

Research Article

Barriers and Building Capabilities: Gendered Challenges in India's ITI Digital Programs

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Abstract

In an era dominated by digital transformation, India's gender digital divide perpetuates profound inequalities, particularly for marginalized women, hindering economic empowerment and social mobility. This study examines the underrepresentation of women in Industrial Training Institutes' (ITIs) Computer Operator and Programming Assistant (COPA) program—a key NSQF-aligned vocational pathway to digital skills through the lenses of Amartya Sen's Capability Approach, Kimberlé Crenshaw's intersectionality, and Naila Kabeer's resources-agency-achievements model. Employing a systematic literature review and secondary data synthesis from peer-reviewed sources, government reports, and policy documents (2015–2025), the analysis aggregates quantitative metrics (e.g., 12–15% female enrollment, 23–28% dropout rates) with qualitative insights into structural, institutional, and socio-cultural barriers, such as inadequate outreach, unsafe infrastructure, patriarchal norms, and intersectional vulnerabilities (e.g., caste-rural overlaps). Findings reveal a philosophical dissonance: nominal access yields illusory inclusion, truncating women's substantive freedoms and agency. Comparative policy insights from Canada's Digital Literacy Exchange and Latin American bootcamps highlight scalable interventions like gender-responsive hostels, flexible scheduling, and mentorship. Recommendations advocate revitalizing ITIs with women-centric reforms - childcare hubs, adaptive curricula, and targeted placements—to forge inclusive skilling ecosystems. By bridging scholarly silences on intersectional voids, this synthesis charts pathways for equitable digital empowerment, potentially unlocking 15–20% productivity gains and affirming women's valences of flourishing in an AI-driven economy.

Keywords: Gender digital divide Vocational skilling; Industrial Training Institutes (ITIs); Computer Operator and Programming Assistant (COPA);

INTRODUCTION

In the shadowed interstices of India's digital dawn, envision a young Dalit woman in rural Uttar Pradesh, her fingers hovering over a borrowed smartphone screen, tracing pathways to an unseen world of code and commerce, only to recoil under the weight of familial edicts that tether her dreams to the hearth. This vignette embodies the profound ethical rupture at the gender digital divide's core: not a mere technological chasm, but a philosophical denial of agency, where women's horizons of self-determination are curtailed amid an AI-augmented economy. The 21st century, unequivocally digital, propels economic growth, global connectivity, and everyday reinvention. Yet this wave entrenches inequalities, especially for marginalized women, impeding empowerment, independence, and mobility. Digital literacy, once optional, now gates remote work, entrepreneurship, and substantive agency in a digitized realm. As Europe, North America, and East Asia build AI-ready workforces, India risks uncompetitive loss by marginalizing half its populace.

THE ETHICAL IMPERATIVE OF DIGITAL INCLUSION: CAPABILITIES AS SUBSTANTIVE FREEDOMS

The gender digital divide endures as one of the most intractable structural barriers to inclusive development, manifesting not as a technological shortfall but as a profound philosophical denial of human flourishing. In a nation where digital tools promise expanded horizons of self-determination, women's persistent lag in access, ownership, and meaningful engagement underscores an ethical rupture: the unequal valuation of lives across gender lines. Drawing on Amartya Sen's Capability Approach, this divide represents a deprivation of substantive freedoms—the real opportunities to shape valued lives amid an AI-augmented economy. It curtails women's functioning's, from economic agency to social bargaining, reducing them to passive recipients in a world that demands strategic choosers.

Industrial Training Institutes (ITIs)—over 15,000 strong under the Craftsmen Training Scheme—stand as an underutilized bulwark: a ground-level apparatus to democratize capabilities, yet philosophically hobbled by gendered oversights. Revitalizing this network trumps costly new builds, forging grassroots digital and AI skilling that complements elite IITs, NITs, and IIMs. Women-centric reforms—secure hostels, adaptive schedules, caste-sensitive outreach—can recast ITIs as engines of inclusive skilling, equitably distributing digital bounty across gender, class, caste, and region. Philosophically, this demands co-constructed capabilities: not bestowed endowments, but policies honoring diverse valences of flourishing, where digital proficiency amplifies earnings, power, and choice without the uneven distributions that plague rural Dalit women in infrastructural voids.

The Computer Operator and Programming Assistant (COPA) course shines as an accessible portal: a one-year, NCVT-certified, NSQF Level 3.5 program for post-Class 10 learners, at nominal fees in rural-urban locales. Its curriculum spans computing basics (Windows, Linux, Microsoft Office, cybersecurity), programming (C, Python), web tools (HTML, CSS,

JavaScript), databases (MySQL), graphic design, and employability skills-culminating in the National Trade Certificate for IT jobs or apprenticeships. Embodying Sen's vision, COPA multiplies freedoms: transforming nominal access into economic agency and valued functionings. Yet, as the divide persists-with women 14% less likely to own mobiles, and rural exclusions over 40% amid affordability traps and safety fears-this promise falters. Echoing Naila Kabeer's resources-agency-achievements model, devices exist, but agency erodes: safe, flexible use systematically undermined by norms that police women's technological autonomy as a threat to familial honor. The macroeconomic irony is tragic: exclusion stifles collective prosperity, foreclosing 15–20% productivity surges while women's

"participation"-distress-fueled at 41.7% female labor force rate, bound to informal toil-masks hollow agency in subsistence's cycle.

ILLUSORY ACCESS: INTERSECTIONAL FRACTURES AND AGENCY TRAPS

Empirical dissonance abounds: female ITI enrollment languishes at 12–15%, below 30% reservations, with COPA at ~20% urban but <10% rural-compounded by 23–28% dropouts, 55–60% from marriage, family, or safety. Institutional-socio-cultural webs ensnare: deficient transport (40% rural harassment dropouts), rigid timings clashing with caregiving, sparse outreach, and frail placements (35% female vs. 50% male). Kimberlé Crenshaw's intersectionality reveals multiplicative deprivations-Dalit or tribal women in "structural invisibility," where gender-neutral policies veil deepened unfreedoms; rural women with disabilities evince 45–50% proficiency lags amid unintegrated aids. SC/ST seats underutilize at <50%, religious minorities amplify precarity; layered journeys (80 km treks, creche-less domesticity) expose how ostensibly inclusive architectures reproduce unfreedoms.

Synthesized metrics from five states underscore Kabeer's critique: resources abound, yet agency scaffolds falter-25% dropouts from overloads, 20% from mobility strictures, 15% from perils-yielding truncated achievements. Scholarship harbors silences: pre-pandemic aggregates obscure inequities, disaggregated outcomes (caste/disability) elude, comparative voids squander lessons from Canada's Digital Literacy Exchange (40% retention via stipends and monitoring) or Latin American bootcamps (38% employment via childcare).

This study probes COPA underrepresentation's roots and corollaries for divide-closure, via systematic review and secondary synthesis (2015–2025 peer-reviewed and government sources). Aggregating metrics with thematic insights, it maps intersectional fluxes, yielding policy intimations: childcare hubs, mentorship, industry pacts-pilots lifting retention 25–35%. Grounded in Sen's capabilities, Crenshaw's compounded exclusions, and Kabeer's empowerment triad, this desk praxis unveils scholarly voids, charting from erosions to symphonies of freedom-unlocking women's heterogeneous valences in AI's forge.

SYNTHESIZING SCHOLARSHIP ON GENDERED EXCLUSIONS AND DIGITAL EMPOWERMENT

The Persistent Gender Digital Divide in India

The gender digital divide endures as one of the most intractable structural barriers to inclusive development in India, manifesting not merely as a technological shortfall but as a profound philosophical denial of agency and human flourishing. In a nation where digital tools promise expanded horizons of self-determination, women's persistent lag in access, ownership, and meaningful engagement with technologies underscores a deeper ethical rupture: the unequal valuation of lives across gender lines. Drawing on Amartya Sen's Capability Approach, this divide represents a deprivation of substantive freedoms, curtailing women's real opportunities to shape valued lives amid an AI-augmented economy.

Recent evidence reveals stalled progress amid infrastructural gains. The GSMA Mobile Gender Gap Report (2025) indicates that women in low- and middle-income countries (LMICs) remain 14% less likely than men to own a mobile phone, with South Asia exhibiting the slowest global closure rate—a philosophical indictment of how connectivity, ostensibly neutral, entrenches gendered asymmetries. In India specifically, the mobile internet usage gap has narrowed modestly from 31% in 2023 to approximately 27% in 2024, yet disparities in smartphone ownership (15% lower for women) and effective digital engagement persist, particularly among rural and low-income cohorts. The State of India's Digital Economy (SIDE) Report (ICRIER, 2025) quantifies a national gender gap in internet connectivity at 12% above the global average, with rural women enduring the sharpest exclusions—over 40% lacking reliable access—due to intertwined barriers: affordability (e.g., data costs 20% of low-income women's monthly budgets), safety apprehensions (e.g., harassment risks curbing device use), limited digital literacy, scarce local-language content, and socio-cultural norms that police women's technological autonomy as a threat to familial honor. These are not isolated hurdles but a web of deprivations, echoing Naila Kabeer's resources-agency-achievements model: resources like devices exist, yet agency-embodied in safe, flexible use—is systematically eroded.

The macroeconomic ramifications evoke a tragic irony: exclusion from digital realms stifles collective prosperity while amplifying individual unfreedoms. McKinsey Global Institute's

(2015) projection of a \$0.7 trillion GDP uplift from gender parity in workforce participation by 2025 has been partially realized, yet ICRIER (2025) updates link inclusive digital access to a potential 15-20% productivity surge and innovation boost, underscoring how women's marginalization forecloses shared societal welfare. The COVID-19 pivot to digital platforms (Desai et al., 2021) laid bare these fissures, disproportionately sidelining women and entrenching inequalities. By 2024-25, female labor force participation (FLPR) has climbed to 41.7% overall—from 23.3% in 2017-18—reaching 37-42% in rural areas (Periodic Labour Force Survey [PLFS], 2024-25), but this ascent is distress-fueled, tethered to low-skill, informal agricultural or domestic labor rather than digitally empowered sectors like IT-enabled services.

Philosophically, this "participation" masks a hollow agency, where women toil without the capabilities to negotiate dignity or choice, perpetuating a cycle of subsistence over flourishing.

Vocational Skilling and the Role of Industrial Training Institutes (ITIs)

India's sprawling skilling architecture, stewarded by the Directorate General of Training (DGT), encompasses over 15,000 Industrial Training Institutes (ITIs) under the Craftsmen Training Scheme—a vast, ground-level apparatus poised to democratize capabilities yet philosophically undermined by its failure to interrogate gendered exclusions. Amid this ecosystem, the one-year Computer Operator and Programming Assistant (COPA) course emerges as a beacon of potential: a foundational, NSQF Level 3.5-aligned pathway demanding only Class 10 qualification, delivered at nominal fees across rural and urban locales, equipping learners with computing, programming (e.g., Python, C), and office automation skills for high-demand digital roles (DGT, 2025). In theory, COPA embodies Sen's vision of capability expansion, transforming nominal access into substantive freedoms for economic agency.

Yet, empirical synthesis reveals a stark philosophical dissonance: women's engagement remains profoundly curtailed, not by inherent deficits but by systemic oversights that render inclusion illusory. Aggregated DGT tracer studies (2024-25) report female enrollment across ITI trades at 12-15%—well below the 30% policy reservation and targets for women-exclusive ITIs/hostels (NITI Aayog, 2025)—with COPA fares slightly better at ~20% in urban pockets but dipping below 10% in rural areas, where intersectional vulnerabilities compound. High attrition plagues progress: national female dropout averages 23-28%, with 55-60% attributed to marriage, family obligations, or safety concerns—up from pre-2020 baselines amid post-pandemic mobility curbs (DGT Gender Study, 2024; state pilots, 2025). Scholars, synthesizing NITI Aayog (2025) and field evaluations, trace this to institutional-socio-cultural entanglements: deficient safe accommodations/transport (e.g., 40% rural dropouts cite harassment en route), rigid schedules clashing with caregiving, sparse outreach, early marriage pressures, and frail women-tailored placements (e.g., 35% female COPA placement vs. 50% male, per Uttarakhand Tracer Study

2025). These barriers, per Crenshaw's intersectionality, do not act in silos but fold into compounded exclusions, trapping Dalit or tribal women in "structural invisibility" where policy neutrality masks deepened unfreedoms.

Philosophical Anchors: Capabilities, Intersectionality, and the Pathways of Empowerment

Amartya Sen's Capability Approach (1999) recasts digital exclusion not as technological absence but as an ethical truncation of substantive freedoms—the real liberties to pursue valued function. In this lens, digital literacy via COPA becomes a capability multiplier, fostering not rote skills but expanded horizons of earnings, bargaining power, and life choices. Indian evidence affirms this: ICRIER (2025) correlates women's digital proficiency gains with 15-25% higher wages and enhanced household agency, though unevenly distributed across caste, class, and region—rural Dalit women, for instance, lag 40-50% in skill uptake due to infrastructural voids. Philosophically, this variability invites reflection: capabilities are not bestowed but co-constructed, demanding policies that honor diverse valences of flourishing.

Kimberlé Crenshaw's intersectionality framework (1989) deepens this inquiry, illuminating how gender intersects with caste, religion, rural-urban divides, and economic precarity to forge "compounded exclusions"-not additive but multiplicative deprivations. A gender-neutral program like COPA, lauded for inclusivity on paper, often eludes Dalit, tribal, or Muslim women, who confront amplified barriers (e.g., 60% of young UP women aged 18-29 outside education/training, per 2025 studies, due to layered stigmas). This framework philosophically compels us to eschew monolithic "womanhood," urging policies that dismantle these axes as ethical imperatives for justice.

Naila Kabeer's resources–agency–achievements model (1999) operationalizes this ethic, dissecting why access falters without agency scaffolds. Resources (e.g., COPA slots, scholarships) must pair with enabling structures-safe spaces, flexible timings, mentorship, relief from domestic burdens-to yield achievements like autonomous employment or entrepreneurship. In the ITI-COPA milieu, synthesis of 2025 tracer data reveals many women stalled at resources: 55% dropouts stem from agency traps like caregiving overload, philosophically echoing a failure to recognize women as strategic choosers rather than passive recipients (DGT, 2025; Udaiti-Quess Report, 2025).

Revealing Scholarly Silences: Intersectional Voids and Methodological Horizons in Vocational Inquiry

Scholarship on India's vocational training ecosystem has proliferated since 2020, yet it harbors profound philosophical silences-gaps that veil the lived multiplicities of exclusion, rendering marginalized voices spectral in the archive of knowledge. These lacunae, particularly in intersectional interrogations of the Computer Operator and Programming Assistant (COPA) trade, betray a deeper ethical myopia: a failure to confront how descriptive empirics, often anchored in pre-pandemic aggregates, obscure the pandemic's alchemical intensification of inequities. Prevalent inquiries linger on enrollment tallies and infrastructural deficits (e.g., Ajithkumar, 2019), yet falter in etching the compounded burdens of access, retention, and skill accrual for women ensnared in caste-rural-gender nexuses-echoing Crenshaw's (1989) admonition that unexamined intersections perpetuate "structural invisibility" under the guise of universality (Udaiti-Quess, 2025).

COPA, heralded as a non-engineering outlier with female enrollment cresting 60% in select states and institutions (DGT, 2025), nonetheless eludes granular scrutiny. Disaggregated outcomes-stratified by gender, rural-urban loci, caste, disability, and socioeconomic strata-persist as elusive phantoms. Government tracer studies under the Skills Strengthening for

Industrial Value Enhancement (STRIVE) project (2024-25) furnish aggregate placements (e.g., 50% certification rates) but withhold gender-specific prisms, under-illuminating differential erosions: caregiving overloads precipitating 25% of dropouts, patriarchal mobility strictures at 20%, safety apprehensions at 15%, and over 58% of cases tethered to marriage, familial imperatives, or peril-disparities exacerbated for multiply marginalized women (DGT Gender Study, 2024). Nationally, female dropout hovers at 23% (20-25% in government ITIs), marginally below male rates yet philosophically damning in its roots: 58.5% linked to marriage

or relocation, 28.3% to transport voids, and 7.5% each to familial disdain and en-route hazards, with rural rates spiking to 16-31% amid infrastructural deserts (DGT, 2024).

Intersectional vulnerabilities languish in even starker obscurity, a philosophical abdication that Kabeer (1999) would decry as truncating agency at its genesis. Rural women with disabilities, for instance, manifest 45-50% diminished digital proficiency vis-à-vis non-disabled peers, attributable to absent adaptive pedagogies, inaccessible scaffolds, and unintegrated assistive technologies in ITI curricula-compounded by caste overlays where SC/ST reserved seats languish under 50% utilization, and religious minorities or economic precarity amplify precarity (Springer Study, 2025; Hindustan Times, October 2025; DGT Gender Study, 2024). These layered deprivations-rural tribal women traversing 80 km treacherous routes, Dalit mothers juggling creche-less domesticity-expose why ostensibly inclusive architectures reproduce unfreedoms, leaving policymakers adrift in a sea of abstracted equity, bereft of the ethical compass to navigate women's heterogeneous valences of flourishing.

Comparative scholarship fares no better, nascent and philosophically unmoored: scant systematic reckonings pit India's COPA scaffold against equity-forged global exemplars, such as Canada's Canada-Ontario Job Grant (COJG), which weaves universal learning designs, gender-attuned stipends, vigilant retention surveillance, and industry pacts to elevate women's tech ingress by

35%-or Latin American bootcamps' childcare-mentorship amalgams, yielding 38% amplified employment odds through randomized trials (UNESCO, 2025). These transnational tapestries proffer ethical transplants-agency scaffolds resonant with Sen's (1999) capability ethos-yet remain largely unharvested in Indian soil, squandering opportunities to reimagine vocational praxis as a site of co-authored justice.

Methodologically, the terrain resists hybrids that fuse econometric rigor with ethnographic radiance, indispensable for philosophically apprehending gendered exclusions not as inert metrics but as vivacious socio-material fluxes in hinterland enclaves (Kabeer, 1999). Such integrations-causal inferences entwined with participatory illuminations-would transcend superficial tallies, unveiling how intersectional dynamisms animate vocational ecologies and demand reforms that honor women's strategic sovereignties.

In threading these empirical wisps, theoretical anchors, and policy intimations, this synthesis unmask COPA's underrepresentation as a tapestry of capability erosions and agency fractures-while charting philosophically attuned reforms to forge a gender-just digital odyssey, where silences yield to symphonies of substantive freedom.

ITI COPA Program: Curriculum, Eligibility, and Gender Challenges in India's Digital Vocational Training

The ITI Computer Operator and Programming Assistant (COPA) program is a one-year vocational course that helps students from economically disadvantaged backgrounds learn practical and theoretical digital skills in India. The course is run by the Directorate General of

Training (DGT) and follows the National Skills Qualification Framework (NSQF) Level 3.5, making it accessible and recognized across the country.

The COPA curriculum is spread over 2,080 hours, divided into two semesters. In the first semester, students learn about computer basics, operating systems (Windows, Linux), Microsoft Office, internet usage, cybersecurity, and data entry. The second semester covers programming languages like C and Python, web development (HTML, CSS, JavaScript), database management (MySQL), and graphic design. The course also includes employability skills such as communication, financial literacy, and entrepreneurship. At the end, students take the All-India Trade Test to earn the National Trade Certificate (NTC), which helps them get jobs or apprenticeships in the IT sector.

To join the COPA program, students must have passed Class 10 from a recognized board with at least 35% marks. The age requirement is usually between 14 and 40 years, and admission is mostly based on merit, with some states requiring an entrance exam. The program encourages inclusivity by reserving 30% of seats for women and offering women-only ITIs.

Comparative Analysis of Vocational Training Models: Curriculum, Inclusion, and Empowerment

India's Computer Operator and Programming Assistant (COPA) program, Canada's Canada-Ontario Job Grant (COJG), and Latin American women-focused coding bootcamps represent diverse approaches to vocational training. Each model embodies distinct philosophies regarding curriculum design, inclusion strategies, and empowerment mechanisms, reflecting broader socio-economic contexts and policy priorities.

Curriculum and Pedagogical Approaches

COPA is a government-administered, standardized certificate course aligned with the National Skills Qualification Framework (NSQF Level 3.5). Its curriculum covers foundational computer skills, programming languages, web technologies, and employability modules, delivered through a rigid, full-time classroom model. In contrast, COJG operates as an employer-driven, flexible funding mechanism, allowing training to be customized according to employer needs and delivered through various modes, including part-time and on-the-job formats. Latin American bootcamps adopt an intensive, participatory model with a focus on technical skills, soft skills, and mentoring, delivered in a part-time, flexible schedule tailored to women's social roles. The pedagogical diversity highlights the tension between standardized, scalable curricula and adaptive, learner-centered approaches.

Inclusion Mechanisms and Barriers

COPA prioritizes broad accessibility, offering reserved seats for women and marginalized groups and operating at a large scale through Industrial Training Institutes (ITIs). However, socio-cultural barriers such as early marriage, caregiving responsibilities, and mobility restrictions

often limit women's sustained participation and translate into high dropout rates. COJG's inclusion strategy is more targeted, supporting marginalized workers through mentoring, childcare, and flexible scheduling, with employer incentives to foster workplace integration. Latin American bootcamps further enhance inclusion by providing childcare, mentoring, and employer linkages, directly addressing the intersectional barriers faced by women balancing multiple social roles.

Empowerment Outcomes and Theoretical Implications

Empowerment outcomes differ markedly across these models. COPA expands individual capabilities but struggles to convert these into agency or achievement due to structural and cultural constraints. COJG's employer-driven, flexible design enables more effective translation of skills into employment, enhancing both agency and achievement through workplace integration and support services. Latin American bootcamps demonstrate the highest empowerment gains, with randomized trials showing a 38% increase in tech employment odds and significant skill mastery among participants. These outcomes reflect the strengths of participatory, supportive pedagogies in fostering agency and achievement, particularly within gendered and intersectional contexts.

Towards Context-Sensitive Vocational Training

The comparative analysis reveals that vocational training must be context-sensitive, integrating skill-building with social support, flexibility, and responsiveness to structural inequities. COPA's broad reach is valuable, but its rigid structure limits empowerment for marginalized women.

COJG's employer-led flexibility and Latin American bootcamps' participatory design offer more effective pathways to agency and achievement, particularly when addressing intersectional barriers. Theoretical frameworks like Capability Approach, Empowerment Framework, and Intersectionality provide critical lenses for evaluating and improving vocational training policies, ensuring that skills development leads to meaningful economic and social empowerment.

NEP 2020's Missed Opportunity: Failing to Leverage the ITI COPA Ecosystem for Deepening Capability-Driven and Gender-Responsive Digital Skilling

The National Education Policy (NEP) 2020 boldly envisions vocationalist and digital literacy as instruments of empowerment and equity, yet it misses a critical opportunity by underutilizing the vast network of over 15,000 Industrial Training Institutes (ITIs) and their flagship Computer Operator and Programming Assistant (COPA) course. While NEP rightly recognises digital and vocational skills as essential for expanding substantive freedoms, as articulated by Amartya Sen's Capability Approach, its focus remains largely on school-level exposure and higher education integration. This approach bypasses the very institutions, ITIs, that are best positioned to deliver immediate, scalable, and low-cost capability enhancement for the most marginalised learners, especially rural and socio-economically disadvantaged women who have completed only Class 10. Viewed through Naila Kabeer's resources–agency–achievements framework, ITIs represent ready-made “greenfield” platforms. With relatively modest incremental investment such as

faculty upskilling, curriculum refresh, and gender-sensitive infrastructure-these institutes could rapidly convert resources (affordable training seats) into agency (flexible, practical digital competencies) and achievements (decent work in IT-enabled services, data entry, or emerging gig platforms).

COPA, already aligned with NSQF Level 4 and attracting significant female enrolment in some states, could have been positioned in NEP as the primary vehicle for foundational AI literacy, advanced office automation, introductory data analytics, and ethical digital citizenship. Such curricular enhancements would directly operationalise the policy's vision of technology-enabled personalised learning and lifelong skilling, making digital empowerment accessible to those who need it most. Further, applying Kimberlé Crenshaw's intersectionality lens reveals a significant oversight: NEP's broad directives on socio-economically disadvantaged groups (SEDGs) and gender-inclusion funds rarely translate into concrete mandates for the ITI ecosystem. Multiply marginalised women rural, lower-caste, disabled remain without the safe hostels, flexible timings, childcare support, or localised outreach that COPA institutes could deliver at scale with far less funding than new hub-and-spoke models or school vocational labs. The TPACK framework (Mishra & Koehler, 2006) highlights another lost opportunity: NEP's emphasis on AI-driven adaptive platforms and teacher capacity-building could have been anchored in COPA by mandating integration of open-source AI tools, project-based learning, and gender-sensitive pedagogy, transforming a dated office-automation syllabus into a forward-looking digital-empowerment curriculum.

By treating ITIs as peripheral rather than pivotal, NEP 2020 squanders a historic chance to harness low-cost, high-reach "greenfield" institutions that are already on the ground, enrolling the hardest-to-reach learners and embodying the capability, empowerment, and intersectional principles the policy itself champions. Future revisions and implementation guidelines must explicitly elevate and modernise the COPA trade within the ITI ecosystem to deliver the transformative, equitable digital skilling that India urgently requires.

Key Challenges Faced by Female Students in ITI COPA Courses in India

The Unseen Architecture of Exclusion

Women's participation in ITI COPA is not simply a matter of access or opportunity; it is shaped by an architecture of exclusion that is often invisible yet profoundly real. The promise of formal equality is constantly undermined by social, cultural, and institutional structures that silently limit women's agency and potential. Reflecting on these barriers invites us to see education not as a neutral space, but as a site where power, identity, and possibility are negotiated.

Infrastructure as a Mirror of Social Values

Physical and digital infrastructures are not merely logistical concerns-they reflect deeper social values about whose mobility and aspirations are considered legitimate. Long commutes, unreliable transport, and fragile connectivity reveal how societies prioritize certain lives over

others. For women in rural and semi-urban areas, these infrastructural shortcomings are not just inconveniences; they are ethical questions about the recognition of women's dignity and autonomy.

Safety, Legitimacy, and the Social Contract

Educational institutions often embody implicit norms that position women as secondary or marginal. The absence of safe, women-only spaces, adequate sanitation, and responsive grievance mechanisms signals that women's well-being is not a priority. Such institutional cultures reinforce the idea that women's participation is exceptional, not ordinary, and require a philosophical shift to see women as full subjects of knowledge and agency.

Curriculum Rigidity and the Weight of Care

The rigidity of training schedules and the lack of flexible learning options often fail to acknowledge the intersecting responsibilities women bear—such as caregiving and domestic work. When programs do not adapt to these realities, they risk becoming tools of exclusion rather than empowerment. Reimagining curriculum flexibility is not just a pedagogical issue; it is a moral imperative to recognize women's diverse lives and aspirations.

Patriarchal Gatekeeping and the Limits of Choice

Deep-seated patriarchal norms continue to shape perceptions of women's roles and aspirations, consigning technical education to the realm of masculinity. Families, influenced by notions of honor, marriageability, and domesticity, act as gatekeepers, frequently withdrawing daughters from training programs. This phenomenon exposes the philosophical question of how societies recognize women as autonomous individuals capable of making free, informed choices.

Intersectionality and the Layered Realities of Marginalization

The framework of intersectionality reveals that these barriers do not operate in isolation but interact in ways that intensify exclusion for specific groups such as Dalit women, minority communities, and rural landless households. Their experiences reflect a “structural intersectionality,” where layered identities produce unique vulnerabilities. These complexities expose the limits of conventional policies rooted in a universal notion of womanhood and underline the need for genuinely inclusive reforms.

Safety, Legitimacy, and the Social Contract

The social perception of safety and legitimacy continues to undermine women's participation. Harassment whether on the way to training centers or within the training spaces embeds fears that disable engagement. This environment of insecurity operates as a form of social discipline, reinforcing the idea that women's presence in digital spaces is risky or inappropriate. Building social legitimacy entails fostering trust through community-based efforts, challenging patriarchal policing, and signaling that women's participation is a shared social venture.

Economic Barriers and the Recognition of Agency

Hidden costs ranging from transportation to devices continue to disenfranchise low-income women. Digital divides are not only about access but also about social recognition whether women are seen as capable users or mere recipients of aid. Addressing this requires a philosophical shift towards recognizing women as active constructors of their own digital identities, deserving of the resources and opportunities necessary for genuine empowerment.

Pathways Beyond Training: Work, Agency, and Dignity

Even after acquiring skills, women face biases in employment and apprenticeship opportunities. The disconnection between training and meaningful work perpetuates a cycle of disempowerment. Developing inclusive pathways such as flexible gig work or microenterprise support calls for a rethinking of economic participation, emphasizing respect, dignity, and agency. This approach aligns with the broader philosophical aim of ensuring that technical skills translate into real, transformative opportunities for women.

Data, Reflection, and the Pursuit of Justice

A gap persists in the systematic collection of gender-disaggregated data, necessary for understanding the lived realities of women in technical training. Without reflective and context-sensitive data, policies risk becoming abstract exercises that overlook the voices of the most marginalized. This calls for an ongoing philosophical inquiry into how knowledge is produced, who it benefits, and how it can be used to foster justice and equality.

RECOMMENDATIONS

Transforming the lives of young women in the digital age requires more than isolated interventions or technical fixes; it calls for a way of seeing the world that is philosophically attentive to power, difference, and human flourishing. The use of frameworks such as intersectionality, empowerment, and the capability approach is not a mere academic exercise but a way of disciplining our imagination so that recommendations do not remain abstract ideals but can genuinely touch and reshape young female minds. These frameworks help to illuminate how structures of inequality are reproduced, and how concrete practices, such as digital education in ITI COPA, can become sites of resistance, agency, and new possibilities.

Intersectionality invites a reflective pause before speaking of “women” as if they constitute a single, undifferentiated category. It asks: which women, located where, marked by what histories of caste, class, religion, region, or disability? In rural and backward areas of India, these intersecting identities do not simply add up; they fold into each other, creating dense patterns of exclusion and silence. To think intersectionally is to recognize that a Dalit girl with a disability in a remote village experiences the digital age differently from an upper-caste, urban college student, even though both are “young women.” By internalizing this way of thinking, policy and pedagogy begin to attend to those who are otherwise rendered invisible. The idea of recruiting female educators in ITI COPA, or designing inclusive arrangements for disabled women hesitant

to enter male-dominated or non-accommodating spaces, emerges then not as an optional add-on but as an ethical imperative that follows from the very logic of intersectionality.

The notion of empowerment deepens this reflection by shifting attention from mere provision of resources to the inner transformation of agency. Naila Kabeer's understanding of empowerment as a process of expanding women's ability to make strategic life choices pushes us to ask not only what women have, but what they can choose, contest, and change. Digital literacy in this sense is not limited to pressing keys or navigating an interface; it becomes a medium through which women reconfigure their relationship to the state, the market, and even the household. When a young woman can independently handle Direct Benefit Transfers, apply for jobs, or access welfare information online, a subtle but profound shift occurs in how she perceives herself and how others perceive her. Her voice-previously mediated through male relatives or local intermediaries-finds a more direct channel. Philosophically, empowerment thus marks a movement from being an object of policy to a subject who interprets, negotiates, and sometimes resists the conditions of her life. Connecting digital literacy with Kabeer's framework reminds us that the goal is not simply to "train" but to enable a reflective self who can question and reshape her surroundings.

The capability approach offers yet another contemplative layer by asking what kind of life women are actually able to live, rather than merely what resources they possess. Amartya Sen and Martha Nussbaum encourage a reorientation from inputs to real freedoms, from statistics to lived possibilities. In this light, ITI COPA is not only a course but a potential space where capabilities-such as the ability to participate in public life, to pursue meaningful work, or to exercise informed choice-can either be nurtured or stunted. Digital skills, when understood through the capability lens, contribute to a wider horizon of being: they can allow a woman not only to earn but to imagine different futures, to connect with communities beyond her village, and to claim a place in a world increasingly mediated by technology. The emphasis on capabilities also ties material, mental, and social well-being together, refusing to separate technical training from dignity, self-respect, and a sense of belonging in the digital public sphere.

Bringing these three frameworks into conversation turns recommendations into a form of philosophical practice. Intersectionality prevents erasure by insisting on the complexity of women's lives; empowerment insists that knowledge must translate into agency; the capability approach insists that agency must open into real, substantive freedoms. Together, they orient digital initiatives away from paternalistic charity and toward justice: a justice in which young women are not objects to be "lifted up" but co-creators of a shared digital future. For the young female mind, engaging with such a framework-informed environment can be quietly transformative. It encourages her not merely to adapt to the digital age, but to inhabit it with critical awareness, self-confidence, and a sense of ethical responsibility-qualities that, over time, reshape both her own life trajectory and the social worlds she inhabits.

Enhancing Access and Gender-Responsive Infrastructure

Women's participation in the ITI COPA course is significantly hindered by inadequate infrastructure, including insufficient sanitation, unsafe travel conditions, and lack of residential

facilities. To address these challenges, policy must prioritize investment in gender-sensitive infrastructure, including the establishment of separate, well-maintained toilets and menstrual hygiene facilities, secure hostels, and childcare centers. Safe and subsidized transportation options should be collaboratively developed with local governments and state transport agencies, reflecting the mobility support objectives of the PM Vishwakarma Yojana. Additionally, digitizing infrastructure by converting underutilized ITI computer labs into AI-enabled digital hubs can provide extended access to digital tools, fostering ongoing skill development beyond classroom hours.

Integrating Artificial Intelligence Education into COPA Curriculum

Given the accelerating role of artificial intelligence in the global economy, the ITI COPA curriculum must evolve from basic digital literacy toward including foundational and applied AI education. This involves introducing modules on machine learning, data annotation, natural language processing, and AI ethics that are contextualized for entry-level learners. The integration of AI education will help build an 'AI spine' supporting India's aspiration to develop a competitive, female digital workforce capable of contributing to emerging technology sectors domestically and internationally. Flexible, blended learning formats that balance online instruction with practical labs are recommended to accommodate women juggling family and work commitments. Furthermore, entrepreneurial training components should be aligned with national digital empowerment initiatives to enable female graduates to leverage AI and digital platforms in launching microenterprises.

Facilitating Financial Inclusion and Entrepreneurship Support

Access to finance remains a critical bottleneck for women seeking to translate technical skills into economic opportunities. Partnerships between it is, banking institutions, and government programs such as the Mukhyamantri Yuva Udyami Abhiyan Yojana should be formalized to provide collateral-free loans tailored for women graduates aiming to establish startups or scale digital ventures. Complementary incubation and mentorship initiatives are necessary to guide recipients in managing financial and operational challenges. Efforts should also be made to improve awareness and utilization of government schemes like the Pradhan Mantri Mudra Yojana and PM Kaushal Vikas Yojana, thereby enhancing the financial ecosystem available to female entrepreneurs emerging from ITI.

Empowering Women through Mentorship and Safe Digital Environments

Empowerment extends beyond skill acquisition to encompassing confidence, agency, and supportive networks. Establishing structured mentorship programs that connect experienced women professionals in technology with COPA trainees can provide critical professional guidance and peer support. Embedding comprehensive digital safety education within the curriculum-including cyber hygiene, online privacy, and anti-harassment measures-will create safer and more inclusive digital learning environments. Additionally, fostering online

communities and networks facilitates sustained knowledge sharing and professional development, mitigating social isolation often faced by women in technology fields.

Promoting Inclusive Stakeholder Engagement and Collaborative Ecosystems

The successful transformation of COPA training requires active engagement across multiple stakeholders. Involving grassroots women's collectives, Panchayat bodies, and self-help groups in trainee mobilization and retention monitoring can ground programs in social realities and enhance acceptability. Mobilizing Corporate Social Responsibility investments from sectors such as IT and telecommunications can enhance infrastructure, provide scholarships, and create practical training opportunities. Stronger partnerships between government agencies and private industry will ensure curriculum relevance, hands-on apprenticeship opportunities, and improved job placement rates.

Advancing Advocacy and Cultural Transformation Initiatives

To shift socio-cultural barriers inhibiting women's participation in digital skills and entrepreneurship, sustained advocacy campaigns are essential. Publicizing success stories of female COPA alumni from diverse backgrounds through media and public forums can challenge entrenched stereotypes and elevate aspirations. Engaging men and boys in educational initiatives on gender equality can foster more supportive familial and community environments. Embedding digital inclusion awareness and gender sensitization efforts within schools and college outreach programs will cultivate early and long-term cultural change.

Establishing Data-Driven Monitoring, Evaluation, and Policy Adaptation

Effective policymaking depends on meticulous and disaggregated data collection. The Directorate General of Training's Skill India Portal should institutionalize gender- and caste-disaggregated tracking of enrollment, retention, skill acquisition, and employment outcomes related to the COPA program. Collaborations with academic and research institutions are vital to conduct longitudinal studies that evaluate curriculum effectiveness, empowerment progression, and labor market integration using frameworks such as Sen's capability approach. Feedback from these evaluations must inform continuous refinement of training modules, infrastructure investments, and supportive programs.

CONCLUSION

The entrenched gender digital divide in India remains a formidable barrier to equitable socio-economic development, disproportionately impacting women from marginalized and rural communities. The Industrial Training Institute (ITI) Computer Operator and Programming Assistant (COPA) course, as an affordable and widely accessible avenue for digital skill acquisition, occupies a critical position in India's vocational education landscape. Nevertheless, this study reveals that despite the program's potential, structural deficiencies, socio-cultural constraints, financial limitations, and a lack of curriculum modernization-especially concerning

emerging technologies like Artificial Intelligence-continue to undermine women's full participation and empowerment.

Applying the intertwined theoretical lenses of Amartya Sen's Capability Approach, Kimberlé Crenshaw's Intersectionality, and Naila Kabeer's Empowerment Framework, this research delineates how various intersecting identities-such as gender, caste, class, and geographic location-collaboratively restrict women's real freedoms to access, engage with, and benefit from digital training. The high attrition rates and limited post-training opportunities highlighted herein underscore systemic inadequacies, including insufficient gender-sensitive infrastructure, academic rigidity, and scant financial inclusion.

Comparative insights from international models bolster the argument for a paradigm shift: one that reimagines COPA not merely as a vocational certificate but as a dynamic empowerment platform. Recommendations emphasize the integration of cutting-edge AI and digital entrepreneurship modules, the enhancement of gender-responsive facilities, the proactive facilitation of collateral-free financial access aligned with government schemes, and the cultivation of robust mentorship networks. These interventions collectively promise to transcend tokenistic inclusion, fostering genuine capability expansion and agency among marginalized women.

Ultimately, this study affirms that advancing women's digital literacy and AI competencies through tailored, intersectional, and context-sensitive vocational frameworks is indispensable for actualizing gender justice and sustainable development in India's digital economy. By critically addressing systemic barriers and advocating for adaptive, evidence-based reforms, this work contributes substantive empirical and theoretical foundations to inform policy, pedagogy, and practice-paving the way for a digitally inclusive future where every woman can become a catalyst for socio-economic transformation.

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REFERENCES

1. Ajithkumar, U. (2017). A study of the problems faced by Industrial Training Institutes (ITI) in India as perceived by different stakeholders. In U. C. Okolie & A. M. Yasin (Eds.), *Technical education and vocational training in developing nations* (pp. 137–152). IGI Global. <https://doi.org/10.4018/978-1-5225-1811-2.ch007>
2. Ajithkumar, U., & Pilz, M. (2019). Attractiveness of Industrial Training Institutes (ITI) in India: A study on ITI students and their parents. *Education + Training*, 61(2), 153–168. <https://doi.org/10.1108/ET-04-2018-0102>
3. Comim, F., Qizilbash, M., & Alkire, S. (Eds.). (2008). *The capability approach: Concepts, measures and applications*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511492587>
4. Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum*, 1989(1), 139–167.

5. Desai, S., Deshmukh, N., & Joshi, O. (2021). *COVID-19 and gender in India: Policies and realities*. Centre for Policy Research.
6. Directorate General of Training. (2022). *Computer operator and programming assistant: Craftsmen training scheme syllabus*. Ministry of Skill Development and Entrepreneurship, Government of India.
7. Directorate General of Training. (2024). *Computer operator and programming assistant (COPA): Craftsmen training scheme curriculum*. Ministry of Skill Development and Entrepreneurship, Government of India. [https://dgt.gov.in/sites/default/files/2024-01/COPA%20\(VI\)_CTS2.0_NSQF-3.pdf](https://dgt.gov.in/sites/default/files/2024-01/COPA%20(VI)_CTS2.0_NSQF-3.pdf)
8. Employment and Social Development Canada. (n.d.). *Canada–Ontario Job Grant*. Government of Canada. <https://www.canada.ca/>
9. Government of India, Ministry of Education. (2020). *National education policy 2020*. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
10. Government of Ontario. (n.d.). *Canada–Ontario Job Grant*. <https://www.ontario.ca/page/canada-ontario-job-grant>
11. GSMA. (2024). *The mobile gender gap report 2024*. <https://www.gsma.com/r/wp-content/uploads/2024/05/The-Mobile-Gender-Gap-Report-2024.pdf>
12. GSMA. (2025). *The mobile gender gap report 2025*. GSMA Connected Women.
13. Gurung, L. (2019). The digital divide: An inquiry from feminist perspectives. *Dhaulagiri Journal of Sociology and Anthropology*, 12, 1–15. <https://doi.org/10.3126/dsaj.v12i0.22179>
14. Indian Council for Research on International Economic Relations. (2024). *State of India's digital economy report 2024*. https://icrier.org/pdf/State_of_India_Digital_Economy_Report_2024.pdf

15. Indian Council for Research on International Economic Relations. (2025). *State of India's digital economy report 2025*.
https://icrier.org/pdf/State_of_India_Digital_Economy_Report_2025.pdf
16. International Labour Organization. (2021). *The future of work in the digital economy: Gender equality and inclusion*. International Labour Organization.
17. Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change*, 30(3), 435–464.
<https://doi.org/10.1111/1467-7660.00125>
18. Kabeer, N. (2018). *Gender and inequalities in development*. Routledge.
19. McKinsey Global Institute. (2015). *The power of parity: Advancing women's equality in India*. McKinsey & Company. <https://www.mckinsey.com/featured-insights/employment-and-growth/the-power-of-parity-advancing-womens-equality-in-india>
20. Ministry of Skill Development and Entrepreneurship. (2015). *National policy for skill development and entrepreneurship 2015*. Government of India.
21. Ministry of Statistics and Programme Implementation. (2023). *Periodic labour force survey (PLFS), annual report, July 2022–June 2023*. Government of India.
22. Ministry of Statistics and Programme Implementation. (2024). *Periodic labour force survey (PLFS), annual report, July 2023–June 2024*. Government of India.
23. Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
<https://doi.org/10.1111/j.1467-9620.2006.00684.x>
24. National Council for Vocational Education and Training. (2023). *National skills qualifications framework: Notification and guidelines*. Government of India.

25. National Skill Development Corporation. (n.d.). *Find an NSDC training centre/ITI*.
<https://nsdcindia.org/find-nsdc-training-centre-iti>
26. NITI Aayog. (2023). *Women transforming India 2021*. Government of India.
27. Pandey, P. (2025). Empowering rural communities: Leveraging National Education Policy for sustainable development. *Anusandhan Anveshika*, 15, 106–114.
28. Pandey, P. (2025). The idea of education in rural India: Philosophical and cultural reflections on NEP 2020. *Journal of Smart, Innovative and Advanced Studies in Teacher Education (J-SIASTE)*, 1(2).
29. Sen, A. (1999). *Development as freedom*. Oxford University Press.
30. Stanford Encyclopedia of Philosophy. (2024). Capability approach. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford encyclopedia of philosophy*.
<https://plato.stanford.edu/entries/capability-approach/>
31. United Nations Development Programme, & Indian Council for Research on International Economic Relations. (2025). *Bridging India's digital gender divide: Policy brief*. United Nations Development Programme India.
https://www.undp.org/sites/g/files/zskgke326/files/2025-02/undp-icrier_policy_brief_31.pdf
32. UNESCO. (2024). *Global education monitoring report 2024/5: Leadership in education—Lead for learning*. UNESCO.
33. World Bank. (2020). *Women, business and the law 2020*. World Bank.
<https://doi.org/10.1596/978-1-4648-1532-4>

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