Leveraging EdTech for Inclusive Growth: Analysing NEP 2020's Vision for Social Transformation in Indian Education

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ABSTRACT

The National Education Policy (NEP) 2020 conceptualizes digital technology as a structural catalyst for reconfiguring India's education system while promoting equitable socio-economic development (Government of India [GoI], 2020). In a nation characterized by demographic diversity, socio-economic stratification, linguistic plurality, and regional imbalances, Education Technology (EdTech) is positioned as a foundational public digital infrastructure capable of expanding access, improving quality, and mitigating entrenched inequalities. This paper critically examines the extent to which EdTech initiatives introduced under NEP 2020 contribute to inclusive growth and broader social transformation. The research evaluates progress in digital infrastructure, student engagement, teacher readiness, governance reforms, and equity results by utilizing secondary data sources such as the Economic Survey 2023–24 (Ministry of Finance, 2024a), Union Budget 2024–25 (Ministry of Finance, 2024b), UNESCO (2023), ASER (2023), NITI Aayog (2021), and peer-reviewed research (2020–2024). Key initiatives like DIKSHA, SWAYAM, PM eVIDYA, National Digital Education Architecture (NDEAR), and the proposed Digital University are examined within the larger context of India's Digital Public Infrastructure (DPI). The results reveal that although EdTech has greatly expanded outreach and facilitated scalable delivery methods, ongoing issues related to connectivity, device ownership, digital skills, linguistic diversity, and gender access still hinder inclusive outcomes. The research contends that digital transformation can foster inclusive growth only when it is backed by continuous public investment, enhancement of institutions, and implementation frameworks that prioritize equity. The study emphasizes that for digital transformation to effectively encourage inclusive growth, it is essential to have equity-focused implementation frameworks, strengthened institutions, and reliable public investment.

***Keywords**: EdTech, NEP 2020, Inclusive Growth, Digital Divide, Human Capital, India, Social Transformation.*

Introduction

Historically, education has played a crucial role in ensuring institutional stability, driving economic growth, and facilitating social mobility. It has enhanced governance, promoted intergenerational advancement, and cultivated civic awareness across various cultures. In contemporary nation-states, education serves as a strategic instrument for enhancing human capabilities, fostering innovation, and boosting global competitiveness. Its role has evolved beyond mere moral or cultural transmission. Education represents both a long-term financial investment and a vital developmental requirement for emerging nations such as India. As India transitions towards a knowledge-based economy, the significance of education in generating skilled human capital has become increasingly pronounced.

Education as a Pillar of Nation-Building

Education plays a crucial role in nation-building by cultivating informed individuals who can participate actively in democratic governance. A literate and critically aware citizenry enhances

institutional credibility through increased civic engagement, awareness of rights, and social responsibility. Furthermore, education promotes constitutional values such as equality, secularism, and social justice in a diverse country like India (GoI, 2020).

In the policy frameworks established after independence, expanding education was prioritized as a means to modernize and unify society. The growth of higher education became more standardized due to institutional mechanisms like the University Grants Commission (UGC) and various national education initiatives. Initiatives such as Rashtriya Madhyamik Shiksha Abhiyan and Sarva Shiksha Abhiyan have demonstrated ongoing efforts to achieve universal education. However, this expansion has not consistently led to enhancements in equity or quality.

Education as a Driver of Economic Development

Education enhances national output, productivity, and income potential through the lens of human capital (Becker, 1964). Following India's economic liberalization in 1991, the country's entry into global markets heightened the demand for skilled labor, particularly in service and technology-driven sectors. India's reputation in the realm of technical and managerial education has been bolstered by institutions such as IITs and IIMs. Nevertheless, the quality of basic education remains uneven, despite the excellence demonstrated by top-tier schools. A significant segment of India's workforce continues to be employed in unorganized sectors characterized by low educational attainment and sluggish productivity growth. Consequently, improvements in basic literacy and numeracy, alongside elite higher education, are essential for fostering inclusive economic development.

Education and Poverty Reduction

An increase in the number of years spent in education is positively associated with higher income levels and a reduced likelihood of experiencing poverty, as evidenced by empirical studies (World Bank, 2022). The establishment of educational institutions and legislation such as the Right to Education Act significantly boosted enrollment rates in India. This disparity in educational attainment suggests that merely providing access is insufficient to effectively disrupt cycles of intergenerational poverty without ensuring quality education.

Expansion Since the 1990s: Achievements and Gaps:

India has experienced considerable quantitative advancement in education since the 1990s. Vocational education has garnered policy focus, private schools have rapidly proliferated, and Gross Enrollment Ratios (GER) in higher education have risen significantly. Access has been further enhanced by digital initiatives such as SWAYAM and online learning platforms.

However, disparities remain deeply embedded in the system:

- **Socio-Economic Disparities:** While affluent families enjoy access to high-quality private education, children from economically disadvantaged backgrounds often find themselves in underfunded public schools. This situation results in long-term disparities in outcomes as well as unequal learning environments.

- **Regional Disparities:** While states such as Bihar and Jharkhand face challenges related to infrastructure and quality, Kerala and Tamil Nadu demonstrate high literacy rates and exceptional educational performance.

- **Caste and Social Category Gaps:** Historically marginalized communities, including Scheduled Tribes (STs) and Scheduled Castes (SCs), continue to confront challenges such as geographic isolation, lower levels of parental education, and social discrimination.

- **Gender Gaps:** Despite significant progress in achieving gender parity in primary education, certain regions still experience elevated secondary dropout rates for girls due to sociocultural norms, safety issues, and early marriage.

- **Urban–Rural Divide:** In comparison to rural schools, urban institutions typically offer better facilities, more qualified educators, and greater access to digital resources. These disparities indicate that educational advancement has been uneven, and variations in quality threaten to exacerbate pre-existing socioeconomic divides.

India's Demographic Context: Opportunity and Urgency

India is currently experiencing a significant demographic shift, possessing one of the largest youth populations globally. Should the youth acquire the essential skills and competencies, the demographic dividend presents an opportunity for accelerated growth. Conversely, if educational funding

is inadequate, this dividend may transform into a socioeconomic liability characterized by underemployment and unemployment. In this pressing context, the National Education Policy (NEP) 2020 has been formulated. It strongly focuses on the development of teachers, the integration of digital technologies, transdisciplinary education, foundational literacy, and aims to increase the Gross Enrollment Ratio to 50% by the year 2035 (GoI, 2020).

The National Education Policy 2020 (NEP 2020) (Government of India [GoI], 2020)

The most significant transformation of India's educational system since 1986 is represented by this initiative. Unlike earlier policies that emphasized access and growth, NEP 2020 centers technology as the foundation of systemic change, recognizing digital infrastructure as a crucial enabler of equity, quality, effective governance, and sustainable economic growth, rather than merely an auxiliary tool. The policy envisions the integration of digital technologies into various aspects such as curriculum delivery, teacher professional development, assessment reforms, vocational integration, research collaboration, institutional governance, and lifelong learning. The digital vision outlined in NEP 2020 aligns closely with India's broader developmental path. The strategy recognizes the necessity for educational institutions to evolve in order to equip students not only for employment but also for adaptability, creativity, and digital citizenship in an increasingly digitized global economy characterized by automation, artificial intelligence, and data-driven decision-making. Consequently, technology is framed as a catalyst for both socioeconomic advancement and educational reform.

COVID-19: Acceleration and Exposure of Digital Inequality

The COVID-19 pandemic hastened the adoption of digital technologies while also exposing systemic inequities in access. As reported by ASER (2023), notable differences in device ownership and connectivity hindered participation from rural and economically disadvantaged households. Numerous students relied on shared smartphones, which constrained their study time and continuity. Consequently, the pandemic underscored that the digital divide is multifaceted, involving factors such as income, gender, geography, and digital proficiency (OECD, 2021).

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- Households with lower incomes have reduced access to devices.
- There are disparities between genders regarding digital usage and phone ownership.
- Insufficient digital literacy results in diminished parental support.
- There has been a loss of learning, particularly among students in foundational grades.
- Marginalized communities are more prone to dropping out.

For some individuals, digital platforms ensured continuity; however, millions were effectively excluded. Consequently, the pandemic highlighted the "digital divide," which represents a complex imbalance that encompasses poverty, gender, geography, and social capital, in addition to the technological gap.

Digital Public Infrastructure (DPI) as a Growth Multiplier

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Union Budget 2024–25: Expanding the Digital Education Agenda

The Union Budget 2024–25 reiterates commitments to strengthening digital education infrastructure.

Key initiatives include:

- Expansion of PM eVIDYA channels.
- Development of AI-driven personalized learning systems.
- Enhancement of digital classrooms in public schools.

- Augmented funding for virtual laboratories and digital training for educators. These financial commitments indicate a political acknowledgment of EdTech as a strategic investment rather than merely a temporary reaction to the pandemic. By integrating digital learning into fiscal strategies, the government seeks to institutionalize technological change. However, financial allocations must effectively lead to successful implementation at the grassroots level. Without reliable electricity, broadband infrastructure, and maintenance support, digital classrooms risk becoming underutilized assets.

Inclusive Growth: Promise or Paradox?

Inclusive growth signifies fair access to opportunities, the alleviation of socio-economic inequalities, and comprehensive development of human capital. The EdTech initiative under NEP 2020 possesses transformative capabilities; however, its inclusivity is contingent upon the design of its implementation.

While EdTech under NEP 2020 has the capacity to be inclusive, it is not inherently equitable. The outcomes are dictated by the manner in which it is implemented.

Possible Contributions

- Eliminated geographical barriers.
- Lowered marginal costs for content delivery.
- Flexible pathways for lifelong education.
- Improved transparency in governance.

Its impact depends on complementary policies:

- Investment in infrastructure for rural broadband access.
- Publicly provided affordable devices.
- Development of multilingual digital content.
- Training for teachers in digital literacy.
- Robust regulations for data privacy.
- Mechanisms for monitoring and evaluation.

The policy's vision is progressive and aligned with global digital transformation trends. However, technology alone cannot solve systemic inequalities rooted in poverty, gender norms, and regional disparities.

Conceptual Framework: EdTech and Inclusive Growth

Comprehending the connection between Educational Technology (EdTech) and inclusive growth necessitates a multidisciplinary framework that combines development economics, educational theory, digital sociology, and public policy. This section defines inclusive growth in the context of the education system and positions EdTech through three primary theoretical perspectives: Human Capital Theory, the Capability Approach, and Digital Divide Theory.

- **Inclusive Growth in Education**

Enhancing access and outcomes across various socioeconomic groups while reducing structural inequalities is referred to as inclusive growth in education (World Bank, 2022). This concept encompasses quality, accessibility, linguistic diversity, gender equality, and equitable results alongside enrollment. EdTech has the potential to assist through open resources, adaptive learning tools, and scalable delivery methods. Nevertheless, without infrastructural equity, digital channels may reinforce existing disparities.

Dimensions of Inclusive Education

There are several facets to inclusive expansion in education:

- **Universal Access to High-Quality Education encompasses more than mere enrolment. It includes:**
  - Accessibility of infrastructure (schools, digital devices, connectivity)
  - Competent educators and educational resources.

- ▪ **Digital platforms and adaptive content:** EdTech platforms can mitigate geographical barriers by enhancing educational delivery through blended learning systems, online classrooms, and open educational resources (OERs).

- **Gender Equality:** Despite progress, disparities in digital access and participation in STEM fields persist. In rural India, women's internet usage remains significantly lower than that of men, as indicated by national surveys. EdTech initiatives can alleviate mobility challenges for girls, especially in remote or conservative regions, provided that access to devices and digital literacy programs are established.

- **Accessibility for Differently Abled Learners:** Education systems must cater to students with visual, auditory, cognitive, or physical disabilities to foster inclusive development.

  EdTech Facilitates

  - ▪ Screen reader tools for speech-to-text conversion
  - ▪ AI-driven personalized interfaces.
  - ▪ The incorporation of sign language and subtitles.

  Nonetheless, true accessibility hinges on the design and affordability of platforms.

- **Linguistic Inclusion:** India's multilingual landscape complicates the delivery of a uniform curriculum. EdTech platforms that provide content in regional languages enhance participation and comprehension. Neglecting linguistic diversity can worsen educational inequalities.

- **Regional Balance:** Urban and rural regions exhibit significant disparities in educational resources.

  EdTech can bridge these geographical gaps by:

  - ▪ Delivering lectures virtually.
  - ▪ Providing remote mentoring.
  - ▪ Making high-quality content from esteemed institutions more accessible.

  However, inadequate broadband connectivity in rural areas continues to hinder effectiveness.

- **Learning Gap Reduction:** The incapacity of children to read and comprehend simple text by the age of ten is known as learning poverty, and it continues to be a global concern. AI-powered adaptive learning solutions have the ability to reduce learning gaps by identifying individual shortcomings and tailoring teaching.

Education as a Driver of Inclusive Economic Growth

Education promotes inclusive development in a number of ways:

- **Improving Employability:** Participation in the labor market rises when skill development is in line with industry demands.

- **Increasing Income Levels:** Wage premiums are positively correlated with education.

- **Promoting Entrepreneurship:** Participation in online marketplaces is made possible by digital literacy.

- **Encouraging Social Mobility:** Education ends poverty cycles that span generations.

- **Boosting Civic Engagement:** Digital literacy increases participation in public services and governance.

Education is therefore a profitable investment in the advancement of the country as well as a social good.

Theoretical Foundations

According to Human Capital Theory, education is viewed as an investment that generates financial benefits (Becker, 1964). EdTech enhances cost-effectiveness and scalability. Nevertheless, the disparity in returns due to unequal internet access may worsen socioeconomic inequality. Utilization in the Indian Context: The growth of India's IT and service sectors exemplifies the financial advantages of investing in human capital. Due to ongoing investments in technical training and higher education, cities such as Bengaluru, Hyderabad, and Pune have emerged as centers of knowledge.

The following are several ways in which EdTech supports the Human Capital Theory:

- **Scalability:** Digital platforms can be accessed by millions simultaneously.
- **Cost Efficiency:** The delivery of digital content incurs a lower marginal cost compared to physical expansion.
- **Skill-Oriented Learning:** Micro-credentials and certifications aligned with industry standards enhance employability.
- **Continuous Learning**: Professionals can enhance their skills through online courses without leaving the workforce.

However, the theory presupposes equal access to educational opportunities. If digital access is not equitable, EdTech may disproportionately benefit already privileged groups, thereby exacerbating inequality rather than alleviating it. Therefore, while Human Capital Theory endorses EdTech as a catalyst for growth, it must be paired with policy interventions that prioritize equity.

- **Capability Approach**

The Capability Approach, developed by Sen (1999), shifts the focus from income to freedoms and real opportunities. Education, in this framework, is not merely a means to higher earnings but a fundamental capability that expands individuals' choices and agency.

EdTech Through the Capability Lens

EdTech can enhance capabilities by:

- Expanding access to knowledge
- Enabling flexible learning pathways
- Providing digital literacy
- Connecting learners to global networks

Without these, EdTech risks becoming a symbolic rather than substantive expansion of freedom. The Capability Approach therefore emphasizes equitable access, empowerment, and contextual support, making it highly relevant to India's socio-economic diversity.

- **Digital Divide Theory**

Different socioeconomic groups get different meaningful gains from digital involvement. While marginalized kids could find it difficult to navigate basic EdTech, students from wealthy backgrounds might use it for competitive tests.

Indian Context of the Digital Divide

The divide in India manifests across:

- Urban–Rural Lines: Limited broadband penetration in remote districts.
- Income Groups: Device affordability constraints.
- Gender: Lower female smartphone ownership in certain states.
- Language Communities: Limited regional language digital content.

Thus, EdTech is neither inherently inclusive nor inherently exclusionary. Its impact depends on:

- Infrastructure equity
- Regulatory frameworks
- Public-private collaboration
- Inclusive content design
- Capacity building among teachers and learners

Literature Review

- **Global Perspectives**

UNESCO (2023) argues that technology is a tool- not a substitute- for systemic reform. It cautions against unregulated commercialization of education technology. The World Bank (2022) finds that blended learning improves outcomes when teacher training and infrastructure are adequate. OECD (2021) highlights that digital transformation succeeds in environments with universal connectivity and strong institutional frameworks.

- **Indian Context**

Agarwal (2021) identifies infrastructural constraints in rural schools. Kumar and Gupta (2022) highlight uneven implementation of digital initiatives across states. Banerjee and Duflo (2020) caution that technological interventions may disproportionately benefit already advantaged learners. NITI Aayog (2021) recognizes scalability potential but stresses affordability and regulation.

The ASER (2023) report shows persistent learning recovery gaps in rural India post-pandemic. Sharma (2024) identifies digital exclusion within higher education, especially among first-generation learners.

- **Research Gap**

Existing studies focus primarily on pandemic disruptions. Limited scholarship integrates recent macro-policy developments (Economic Survey 2023–24; Budget 2024–25) with long-term inclusion outcomes. This study addresses that gap.

Methodology

This study adopts a qualitative, policy-analytical approach using secondary data sources:

- NEP 2020 document
- Economic Survey 2023–24
- Union Budget 2024–25
- ASER 2023
- UNESCO Global Education Monitoring Report (2023)
- NITI Aayog (2021)
- Peer-reviewed articles (2020–2024)

Data were analyzed thematically under infrastructure, access, teacher readiness, governance, and equity outcomes.

Government EdTech Initiatives Under NEP 2020:

DIKSHA

DIKSHA serves as India's national digital platform for school education. It integrates QR-coded textbooks, teacher training modules, and multilingual content. The platform has recorded billions of learning sessions since its inception (GoI, 2023).

- **Strengths:**
  - Scalable architecture
  - State-level customization
  - Integration with teacher training

- **SWAYAM**

SWAYAM offers MOOCs from premier institutions. It democratizes access to higher education through credit transfers and certification.

However, high dropout rates (often exceeding 70%) reflect challenges of self-regulated online learning (OECD, 2021).

- **PM eVIDYA**

PM eVIDYA adopts a multi-modal approach—television channels, radio broadcasts, podcasts, and online portals. This hybrid model enhances reach among device-poor households.

- **National Digital Education Architecture (NDEAR)**

NDEAR ensures interoperability among digital platforms. It aims to build a unified digital ecosystem for learners, teachers, and administrators.

- **Digital University**

The proposed Digital University aims to offer flexible, multilingual higher education integrated with the Academic Bank of Credits. However, accreditation clarity and affordability mechanisms remain evolving concerns.

EdTech Adoption Trends in India

India's digital ecosystem has expanded rapidly:

- Over 850 million internet subscribers (TRAI, 2024)
- Smartphone penetration exceeding 750 million users
- Expansion of 4G/5G infrastructure
- Rapid growth of private EdTech firms

However, rural internet penetration remains significantly lower than urban rates. Female internet usage lags male participation (NFHS-5, 2021).

Private firms such as Byju's and Unacademy expanded aggressively during the pandemic, attracting global investment. Yet commercialization raised concerns regarding affordability and aggressive marketing.

Policy Implications and Recommendations

- **Strengthen Digital Public Infrastructure**

  Accelerate BharatNet rural connectivity and ensure last-mile delivery.

- **Device Subsidization**

  Introduce targeted subsidy programs for economically weaker sections.

- **Multilingual and Inclusive Design**

  Expand content into tribal languages. Ensure accessibility features for differently-abled learners.

- **Teacher Capacity Building**

  Mandate continuous digital pedagogy certification programs with incentives.

- **Regulatory Framework**

  Establish ethical standards for data privacy, AI use, and pricing transparency.

- **Gender-Focused Interventions**

  Promote digital literacy among women through community-based programs.

Discussion*: EdTech as a Tool of Social Transformation*

EdTech holds transformative potential by:

- Expanding geographical access
- Reducing transaction costs
- Facilitating lifelong learning
- Enhancing governance transparency

However, technology is not inherently inclusive. Without equity safeguards, digital expansion risks amplifying inequalities.

Inclusive digital transformation requires:

- Infrastructure
- Capacity
- Regulation
- Community engagement
- Public accountability

Conclusion

EdTech under NEP 2020 represents a bold and ambitious reform initiative aimed at integrating digital public infrastructure into India's educational ecosystem. While significant progress has been made in expanding platforms such as DIKSHA, SWAYAM, and PM eVIDYA, structural inequalities continue to limit inclusive outcomes.

Technology alone cannot guarantee social transformation. Inclusive growth requires deliberate policy design, sustained public investment, and equity-centered governance. When embedded within a broader socio-institutional framework that prioritizes accessibility, affordability, and contextual adaptability, EdTech can indeed serve as a powerful instrument for human capital formation and social mobility in India.

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