 such colleges have been set up under the state's social welfare, tribal welfare, and backward-classes welfare societies — together with the Kalyana Lakshmi scheme, is credited with pushing female higher-education GER above both the national average and the state's own male GER (Telangana Today, 2024). International development literature documents a similar pattern of targeted digital-literacy programmes for adolescent girls and young women — for instance those run by civil-society organisations in Jharkhand and Chhattisgarh — that pair device access with parental engagement and skill-building (Sattva/Reimagining Possibilities, 2024), reinforcing the point that policy works only when access, skills, and social acceptance are addressed together.

5.5 Research Gap

Despite this growing body of evidence, most India-focused empirical work on the gendered digital divide draws on northern or metropolitan settings (Delhi-NCR, Noida, Uttar Pradesh, Bihar) or reports only state- or national-level figures where Telangana is concerned. District-level evidence linking rising female higher-education enrolment to digital-skill outcomes remains thin for Telangana's Tier-2/3 districts, Karimnagar among them. This gap is the justification for the literature-based regional profile offered here, and motivates the follow-up recommendation, developed in Section 9, for a primary survey among women students enrolled in Karimnagar's degree colleges.

6. Conceptual Framework

This paper draws on two complementary frameworks to organise its analysis. The first is the multi-level digital-divide model (access-skills-usage-outcomes), used here to separate merely owning a device or connection from being able to convert that access into meaningful educational, civic, or economic results. The second is Sen's Capability Approach, used to bring into view the social and institutional 'conversion factors' — family norms, safety, available time, language, institutional training — that determine whether a woman's degree and nominal digital access actually become functional digital awareness. Taken together, these two lenses suggest that a district's female literacy rate or higher-education GER is, at best, a partial indicator of women's digital awareness; the conversion factors specific to a district's social and institutional setting need to be examined as well.

7. Regional Profile: Women, Education, and Digital Infrastructure in Karimnagar District

Karimnagar sits in the northern, Telugu-speaking part of Telangana. In October 2016 the erstwhile, larger Karimnagar district was reorganised, and three new districts — Jagtial, Peddapalli, and Rajanna Sircilla — were carved out of it (Wikipedia, 2026). Because of this reorganisation, secondary data from before and after 2016 are not always directly comparable, a methodological caution taken up further in Section 9. According to figures published by the present Karimnagar district administration (on a 2011 Census basis), the district's overall literacy rate is 69.16 per cent, made up of 77.94 per cent among males and 60.38 per cent among females — a gap of roughly 17.6 percentage points (Government of Telangana, Karimnagar District Portal, 2019). For the erstwhile, undivided Karimnagar district, the 2011 Census recorded an overall literacy rate of 64.15 per cent, with male literacy at 73.65 per cent and female literacy at 54.79 per cent; literacy was noticeably higher in urban areas (77.77 per cent overall, with female urban literacy at 70.25 per cent) than in rural areas (59.61 per cent overall, with female rural literacy at just 49.72 per cent) (Census of India, 2011). Karimnagar city itself recorded urban literacy of 85.82 per cent, the highest among Telangana's urban centres (Government of Telangana, Karimnagar District Portal, 2019).

Table 1 summarises the key demographic and literacy indicators for Karimnagar district as reported in official sources.

Indicator	Total	Male	Female
Literacy rate — present Karimnagar district (2011 Census basis)	69.16%	77.94%	60.38%
Literacy rate — erstwhile (undivided) Karimnagar district, 2011	64.15%	73.65%	54.79%
— of which, urban areas	77.77%	85.24%	70.25%
— of which, rural areas	59.61%	69.72%	49.72%
Rural population share of district	74.81%	—	—
Telangana state higher-education GER (2021–22)	40.0%	38.5%	41.6%

Sources: Census of India (2011)

These indicators point to a consistent pattern: a male-female literacy gap of 15-18 percentage points at district level; a considerably wider urban-rural gap within the female population alone (70.25 per cent urban against 49.72 per cent rural female literacy in the erstwhile district); and a large rural population base — close to three-quarters of the district — where female literacy, and with it the foundational base for digital literacy, is lowest. At the same time, Telangana's state-wide higher-education GER for women (41.6 per cent) has overtaken that for men (38.5 per cent), reflecting the impact of residential degree colleges and scholarship schemes (Telangana Today, 2024). District-level GER figures and digital-skill-course completion data specific to Karimnagar are not readily available in the public domain — itself a notable data gap, and further grounds for primary research in the district.

8. Analysis: Emergent Patterns and Barriers

This section analyses Karimnagar's regional profile, set out in Section 7, against the three hypotheses framed in Section 3.1, drawing on the literature reviewed in Section 5 and the multi-level digital-divide and Capability Approach frameworks set out in Section 6. As no primary survey was conducted for this paper, the analysis evaluates the plausibility of each hypothesis in light of available secondary evidence, rather than confirming or rejecting it in a statistical sense.

8.1 Educational and Digital-Skill Gap

The demographic evidence in Table 1 is consistent with H1. Karimnagar records a male-female literacy gap of roughly 15-18 percentage points, and a considerably wider urban-rural gap within the female population alone (a 20-percentage-point difference between urban and rural female literacy in the erstwhile district). Because roughly three-quarters of the district's population is rural, and rural female literacy is the lowest sub-group figure recorded (49.72 per cent), a meaningful share of the women now entering higher education under Telangana's expanding GER may be doing so from a comparatively weak foundational-literacy base. This pattern echoes the national finding that rural women's internet usage runs at about half the rate recorded for rural men (NCBI/PMC, 2024), lending indirect support to H1 even though Karimnagar-specific digital-skill data are not available to confirm it directly.

8.2 Socio-Cultural Barriers as the Binding Constraint

The wider literature offers stronger support for H2 than for a purely infrastructural explanation of the digital-awareness gap. Studies conducted in better-connected settings than Karimnagar — Noida, for instance — found that women's smartphone ownership approached parity with men's, yet usage for education and e-governance remained well below male rates (IJRASET, 2025), indicating that device access alone does not close the gap. Elsewhere, family restrictions, shared-device arrangements, safety concerns, and time pressure were reported by women considerably more often than by men as barriers to digital participation (Islam & Manchanda, 2023). Read through the Capability Approach lens set out in Section 6, these findings suggest that even where Karimnagar's higher-education institutions provide computer laboratories or internet connectivity, whether this access converts into sustained, purposeful use by women students depends heavily on socio-cultural conversion factors that enrolment or infrastructure statistics do not capture — evidence broadly consistent with H2.

8.3 Policy Responsiveness

Evidence on structured interventions is cautiously supportive of H3. A quasi-experimental digital-literacy training programme in rural India produced measurable gains in participants' skills and subsequent opportunities, and a related evaluation of over 11,700 women trained under national digital-literacy missions reported similar results (NCBI/PMC, 2024). These findings suggest that education-linked, structured training — rather than device access by itself — is what converts nominal digital access into functional digital awareness. Because no comparable intervention has yet been evaluated within Karimnagar's own degree colleges, H3 remains a plausible, literature-grounded proposition rather than a locally demonstrated one; the policy recommendations in Section 10 follow directly from it, and its confirmation is a central aim of the primary research proposed in Section 9.

9. Policy Implications and Recommendations

(i) Introduce a mandatory, credit-bearing digital-literacy module — covering safe internet use, e-governance portals, and academic/research tools — into undergraduate curricula at Karimnagar's degree colleges, in keeping with NEP 2020's ICT-integration mandate.

(ii) Bring PMGDISHA and Digital India outreach activities into direct alignment with higher-education institutions in the district, so that digital-literacy certification becomes part of, rather than separate from, women's degree-college experience.

(iii) Set up women-only or supervised-hours ICT laboratory access in colleges, addressing the safety and social-restriction barriers repeatedly documented in the literature (Islam & Manchanda, 2023).

(iv) Build Telugu-language digital content and peer-mentor/near-peer training models, drawing on evidence that structured, locally adapted training measurably improves rural women's digital skills and later opportunities (NCBI/PMC, 2024).

(v) Set up district-level, sex-disaggregated data collection on digital-skill outcomes — not device access or enrolment alone — so that these interventions can be tracked and evaluated over time.

10. Conclusion

Rising female enrolment in higher education, whether at Telangana state level or, prospectively, within Karimnagar district, marks a genuine and welcome achievement. Yet the literature reviewed here shows consistently that formal educational access alone does not close the gender gap in digital literacy, usage, or outcomes. Karimnagar's own demographic profile — a substantial male-female literacy gap, a marked urban-rural divide within the female population, and a predominantly rural population base — suggests that the district exemplifies this broader national pattern rather than departing from it. Closing the distance between women's growing presence in higher education and their functional digital awareness will require deliberate curricular, infrastructural, and social interventions, alongside the primary, field-based research that remains a necessary next step for evidence-based policy in Karimnagar and comparable districts.

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