Digital Educational Platforms for Bridging Socio-Economic Inequalities in the Indian Education Space with Special Reference to Madhya Pradesh

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ABSTRACT

Socio-economic inequality in education remains a persistent structural challenge in India, with rural households, lower-income quintiles, and historically marginalized communities facing systemic barriers to quality learning. Digital educational platforms have emerged as a potential equalizer. However, their reach is constrained by a multi-layered digital divide that intersects geography, income, caste, and gender. This study examines the role of digital educational platforms in bridging socio-economic educational inequities, with particular focus on Madhya Pradesh — a populous central Indian state that consistently underperforms national averages on digital infrastructure indicators. Employing secondary data from UDISE+ (2019–20 to 2024–25), Ministry of Education reports, and peer-reviewed empirical literature, the study constructs a composite Digital Education Access Index (DEAI) and applies the Gini coefficient to measure distributional inequality. OLS regression analysis is used to quantify the association between digital infrastructure variables and educational attainment proxies. Results confirm that Madhya Pradesh's composite DEAI (0.336) lags well behind the national average (0.513), with a Gini coefficient of 0.47 compared to the national 0.38. Internet connectivity, device availability, and teacher digital training each register statistically significant positive associations with educational outcomes. The study concludes with an evidence-based policy framework targeting infrastructure acceleration, device subsidization, multilingual content expansion, and community-level digital access.

Keywords: digital education; socio-economic inequality; digital divide; Madhya Pradesh; UDISE+; educational technology; inclusive education; DEAI; Gini coefficient; NEP 2020

INTRODUCTION

Education is universally recognized as the primary mechanism through which societies reproduce knowledge, capability, and social mobility across generations. In developing economies such as India, it also constitutes the most reliable pathway through which individuals can exit structural poverty. Yet access to quality education in India remains profoundly unequal. Disparities rooted in income, geography, caste, gender, and language continue to determine the nature and quality of the educational experience received by millions of children.

India's school education system is among the largest in the world, encompassing 14.72 lakh schools, 98 lakh teachers, and approximately 24.8 crore enrolled students as of 2023-24 (UDISE+, 2024). Despite its scale, the system is marked by stark stratification. Government schools, which account for 69% of all schools and enroll 50% of students, serve predominantly rural and lower-income populations. Private schools, constituting 22.5% of institutions, enroll 32.6% of students, typically from urban and higher-income households (Economic Survey, 2025). This structural bifurcation perpetuates rather than dismantles socio-economic inequalities in educational outcomes.

The advent of digital technology introduced a potentially transformative intervention in Digital educational platforms can, in principle, decouple the quality of learning from the physical proximity to well-resourced schools. Platforms such as DIKSHA (Digital Infrastructure for Knowledge Sharing), SWAYAM, e-Pathshala, and PM e-VIDYA — launched under the aegis of Digital India — represent India's most ambitious effort to

use technology as an equity lever in education. DIKSHA alone had accumulated over 60 billion learning minutes and 135 million course completions, reaching approximately 180 million students and seven million teachers by January 2023 (Carnegie Endowment, 2023).

However, the promise of digital education is contingent on a precondition that remains unmet for a large share of India's student population: access to functional digital infrastructure. As of 2023-24, only 57.2% of Indian schools had computers and 53.9% had internet access — implying that nearly half of all schools remained digitally excluded (UDISE+, 2024). In rural areas, the situation is more acute: only 22% of rural schools had functional computer labs and 18% had internet access, compared to 55% and 62% respectively in urban schools (UDISE+, 2023, as cited in Charan, 2024). These figures reveal that the digital divide, far from being merely a technological gap, is an extension of pre-existing socio-economic divides (Laskar, 2023).

Madhya Pradesh (MP) — India's second-largest state by area, home to over 72 million people, with 21% of its population belonging to Scheduled Tribes — exemplifies this challenge. MP consistently registers below-national-average performance on digital infrastructure indicators, educational access metrics, and learning outcomes. The state had a secondary-level dropout rate of 16.8% in 2024-25, contributing to the national pool of approximately 5-6 million annual dropouts (UDISE+, 2025). With 12.7% of India's out-of-school children, MP is a critical frontier for inclusive digital education policy (Education for All in India, 2025).

This study investigates the relationship between digital educational platforms and the reduction of socio-economic educational inequities in India, with particular empirical depth in the context of Madhya Pradesh. It develops and applies a composite Digital Education Access Index (DEAI), estimates distributional inequality using the Gini coefficient, and employs OLS regression to measure the association between digital infrastructure components and educational outcomes. The study concludes with evidence-based policy recommendations grounded in verified data.

LITERATURE REVIEW

The theoretical discourse on digital technology and education spans several complementary frameworks. Castells (2000) conceptualized the 'network society' in which individuals' and communities' life chances are increasingly determined by their integration into digital networks. Those excluded from these networks face what he terms 'structural exclusion' — a form of marginalization as consequential as traditional economic exclusion. Dijk (2005) extended this framework by disaggregating digital inequality into four sequential barriers: motivational access, physical access, skills access, and usage access. India's digital education challenge spans all four levels, with physical and skills access being the most critical impediments in rural areas.

Sen's capability approach (1993, 2009) provides a normative anchor for this analysis. If education is a fundamental human capability — one that expands the freedom to lead a self-determined life — then digital exclusion constitutes a capability deprivation. Riggins and Dewan (2005) formalized the distinction between first-order digital divide effects (inequalities in ICT access) and second-order effects (inequalities in the ability to effectively utilize ICT even among those with access). Both dimensions are visible in the Indian context.

UNESCO's Global Education Monitoring Report (2023) estimates that achieving the digital transformation of education systems globally between 2024 and 2030 would require an expenditure of approximately US$21 billion per year. India's actual expenditure on school education was ₹73,498 crore in 2024-25 under the Department of School Education and Literacy, with ₹37,010 crore allocated to Samagra Shiksha — a significant commitment, though falling short of the NEP 2020 target of 6% of GDP (Education for All in India, 2025).

Laskar (2023), in a peer-reviewed study published in Frontiers in Sociology, demonstrated that India's prevailing socio-economic divide is the root source of its digital divide. The divide was found to operate across rural-urban lines, class hierarchies, and caste structures. Importantly, the study emphasized that digital inequality is not reducible to mere technological access but is a complex socio-technical phenomenon shaped by capability, infrastructure, and economic conditions.

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Arora and colleagues (2025), in a working paper presented at the Lincoln International Business School's Development Economics Conference, documented persistent rural-urban digital divergence across Indian states. States such as Maharashtra, Karnataka, and Tamil Nadu exhibited digital convergence patterns, while central and eastern states — including Madhya Pradesh, Uttar Pradesh, Bihar, and Rajasthan — showed deepening divergence. Urban tele-density in India stood at 134% against rural tele-density of 59% as of March 2024, a gap of 75 percentage points (TRAI, 2024)

At the global level, the International Telecommunication Union (ITU, 2024) reported that internet usage in urban areas globally reached 83%, compared to just 48% in rural regions. While the global digital divide is widely acknowledged, the within-country dimensions in low-to-middle-income nations like India are particularly severe. India and China are paradoxically among the 15 countries with the highest private AI investment while simultaneously facing significant internal gaps in internet penetration (ISPI, 2025). This creates what may be termed a 'dual digital duality' — technological leadership at the frontier while persistent exclusion at the base.

Research by Kumari, Lavanya, and Padmambika (2024) in the International Journal of Indian Psychology documented the gender dimension of digital exclusion in India. Only 21% of Indian women use the internet, and households with higher proportions of young males and more family members tend to have systematically better access to digital devices. Girls in rural areas are at compounded disadvantage: they face both gender-based digital exclusion and geographic infrastructure deficits.

The National Sample Survey (NSS, 2022) found that only 24% of rural residents possessed basic digital skills, compared to 56% of urban residents. This skills-access gap compounds the physical access gap and limits the effectiveness of digital platforms even in schools where infrastructure nominally exists (Charan, 2024).

India's digital education ecosystem has expanded significantly since 2017. DIKSHA — launched as the 'One Nation, One Digital Platform' for school education — now offers over 8,900 courses and more than 200,000 pieces of content across 30 Indian languages, contributed by over 11,500 educators and institutions (Carnegie Endowment, 2023). SWAYAM hosts Massive Open Online Courses (MOOCs) across all higher education disciplines, with enrolment rising from 25,905 in 2020-21 to over 100,000 in 2024-25 (Education for All in India, 2025). PM e-VIDYA integrates multi-modal delivery through DIKSHA, dedicated television channels, and radio broadcasts.

NCERT textbooks now incorporate QR codes enabling students to access supplementary DIKSHA content offline — a design feature that partially circumvents internet connectivity constraints. The National Digital Education Architecture (NDEAR), launched by the Prime Minister in July 2021, provides the interoperable technology backbone for these platforms. However, a study on DIKSHA's use among secondary-stage students in Varanasi found low awareness levels, with significant differences in utilization between government and private school students — underscoring implementation and outreach gaps (LEPJ, 2024).

Madhya Pradesh: An Educational Context

Madhya Pradesh presents a distinctive and concerning educational profile. UDISE+ data for 2023-24 indicate that the state lags behind national averages on virtually every digital infrastructure indicator. It recorded 2,170 school closures between 2022-23 and 2023-24, the third-highest in India (Education for All in India, 2025). School mergers in MP's Morena district, flagged for raising Right to Education concerns by The Hindu in October 2025, illustrate the tension between rationalization policies and access imperatives (The Hindu, 2025).

In terms of educational outcomes, MP's secondary-level dropout rate of 16.8% in 2024-25 places it among the weakest-performing states, alongside Bihar, Uttar Pradesh, Rajasthan, and Assam. These states collectively face secondary dropouts of 15-20%, transitions of only 70-80%, and retention rates of approximately 50-60% — trajectories incompatible with NEP 2020's goal of 100% Gross Enrolment Ratio by 2030 (UDISE+, 2025; Education for All in India, 2025). Furthermore, MP accounts for 12.7% of India's out-of-school children, primarily attributable to rural underdevelopment and lower female literacy rates (Education for All in India, 2025).

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RESEARCH GAP

Existing literature addresses either the supply-side dimensions of digital education (infrastructure, platforms) or the demand-side dimensions (socio-economic inequality, dropout rates) in relative isolation. Comprehensive empirical studies that construct composite indices to measure digital educational access inequality and link these indices to state-level educational outcomes — particularly for Madhya Pradesh — remain sparse. This study addresses that gap by integrating infrastructure data, composite index construction, distributional analysis, and regression modelling within a single analytical framework.

RESEARCH OBJECTIVES

The study is guided by the following primary objectives:

(i) To examine the temporal and cross-sectional trends in digital educational infrastructure across India and Madhya Pradesh using UDISE+ panel data (2019-20 to 2024-25).

(ii) To construct and compute the Digital Education Access Index (DEAI) as a composite measure of digital educational access at national and state levels.

(iii) To estimate the extent of distributional inequality in digital educational access using the Gini coefficient methodology.

(iv) To identify and quantify the associations between digital infrastructure components and educational attainment proxies through OLS regression analysis.

(v) To formulate evidence-based policy recommendations targeted at reducing digital educational inequity in Madhya Pradesh within the NEP 2020 and SDG-4 frameworks.

DATA AND METHODOLOGY

This study relies exclusively on secondary data obtained from verified, authoritative sources. The primary statistical source is the Unified District Information System for Education Plus (UDISE+) published by the Department of School Education and Literacy, Ministry of Education, Government of India. Annual reports covering 2019-20 through 2024-25 were used to construct a longitudinal dataset of digital infrastructure indicators. Supplementary data were drawn from the Economic Survey 2024-25 (Government of India), the Annual Status of Education Report (ASER 2024), and peer-reviewed empirical studies published in Scopus-indexed journals.

The study is explicitly positioned as a secondary-data empirical study. It does not rely on primary survey data, ensuring reproducibility and independence from researcher-specific sampling biases. All numerical estimates in this paper are either directly sourced from cited government documents or derived using transparent methodological formulas applied to cited source data. Where state-level data for Madhya Pradesh were unavailable at granular levels, nationally validated estimation methods were applied and clearly marked with an asterisk (*) in tabular presentations.

The Digital Education Access Index (DEAI)

To measure digital educational access in a composite and comparable manner, this study constructs the Digital Education Access Index (DEAI). The DEAI is a normalized composite index drawing on four equally weighted components:

C = Proportion of schools with functional computers

I = Proportion of schools with functional internet access

D = Availability of digital learning devices per student (normalized)

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T = Proportion of teachers with documented digital training

The DEAI formula is:

$$DEAI = (C + I + D + T) / 4$$

This formulation yields a score on a 0-to-1 scale, where 0 indicates complete digital exclusion and 1 indicates universal digital access across all four dimensions. The equal-weighting assumption reflects the view that each dimension independently constrains digital educational access. A school with computers but no internet, or with internet but no trained teachers, cannot effectively deliver digital education. Future research may apply Analytic Hierarchy Process (AHP) or principal component analysis (PCA) to derive empirically optimal weights.

Gini Coefficient for Digital Educational Access

The Gini coefficient (G) is a well-established measure of distributional inequality, with values ranging from 0 (perfect equality) to 1 (maximal inequality). It is applied here to measure the dispersion of digital access across districts or school categories. The formula is:

$$G = \Sigma \Sigma |x_i - x_j| / (2n^2\mu)$$

Where x_i represents the digital access indicator for unit i, μ is the mean value of the indicator across all units, and n is the number of observations. A Gini coefficient of 0.35–0.45 is typically characterized as moderate-to-high inequality; above 0.45 is considered high inequality in the educational infrastructure context.

Regression Model

To quantify the relationship between digital infrastructure components and educational outcomes, an Ordinary Least Squares (OLS) regression model is specified as follows:

$$Y = \beta_0 + \beta_1 I + \beta_2 D + \beta_3 T + \varepsilon$$

Where Y is the educational outcome proxy (composite of Gross Enrolment Ratio and inverse dropout rate); I is internet connectivity (proportion of schools with internet); D is digital device availability (normalised); T is teacher digital training (proportion trained); β_0 is the constant; β_1, β_2, β_3 are the regression coefficients of interest; and ε is the error term. District-level or state-level data from UDISE+ and associated reports constitute the unit of observation. Standard errors are assumed to be heteroskedasticity-robust given the cross-sectional nature of the data.

It is important to acknowledge the limitations of this approach. The regression is associational, not causal; endogeneity (e.g., better-performing districts attracting more infrastructure investment) cannot be ruled out. Instrumental variable methods or panel-fixed-effects specifications using multi-year data would strengthen causal identification in future research. The present analysis is best interpreted as establishing the directional and magnitude associations between digital infrastructure and educational outcomes, consistent with the existing empirical literature.

Digital Education Infrastructure: National Trends and Madhya Pradesh

India has made measurable progress in expanding digital infrastructure in schools over the past five years. The percentage of schools with computers increased from 38.5% in 2019-20 to 57.2% in 2023-24, and further to 64.7% in 2024-25 — an aggregate increase of 26.2 percentage points over five years (Economic Survey, 2025; UDISE+, 2025). Internet-connected schools rose more sharply: from 22.3% in 2019-20 to 53.9% in 2023-24, and 63.5% in 2024-25 — a gain of 41.2 percentage points (UDISE+, 2025). Electricity availability improved from an estimated 85% to 93.6% in 2024-25. Smart classrooms in government schools reached 21.2% in 2023-24, up from 14.4% in 2021-22 (IndiaSpend, 2025).

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Despite this progress, profound challenges persist. More than one-third of Indian schools still lacked computers and internet as of 2024-25. In absolute terms, this means that tens of thousands of schools — serving millions of students — remain digitally unserved. The BharatNet project, which targets rural broadband connectivity, had connected only 2.14 lakh of a targeted 6 lakh villages by October 2024 (Rau's IAS, 2025). The consequences of this implementation lag are directly visible in the rural-urban digital divide within the school system.

Madhya Pradesh's situation is substantially more precarious than the national aggregate suggests. As shown in Table 1 below, the state lags behind India on every measured dimension. Only 41% of MP schools had computers and 35.3% had internet access as of 2023-24, compared to national averages of 57.2% and 53.9% respectively. Smart classroom penetration in MP government schools stood at approximately 12%, against the national government-school average of 21.2%. Digital library availability remained at a mere 2% in MP, compared to a national 10%.

Table(1) Digital Infrastructure in Schools — India and Madhya Pradesh (2019–2025)

Infrastructure Indicator	**India 2019-20 (%)**	**India 2023-24 (%)**	**India 2024-25 (%)**	**Madhya Pradesh 2023-24 (%)**
Schools with Computers	38.5	57.2	64.7	41.0
Schools with Internet Access	22.3	53.9	63.5	35.3
Schools with Electricity	—	89.7	93.6	~81.0*
Smart Classrooms (Govt. Schools)	—	21.2	~24.0*	12.0
Digital Libraries	—	10.0	~12.0*	2.0

Note: * Estimated using state-level infrastructure ratios from UDISE+ 2023-24 and regional averages. Sources: UDISE+ (2024, 2025); Economic Survey (2025); IndiaSpend (2025).

The rural-urban dimension compounds state-level disparities further. Nationally, rural schools had computer access in only 22% of cases, versus 55% of urban schools; internet was available in 18% of rural schools against 62% of urban schools (Charan, 2024). In Madhya Pradesh, where 75% of the population is classified as rural, these rural deficits are structurally dominant. Power outages further degrade the effective utility of digital infrastructure even where it nominally exists: 89.7% of Indian schools had electricity as of 2023-24 (UDISE+), but frequent outages — particularly in rural MP — render digital infrastructure functionally unreliable (Rau's IAS, 2025).

The tribal dimension is especially significant for Madhya Pradesh. The state has 46 recognised Scheduled Tribe communities, and DIKSHA's content in tribal languages such as Gondi and Bhili remains limited. The platform's content, while available in 36 Indian languages, does not yet comprehensively cover the linguistic diversity of MP's Adivasi regions. This creates a 'third-order' digital divide: even where infrastructure and devices exist, content may not be accessible in the learner's mother tongue.

RESULTS AND ANALYSIS

Digital Education Access Index (DEAI)

Table 2 presents the component-wise and composite DEAI scores for India and Madhya Pradesh, computed using UDISE+ 2023-24 data. The composite DEAI for Madhya Pradesh is estimated at 0.336, against a national composite of 0.513. This gap of 0.177 points signifies that MP's digital educational access is approximately 34.5% lower than the national average on a normalized scale.

The sharpest gaps appear in internet connectivity (0.186) and teacher digital training (0.190). These are also the dimensions with the greatest demonstrated association with educational outcomes in the regression model. This

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convergence of evidence suggests that targeted investment in internet connectivity and teacher capacity building would yield the highest return on equity per rupee of policy expenditure in Madhya Pradesh.

Table(2) Digital Education Access Index (DEAI) — Component-Wise Analysis, India vs. Madhya Pradesh (2023-24)

DEAI Component	India Score	MP Score	Gap (India − MP)
Computer Availability (C)	0.572	0.410	0.162
Internet Connectivity (I)	0.539	0.353	0.186
Digital Device Availability (D)	0.480	0.310	0.170
Teacher Digital Training (T)	0.460	0.270	0.190
Composite DEAI Score	0.513	0.336	0.177

Note: DEAI = (C + I + D + T) / 4. Source: Authors' computation based on UDISE+ (2024).

Regression Analysis: Digital Infrastructure and Educational Outcomes

The OLS regression results are presented in Table 3. All three digital infrastructure predictors — internet connectivity, digital device availability, and teacher digital training — exhibit positive and statistically significant associations with the composite educational outcome variable (GER-adjusted dropout inverse). The model explains approximately 64% of the variance in the outcome variable (Adjusted $R^2 = 0.64$), indicating substantial explanatory power.

Internet connectivity registers the largest coefficient ($\beta = 0.42$, $p < 0.001$), suggesting that a 10-percentage-point increase in the share of internet-connected schools is associated, on average, with a 4.2-point improvement in the composite educational outcome measure. Digital device availability contributes a coefficient of 0.31, and teacher digital training contributes 0.28 — both significant at the 0.1% level. The ordering of effect sizes is consistent with international evidence: infrastructure-level access (internet) enables the use of platforms, while pedagogical capacity (teacher training) determines whether such access translates into learning gains.

Table(3) OLS Regression Results — Digital Infrastructure and Educational Outcomes

Predictor Variable	Coefficient (β)	Std. Error	t-value	Significance
Internet Connectivity (I)	0.42	0.071	5.91	$p < 0.001$
Digital Devices (D)	0.31	0.068	4.56	$p < 0.001$
Teacher Digital Training (T)	0.28	0.063	4.44	$p < 0.001$
Adjusted R^2	0.64	—	—	—

Note: Dependent variable (Y) is a composite of GER and inverse dropout rate, normalised to 0-1 scale. All predictors normalized. Source: Authors' computation based on UDISE+ (2024).

Distributional Inequality: Gini Coefficient Analysis

Table 4 presents the Gini coefficient estimates for digital educational access at different levels of aggregation. The all-India Gini of 0.38 indicates moderate inequality in the distribution of digital educational access across schools and districts. Madhya Pradesh's state-level Gini of 0.47 falls in the 'high inequality' range, consistent with the significant inter-district disparities documented in UDISE+ data.

The rural-urban decomposition of the Gini reveals an especially stark contrast: estimated rural India Gini of 0.51 versus urban Gini of 0.22. This decomposition underscores that the aggregate national moderate inequality conceals a deep rural-urban fracture — a finding that has direct implications for the geographic targeting of digital education investment.

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Table(4) Gini Coefficient for Digital Educational Access — India and Madhya Pradesh

Region / Level	Gini Coefficient	Interpretation
All-India (2023-24)	0.38	Moderate inequality
Madhya Pradesh (2023-24)	0.47	High inequality
Rural India (estimated)	0.51	High inequality
Urban India (estimated)	0.22	Low-moderate inequality

Note: Rural/urban estimates are derived using state-specific DEAI components weighted by school population shares. Source: Authors' computation based on UDISE+ (2024); Charan (2024).

DISCUSSION

The results of this study converge on a central finding: digital educational platforms carry significant potential to reduce socio-economic educational inequities in India, but this potential is severely constrained by the digital divide — particularly in lagging states such as Madhya Pradesh. The three-layered challenge of physical infrastructure, digital device access, and teacher capability acts as a compound barrier.

The DEAI framework developed in this study offers a useful diagnostic tool. It enables policymakers and researchers to identify not merely whether a school has 'some' digital infrastructure, but which specific dimensions of access are most deficient and therefore most in need of targeted investment. In Madhya Pradesh, the analysis points unambiguously to internet connectivity and teacher training as the highest-priority intervention domains.

The regression results confirm what the theoretical literature (Dijk, 2005; Riggins and Dewan, 2005) would predict: first-order access (internet and devices) is necessary but insufficient. Second-order access — the capability to effectively use digital tools — depends critically on teacher training. NISHTHA 3.0, India's national teacher training programme, has made significant strides, but its penetration in Madhya Pradesh's remote districts remains uneven. A state-specific deep-dive study on NISHTHA implementation in MP's tribal blocks would be a valuable contribution to the literature.

The digital divide in Madhya Pradesh is also a temporal problem. The UDISE+ trend data (2019-20 to 2024-25) show that national improvements in computer and internet access in schools have been significant and consistent. However, the absolute gap between MP and the national average has not narrowed commensurately. This suggests a 'digital Matthew effect' — the advantage of higher-infrastructure regions compounds over time as new technologies build on existing foundations, while under-infrastructure regions fall further behind. Active redistribution of digital investment toward lagging states is essential to prevent this dynamic from deepening.

The gender dimension, while not the central focus of this paper, deserves explicit acknowledgement. With only 21% of Indian women using the internet and rural girls facing compounded barriers, digital education platforms risk becoming yet another domain in which gender gaps are replicated or amplified rather than reduced. Platform design, content, and community engagement strategies must explicitly incorporate gender-responsive approaches.

Finally, the linguistic dimension of digital access in Madhya Pradesh deserves policy attention. DIKSHA's multilingual content is a significant achievement, but the platform's coverage of MP's tribal languages — including Gondi, Bhili, Korku, and Baiga — is nascent at best. Content in a learner's mother tongue is not merely a pedagogical preference; research consistently demonstrates that mother-tongue instruction significantly improves foundational literacy and learning outcomes, particularly in the early grades. Expanding DIKSHA's content in MP's tribal languages should be treated as an equity imperative, not an optional enhancement.

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POLICY IMPLICATIONS AND RECOMMENDATIONS

Based on the empirical analysis and the existing evidence base, this study proposes the following evidence-grounded policy framework. Table 5 provides a summary matrix of recommendations, domains, and target beneficiaries.

Table(5) Policy Recommendation Matrix — Digital Education Equity in Madhya Pradesh

Policy Domain	Recommended Action	Target Beneficiary
Infrastructure	Accelerate BharatNet Phase III to connect all rural schools by 2027	Rural schools in states like MP
Device Access	Subsidize low-cost tablets under Samagra Shiksha for SC/ST and BPL students	Economically disadvantaged students
Teacher Capacity	Mandate NISHTHA 3.0 digital pedagogy modules for all government school teachers	All government school teachers
Content Localization	Expand DIKSHA content in tribal languages (Gondi, Bhili) for MP's Adivasi regions	Tribal communities in MP
Community Access	Establish Digital Learning Centres (DLCs) at Gram Panchayat level	Rural & semi-urban communities
Monitoring	Integrate DEAI tracking into annual UDISE+ reporting cycle	Ministry of Education / state SPDs

Source: Authors' synthesis based on empirical findings and policy evidence.

Infrastructure Acceleration

BharatNet Phase III must priorities connectivity for government secondary schools in Madhya Pradesh's 52 districts, with particular emphasis on the 20 tribal districts. Solar-powered hybrid connectivity solutions should be deployed for schools in areas with persistent power outages. The Ministry of Education's ₹5,989.91 crore ICT investment announced in 2025 should incorporate an equity-weighted allocation formula that channels higher per-school investment to states with DEAI scores below 0.40.

Device Accessibility

A dedicated device subsidy program under Samagra Shiksha — structured similarly to the existing uniform and textbook distribution schemes — should provide tablets or low-cost computing devices to students from BPL, SC, ST, and OBC households. Community device libraries at Gram Panchayat levels can serve as shared access points for students without household devices. Solar-powered tablet charging stations would address the electricity constraint in tandem.

Teacher Digital Capacity

NISHTHA 3.0 completion rates among MP's government school teachers must be tracked and incentivized through teacher performance appraisal mechanisms. District-level digital pedagogy resource centers, staffed by master trainers, should be established across all 52 districts. The Digital Education Coordinator role — proposed under NEP 2020 — should be mandatorily deployed at the block level in MP, with a specific mandate to support teachers in integrating DIKSHA and other platforms into daily instruction.

Localized Content and Language

NCERT and MP State Council of Educational Research and Training (SCERT) should commission and validate DIKSHA content in Gondi, Bhili, Korku, and Baiga — the four largest tribal languages in MP — covering at minimum the foundational (Grades 1-5) and preparatory (Grades 6-8) stages of schooling. Open-licensing frameworks should incentivise local educators and community members to contribute language-specific content through the VidyaDaan mechanism.

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Monitoring and Accountability

The DEAI framework developed in this study should be integrated into UDISE+'s annual reporting cycle, enabling year-on-year tracking of digital access inequality at state, district, and block levels. A District Digital Education Report Card, modelled on the ASER report format, should be published annually to create public accountability for digital infrastructure improvements.

CONCLUSION

This study has examined the role of digital educational platforms in addressing socio-economic educational inequities in India, with particular empirical focus on Madhya Pradesh. Through the construction of the Digital Education Access Index (DEAI), Gini coefficient analysis, and OLS regression, the study demonstrates three core findings.

First, digital infrastructure has improved significantly at the national level over the past five years, but a substantial portion of India's schools — and a disproportionately large share of Madhya Pradesh's schools — remain digitally excluded. MP's composite DEAI of 0.336 reflects a 34.5% deficit relative to the national average of 0.513. Second, this deficit is not uniform but concentrated in internet connectivity and teacher digital training — the two dimensions most strongly associated with educational outcome improvements in the regression model. Third, distributional inequality in digital access within Madhya Pradesh (Gini = 0.47) is significantly higher than the national average (Gini = 0.38), with rural schools bearing the heaviest burden of exclusion.

The study also situates these findings within the broader frameworks of NEP 2020 and SDG-4. India's ambition of achieving 100% Gross Enrolment Ratio in school education by 2030 is structurally threatened by the persistence of digital inequality in states like Madhya Pradesh. Without accelerated and equity-weighted digital infrastructure investment, the risk is that digital education platforms — designed as equalisers — may paradoxically become amplifiers of existing socio-economic disparities.

The path toward inclusive digital education in Madhya Pradesh requires not a single intervention but a coordinated, multi-layered strategy: infrastructure acceleration, device subsidisation, teacher training at scale, mother-tongue content development, and community-level access mechanisms. The DEAI framework and the policy matrix presented in this study offer actionable starting points for policymakers, researchers, and civil society partners working toward this goal.

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