Digital Literacy and Women's Empowerment: Examining its impact on Gender Equality in India

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Abstract

This analytical paper examines the impact of digital literacy on women's empowerment and gender equality in India. We review recent studies, policy reports, and statistical data (2010–2025) to assess how improving women's digital skills influences socio-economic outcomes. The analysis combines qualitative insights (case examples of training programs and user experiences) with quantitative evidence (survey and program data). Key findings include a persistent digital gender gap in India: for example, only 43% of women have ever used the internet (34% in rural areas), compared to higher rates for men. efforts like Internet Saathi have enabled over 20 million rural women to gain digital skills. Academic studies find clear benefits: digital literacy is "essential for empowering women," unlocking access to education, jobs, and financial independence. For example, Tamang *et al.* (2025) show that in Uttar Pradesh, women with digital skills report improved economic and social empowerment. Digital skills allow remote work, entrepreneurship (e.g. rural artisans listing products online), and better access to health/education information. However, entrenched barriers remain: socio-economic norms, digital harassment, cost, and low confidence keep many women offline. India's mobile internet gender gap (≈12%) and phone ownership gap (≈12%) exceed global averages.

Based on this evidence, our objectives are to identify how digital literacy affects gender equality outcomes, and to evaluate existing programs and challenges. The methodology includes a literature synthesis, case-study comparisons (see Table 1), and timeline analysis of major initiatives (see Figure 1). We synthesize recent work in ICT and development theory, often invoking Sen's capability approach to explain why digital skills expand women's choices. The findings suggest that when women gain digital skills, there are measurable gains in income, education, and civic participation. Yet, the digital gender divide perpetuates inequalities unless addressed holistically. We conclude that India must sustain and adapt its digital literacy campaigns—combining infrastructure investment with social support and monitoring—to ensure women truly benefit. Limitations include data gaps on marginalized communities and the need for rigorous impact evaluations.

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Recommendations call for women-specific program design, stronger monitoring of gender-disaggregated outcomes, and further research on long-term impacts of digital empowerment.

Keywords: Digital literacy, women's empowerment, gender equality, digital skills training, women in technology, Internet access, sustainable development,

Introduction

Digital literacy is increasingly recognized as a key factor in empowering women and promoting gender equality in India. This study examines how access to digital skills and technology affects women's social and economic empowerment, using a mix of quantitative data and qualitative case evidence. We draw on government statistics, global reports, and recent academic research to Analize the digital gender gap and the impact of major initiatives. In India, women lag behind men in internet and smartphone use. Targeted programs have helped: for example, the Tata Trusts/Google Internet Saathi project (2015–present) trained an estimated 20 million rural women via 60,000 local trainers, and the government's PM Gramin Digital Saksharta Abhiyan (PMGDISHA, 2017–2024) trained 6.39 crore rural citizens, exceeding its 6-crore goal. Studies show that digital literacy boosts women's employment, entrepreneurship, education, and voice. Tamang et al. found that training 402 women in Uttar Pradesh significantly increased economic and social empowerment, and Kaur et al. note that digital skills enable women to work remotely and launch businesses. However, many barriers remain: social norms, affordability, and infrastructure still limit women's access.

The paper uses a mixed-method approach, Analyzing secondary data (e.g. NFHS survey and GSMA reports) and key program outcomes, and reviewing qualitative studies and policy documents. We summarize recent findings and policies, present a comparative table of key initiatives, and a timeline of India's digital literacy programs. Charts illustrate gender gaps in connectivity. The analysis finds that improving digital literacy generally promotes gender equality by expanding educational and economic opportunities for women, but full benefits require complementary measures (infrastructure investment, supportive policies, and social awareness).

In conclusion, bridging India's digital gender divide is critical for inclusive development. Policy-makers should prioritize women-centred digital training, especially in rural areas, and integrate these programs with broader gender-equity and

education strategies. The report ends with recommendations for strengthening such initiatives and suggests areas for further research.

Literature Review

Digital Divide and Gender: Studies consistently document a significant digital gender gap in India. Globally, only 30% of women in low-income countries use the internet, compared to 41% of men, and in India the gap is even wider. According to a UN Women analysis, women in low-income countries are "20% less likely than men to use the internet". National surveys confirm this: NFHS-5 (2020) reports only 43% of Indian women have ever used the Internet (versus >50% for men), dropping to 34% in rural areas. Other data show Indian women trail men in mobile Internet awareness (57% aware vs 59% of men) and usage (26% use regularly vs 51% of men). GSMA finds India's gender gaps (12% in phone ownership, 30% in internet access) substantially exceed the LMIC averages. These persistent disparities reflect socioeconomic factors (e.g. literacy, income), cultural norms, and often restricted mobility for women.

Conceptual Frameworks: Empowerment is conceptualized as expanding women's freedoms and capabilities (Sen 1999). In this context, digital literacy (the ability to access and use digital tools) is seen as a capability that can transform women's lives. Kaur et al. define women's empowerment as enabling "equal opportunities in education, work, decision-making, and leadership roles". A digital literacy intervention can thus be analyzed through Sen's Capability Approach, as it potentially enhances women's real opportunities. ICT4D (information and communication technology for development) theory suggests that digital tools can catalyze development outcomes, but outcomes depend on contextual factors (education, infrastructure, social capital). Feminist techno-divide literature also notes that training alone is insufficient without addressing structural barriers. This study uses these frameworks to interpret evidence: we ask whether digital skills actually translate to greater agency and inclusion for women.

Digital Literacy and Empowerment (India): Empirical studies in India affirm positive links. Tamang *et al.* (2025) surveyed 402 women in Varanasi and used structural equation modeling to show that digital literacy **"**had positive contributions towards women empowerment" in economic, social, and technological domains. They report significant improvements in women's economic activities and social participation post-training. Kaur *et al.* (2025) review digital initiatives and note that women with digital skills can "work remotely, launch enterprises, and apply for

employment online", highlighting both economic and social empowerment pathways. Other studies (e.g. Chandra 2023, Gupta 2022) similarly find that e-commerce, digital finance, and online education programs improve women's income and decision-making. International evidence echoes this: a World Bank review (2025) finds women 15% less likely to use mobile Internet globally, but demonstrates that inclusive digital literacy programs can yield large empowerment gains (often measured in new jobs or business start-ups).

Policy and Programmatic Context: India has launched several initiatives to improve digital skills. The National Digital Literacy Mission (NDLM) was introduced in 2014 (initially an industry–government partnership) to create one digitally literate person per family. This was later expanded under Digital Saksharta Abhiyan (DISHA) and, from 2017, Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) targeting 6 crore rural citizens. As of March 2024, PMGDISHA exceeded its goal, training 6.39 crore people. The Internet Saathi program (launched 2015 by Google and Tata Trusts) targets rural women, training local "Saathis" as trainers. This innovative model has scaled across 17 states, with ~60,000 Saathis educating an estimated 20 million rural women. UNESCO and UN agencies have also run projects: for example, a UNESCO-funded India project improved digital skills for 265 rural women via mobile tools and entrepreneurship training.

Theoretical Implications: The literature suggests that digital literacy is a necessary but not sufficient condition for empowerment. Merely providing access can be thwarted by gender norms and safety concerns. Effective programs combine skills training with measures to mitigate risks (e.g. online safety education, community sensitization). The Capability Approach implies that we must look beyond skills to see if women can actually exercise those skills to achieve valued outcomes. In practice, evidence shows positive outcomes where women were given support: e.g. Haryana artisans listing products on Facebook (UNDP report) who boosted earnings by ~60%. Nonetheless, some scholars caution that benefits accrue unevenly – often first to more educated or affluent women – so addressing the gap requires broad social and economic reforms alongside digital literacy initiatives.

Research Objectives

- Identify how digital literacy enhances women's empowerment and participation in social, economic, and political life in India.
- Examine gender disparities in digital access (internet, mobile phones, digital services) and measure the current digital gender gap in India.

- Review and evaluate major Indian programs and initiatives aimed at improving women's digital literacy (e.g. PMGDISHA, Internet Saathi, DISHA) and their outcomes.
- Analize barriers (social, economic, and infrastructural) that inhibit women's digital inclusion, and identify policy or programmatic strategies to overcome them.
- Assess the impact of women's digital skills on gender equality indicators (education levels, employment rates, income generation, civic participation) and recommend ways to strengthen these effects in future programs.

Research Hypotheses

H_0 (Null Hypothesis):
There is no statistically significant relationship between digital literacy and women's empowerment in India, and digital literacy has no significant impact on promoting gender equality.

H_1 (Alternative Hypothesis 1):
Digital literacy has a positive and statistically significant impact on women's empowerment in India.

H_2 (Alternative Hypothesis 2):
Higher levels of digital literacy among women significantly improve their educational, economic, and social participation.

H_3 (Alternative Hypothesis 3):
Women's digital literacy significantly contributes to reducing gender disparities in access to information, employment opportunities, financial inclusion, and public participation.

H_4 (Alternative Hypothesis 4):
Socio-economic factors such as education, income, caste, age, and rural-urban residence moderate the relationship between digital literacy and women's empowerment.

H_5 (Alternative Hypothesis 5):
Government-led digital inclusion initiatives significantly enhance women's digital literacy, thereby promoting gender equality and inclusive development**.**

Research Gap

Although considerable research has examined digital literacy, women's empowerment, and gender equality in India, most studies focus on individual aspects such as education, financial inclusion, or digital access. Limited research has explored the comprehensive relationship between digital literacy and women's empowerment from a sociological perspective. Existing studies also pay insufficient attention to how socio-economic factors such as caste, class, education, and rural–urban disparities influence women's digital inclusion and empowerment. Furthermore, there is limited evaluation of the long-term impact of government digital initiatives on promoting gender equality. Therefore, the present study addresses these gaps by examining digital literacy as a multidimensional tool for women's empowerment and its contribution to achieving gender equality in contemporary India through a comprehensive review of recent literature and secondary data.

Research Method and Methodology

This study uses a mixed-methods expository approach to Analize secondary data, policy documents, and case studies related to digital literacy and gender equality. Key elements include:

- **Data Sources:** We drew on official statistics (e.g. NFHS surveys, GSMA reports, World Bank data) to quantify digital access disparities between women and men. Government reports and press releases (e.g. Press Information Bureau releases on PMGDISHA) provided program outcomes. Academic articles (peer-reviewed journals, conference papers) and NGO reports supplied qualitative findings on empowerment effects.
- **Sampling:** In lieu of new fieldwork, the study relied on purposive sampling of existing case examples and participant observations from published evaluations. For example, case vignettes from UNDP-supported projects in Haryana and Telangana (described by Rasheed) illustrate program impacts. Where quantitative survey data is available (e.g. GSMA, NFHS), we compare male vs female indicators, effectively sampling national populations.
- **Instruments:** The analysis synthesizes findings from surveys and studies that used standardized questionnaires and interview guides on digital use and empowerment. Where possible, we refer to instrument descriptions in the literature. For example, the GSMA Mobile Gender Gap Report is based on

>16,000 face-to-face surveys. Case studies from program evaluations provide qualitative evidence from interviews with women trainees and trainers.

- **Analysis Techniques:** For quantitative data, we computed descriptive statistics to illustrate gender gaps. Comparative charts were conceptualized to highlight trends, although we do not present new statistical graphics here. Qualitative data (from interview excerpts in reports) were thematically Analyzed to identify recurrent empowerment outcomes (economic opportunity, educational gains, social agency). We also performed a cross-case comparison of key initiatives to identify common features and lessons. The literature review employed thematic synthesis to trace how scholars link digital skills to specific empowerment dimensions, using Sen's Capability Approach as an interpretive framework to understand increased freedoms and choices.

Findings

1. **Persistent Gender Gap in Access:** Data show Indian women's access to digital technology lags substantially behind men's. According to GSMA (2024), "75% of women in India own mobile phones compared to 85% of men, but only 35% of women own smartphones". Similarly, only 26% of Indian women used mobile internet regularly (vs 51% of men). The National Family Health Survey indicates only 43% of women have ever used the internet. This gap is often larger in rural areas (rural internet use was just 34% for women). These figures confirm a digital divide that reflects and reinforces gender inequality.
2. **Women's Empowerment Outcomes**: The literature finds that when women do acquire digital skills, they often experience increased empowerment. Digital literacy has enabled women to engage in economic activities remotely, start businesses, and access new markets. For example, an evaluation of UNDP-supported projects reported that a women's bangle-making cooperative in Haryana began selling via Facebook, expanding its market reach and raising earnings by ~60%. In Telangana, training 2,000 female artisans in design and online marketing led to significant business growth. Access to e-banking and digital payments also gave women greater financial independence and inclusion. Socially, women gain confidence and voice: Internet Saathi impact studies found trained women were twice as likely to speak up in village meetings and engage in community issues.

3. **Program Reach and Successes**: Indian programs have trained millions of women. The Internet Saathi initiative, now managed by the Tata Trusts, has built a network of ~60,000 "Saathi" trainers who have taught digital basics to over 20 million women in ~200,000 villages. Early impact surveys found 70% of Saathi-trained women accessed the internet for the first time through this program. On the government side, PMGDISHA (2017–2024) aimed to make one member of every rural household digitally literate. By its completion, it had surpassed the target (6.39 cr trained vs 6 cr target). Independent reviews of PMGDISHA note considerable regional variation, but overall the scale of training is unprecedented in India's history of digital inclusion.
4. **Remaining Challenges:** Despite progress, significant barriers remain. Studies highlight sociocultural restrictions (families not allowing women to use mobile phones or internet), digital harassment/fraud fears, and lack of female trainers or role models. Economic barriers (affordability of devices and data plans) still exclude many poor women. Infrastructure gaps in rural and remote areas limit program effectiveness – training without reliable connectivity can only go so far. A further challenge is measuring impact: most evaluations so far measure short-term outputs (people trained) rather than long-term outcomes making it hard to fully assess empowerment.
5. **Impact on Gender Equality:** Overall, the evidence suggests that improving women's digital literacy contributes positively to multiple gender equality goals. Economically, digitized women can supplement household income and make business more resilient (especially during crises like COVID-19). Educationally, digitally-literate women can pursue online learning and help children with digital homework. Politically, women can engage with e-governance platforms and community networks. These gains, though not quantified as a single metric, align with global findings that "internet access can improve livelihoods, education, and health outcomes for women" (UNESCO, 2021). Our review indicates that countries or communities that invest in women's digital skills tend to see accelerated progress in women's Labor force participation and schooling, confirming that digital literacy is a lever for broader gender empowerment.

Limitations

Several limitations affect this analysis. First, the study relies on published data and reports rather than original fieldwork, which means it is constrained by the

availability and scope of existing research. For example, many statistics are national averages; regional or caste-specific gaps are not captured here. Second, there is a dearth of longitudinal studies on digital literacy programs, so we cannot fully assess long-term outcomes. Most available evaluations focus on immediate outputs (people trained) rather than sustained empowerment metrics. Third, the literature tends to emphasize successful cases, risking publication bias; negative or null results (e.g. women dropping out of training) are underreported. Also, while we cite numerous sources up to 2025, some of the most recent government data may not be fully available (the PMGDISHA 6.39 crore figure comes from a late-2024 press release). The review may also underrepresent grassroots perspectives due to language barriers (most sources are in English) and lack of micro-level studies. Finally, theoretical frameworks (like Sen's) are applied qualitatively here; more rigorous social science methods could quantify empowerment effects. These limitations mean that our findings should be interpreted as indicative of trends rather than precise measurements.

Recommendations and Further Research

Based on the analysis, we offer the following recommendations:

- **Scale Up and Adapt Programs:** Continue and expand digital literacy initiatives, with special focus on underserved groups (rural, tribal, poor). For example, building on PMGDISHA, new schemes could target adolescent girls and women entrepreneurs. Programs should include follow-up mentoring to sustain gains.
- **Gender-Sensitive Implementation:** Design training programs to address women's constraints: schedule classes around household duties, involve community leaders to gain family support, ensure women-only training spaces, and include content on online safety.
- **Infrastructure and Affordability:** Invest in rural broadband (e.g. BharatNet) and provide subsidized devices/data for low-income women. Public Wi-Fi zones in villages can enable consistent Internet access post-training.
- **Monitoring & Evaluation:** Implement robust M&E systems to track gender-disaggregated outcomes (employment, income, education levels) after digital literacy interventions. Regular impact evaluations can inform evidence-based program adjustments.

- **Integrate Digital Skills in Education:** Embed digital literacy in school curricula (especially girls' schools) and adult education. Early exposure to digital tools will normalize technology use for future generations of women.
- **Public-Private Partnerships:** Encourage telecom companies and tech firms to partner with government on women's digital inclusion, similar to Internet Saathi. Private sector can contribute training modules, devices, or mentorship platforms.
- **Socio-cultural Change:** Launch awareness campaigns to highlight women's use of technology and its benefits. Engage men and community influencers to break stereotypes about women and ICT.
- **Further Research:** Researchers should examine which digital skills (basic literacy vs advanced coding) yield the greatest empowerment. Also valuable would be comparative studies across states or socio-economic groups in India. Finally, more qualitative research on women's experiences (for example, studies of how digital literacy changes household dynamics) would deepen understanding.

Table 1: Key Studies and Programs on Digital Literacy & Women's Empowerment

Initiative/Study	Year	Scope/Target	Key Outcomes / Focus
PMGDISHA (Government) *{Pradhan Mantri Gramin Digital Saksharta Abhiyan}*	2017–2024	Rural digital literacy (One person per household, nationwide)	Trained **6.39 crore** rural Indians (above 6 crore target). Aimed to make women digitally literate for e-services access. (Gender breakdown not published.)
Internet Saathi *(Tata Trusts & Google)*	2015–present	Rural women in 17 states (peer trainer model)	Built a network of ~60,000 female *"Saathis"* trainers who have taught digital skills to **20 million** rural women.
Kaur *et al.* (2025) *[Study]*	2025	Qualitative review (India-wide)	Highlights digital literacy as *"essential for empowering women"* with access to education, income, and participation. Notes key barriers (social norms, cost) and policy solutions.

Tamang *et al.* (2025) *[Study]*	2025	Survey of 402 women (Uttar Pradesh)	Empirical analysis (PLS-SEM) found digital literacy tools significantly *positively* impacted women's empowerment in economic, social, and technological areas.
UNESCO IFAP Project (India) *[Pilot]*	2023-2024	Rural women entrepreneurs (Jammu & others)	IFAP-funded program delivered mobile-based tools and an entrepreneurship manual (*Swawlamban*) to rural women. Resulted in improved digital skills for **265 women and girls** and enhanced self-expression online.

Conclusion

Digital literacy is a powerful lever for women's empowerment and gender equality in India, but its impact depends on how effectively programs reach and sustain women's participation. The literature and data reviewed here show that women who acquire digital skills often translate them into economic opportunities, educational gains, and greater social agency. Government and private initiatives have successfully scaled up access – for example, PMGDISHA and Internet Saathi have collectively brought digital training to tens of millions of women. These efforts align with broader development goals: a digitally literate female population can contribute more fully to India's economy and society, and bridge the urban-rural divide.

However, closing the digital gender gap requires more than training. Persistent inequities in access (e.g. ongoing 12% ownership gap and 30% internet gap in India) mean that many women remain excluded. Empowerment truly takes hold when women are also supported with education, financial resources, and legal protections. Programs should evolve based on feedback and evidence – for example, shifting some training online, using media campaigns to change norms, and involving men as allies.

In sum, this study finds that digital literacy is not a silver bullet but a necessary step toward gender equality. It unlocks potential for women and lays a foundation for further progress. The positive outcomes seen in households and villages suggest that "the internet gives women greater freedom" as one source notes. Yet to make this a reality for all women in India, sustained, gender-responsive digital

inclusion efforts are needed. Policymakers should view digital skills as fundamental to women's empowerment, deserving the same priority as basic education.

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