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Technological Shift: Revolutionizing Pedagogy and Social Policy for the Next Generation

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Abstract

Aim: *This article examines the impact of digital technology on the Indian educational system, highlighting how new tools have changed the way students learn and how teachers approach their work.*

Methodology and Approach: *Within the framework of social policy development, the study investigates the transition from analogue to digital pedagogical paradigms and evaluates the benefits and drawbacks of each.*

Outcome: *The research shows that marginalised populations continue to face difficulties related to digital exclusion, even though there has been significant progress in integrating technology. Educational gaps persist due to discrepancies in digital infrastructure, as shown in the UDISE+ 2023–2024 report, which indicates that just 57% of schools have working computers and 53% have internet connectivity.*

Conclusion and Suggestions: *Fair distribution of resources and comprehensive digital accessibility regulations are emphasised in the report. It calls for stronger digital safety measures, more inclusive digital curriculum development, improved digital literacy programs, and coordinated national and international policy frameworks. In line with the objectives of the National Education Policy 2020, India can use digital technology more effectively by systematically addressing these challenges, thereby creating an educational ecosystem that is more inclusive and equitable.*

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1 Introduction

The widespread use of technological devices in modern life has grown exponentially in the last decade. Recently, technical advancements rapidly become outdated upon their inception (Yue 226). Concurrently, technology has revolutionised our methods of learning, communication, and processing, and education is no exception. The Indian educational system has seen a substantial transition in recent years. It has rendered learning more interactive and engaging, while facilitating new opportunities for cooperation and knowledge dissemination (Jain).

Conversely, education is fundamental to societal advancement; nevertheless, in a diverse and expansive nation such as India, achieving fair access to quality education is a significant difficulty. Disparities in resources and opportunities impede educational equity, affecting both remote rural locations and urban impoverished neighbourhoods. Nonetheless, technology is swiftly altering this domain, providing innovative solutions to address the educational disparity (CII). Technology-enhanced classrooms, equipped with digital infrastructure, offer various pedagogical and learning opportunities by integrating tools such as interactive whiteboards, screens, audio-visual resources, ICT laboratories, multimedia centres, classroom management software, homework submission sites, and Cloud-hosted learning solutions, among others. Moreover, it has been shown to improve learning pupil retention, transform the educational process, expand opportunities for research, diminish reliance on rote learning, enable both educators and learners, and promote engaged study. In addition, augmented reality and virtual reality technologies are regarded as the future of education (Jain).

Over the subsequent 40 years, computers evolved into the foundation of social policy administration and practice. Back-office computers linked to internet platforms and smartphone applications enable individuals to apply for benefits and services around the clock and report to the government to maintain ongoing compliance (Henman 537). Education has been notably important as a tool of social policy, encompassing not only welfare initiatives but also strategies aimed at addressing societal structure (Aravacik 3). Simultaneously, computers

continuously evaluate incoming data and correlate it with various governmental and non-governmental datasets (e.g., banks, social media) to ensure compliance, thereby automating identity and eligibility evaluations, the suspension and cancellation of benefits or services, and the imposition of penalties and debts (Eubanks 38–40; Braithwaite 242). while India's usage remains embryonic (Jain).

While the global outbreak (covid-19) shows that citizens and their families have the means to access organised official portals and educational platforms, it can be challenging for them to do so at home without the Community and organizational assistance that is often more difficult than technological gadgets. Indeed, digital technology has facilitated a smooth shift for many from office job to remote work, significantly reducing their commute to merely the time required to move from the bedroom to the kitchen for coffee, and then to the home office. The transition of work and education from institutions to the house has been detrimental for the student mandated to maintain her video and microphone on during a Zoom session, so permitting the instructor and her peers to intrude upon her home privacy. The transition has been challenging for the single father who is required to devote a full day from residence while also educating his three kids, utilising a single computer along with a smartphone with a limited wireless cellular network connectivity. Regrettably, the disparity in access to devices and reliable internet connections resulted in the death of Aishwarya Reddy from Hyderabad, as her parents could not afford a laptop or smartphone. Similarly, 16-year-old Ahirwal, a tenth-grade student at a government school in Jammu (The Economic Times).

The year 2020 article entitled “The Parents Are Not Alright” delineated the difficulties encountered by families of kids in school during virtualisation: “We both experienced guilt for the work we were neglecting — and sorrow for our son's struggles, which required our presence and composure.” However, our existing schedule explicitly restricts this, as we oscillate between work calls, demands, and parental responsibilities. “We perceive that we are failing in both aspects” (Cooney).

In this setting, Educators are vital for giving students with the abilities and background information necessary to thrive in a technologically advanced

Competent workforce, which has undergone significant changes because of technology advancements. Scholars in digital technology (Mirra 262; Marcovitz 5131; Deacon, Laufer, and Schafer 444) have emphasised the influence of having accessibility to digital information on the capacity of students to generate fresh information and knowledg. They assert that students must understand and integrate information, evaluate its credibility, adeptly utilise digital technology, and engage actively in the process of learning (Leming and Lisbeth Bergum Johanson). This highlights the imperative for educators' e-learning pedagogy to adapt and respond to the changing dynamics of effective learning. Educators must concentrate on three fundamental aspects of digital technology: (1) equipping students with relevant abilities, (2) employing appropriate pedagogical strategies, and (3) utilising digital technologies to facilitate intellectual transfer (Mthembu, Gachie, and Govender 4–5).

Despite previous conversations emphasising the importance of all three aspects of digital technology formation in relation to pedagogical transformations, numerous scholars examining teachers' instructional strategies (pedagogical methods) in these circumstances have failed to provide practical and well-structured policies. Moreover, these researchers have inadequately considered the potential limitations of the distinctive methodology utilised to examine educators' pedagogical approaches in light of the emergence of technological innovations. As a result, educators may not fully comprehend how to properly implement suitable pedagogical strategies in the digital age, leading to suboptimal teaching and learning outcomes (Mthembu, Gachie, and Govender 1331). Simply utilising laptops and other devices does not guarantee that students will excel in a completely digital educational setting. Educators must receive training in suitable pedagogical methods that seamlessly incorporate digital technology into their practice (Haleem et al. 283).

Caverly et al. have noted that numerous learners encounter difficulties in achieving proficiency in employment sectors and higher education due to insufficient digital abilities (Caverly et al. 171–172). Nonetheless, individuals who have already encountered digital technology in informal contexts are more adept at managing it (Hietajärvi et al. 35–36). This implies that if educators can

adapt their teaching methods in response to the advent of digital technology, they ought to exemplify the advantages of incorporating digital technology across the educational institution (Starkey 48–49). Students will transfer seamlessly from high school to post-secondary education by efficiently utilising digital technology pedagogical methods. Despite the widespread use of technological innovations and novel pedagogical approaches, educational outcomes frequently fall short of expectations or promises (McCarthy et al. 2–3). For instance, while traditional pedagogical architecture like the work of Vygotsky (Daniels 24–26) may enhance certain facets of teaching and learning, they are not necessarily tailored to integrate with contemporary innovations like- "Artificial Intelligence" (AI) or "Generative Artificial Intelligence" (GenAI). To attain effective digital transformation in education, explicit guidelines for the dissemination of digital technology for educational purposes are essential.

Contemporary digital pedagogies may prove unproductive in certain technology-integrated learning environments, the Digital Competence of Educator emphasised the significance of digital competences in education. A digital pedagogy illustration of learning was developed based on an analysis of several publications on digital pedagogy. To further assist teachers in integrating digital technology into their lessons, Vaataja and Ruokamo in 2021 acknowledged that their digital pedagogy approach needed additional testing and refinement. There is limited evidence of its practical application in technological enhance learning-TEL environments (Väätäjä and Ruokamo 6–7; Huang et al. 6–7). So, make sure that all Indian citizens can fully join in digital jobs, education, and civic events, the government must make policies that cover a lot of ground and are well thought out.

Indian economies will have a hard time fully recovering if officials don't take targeted steps and instead let social and economic dynamics happen naturally. A lot of people who weren't involved in the economy before the global recession probably won't start now, and some people who were involved may stop because of the pressures that have made the digital gap worse. For example- Parents of school-aged kids who have the money and electronic devices to do so can send their kids to private educational institutions that they think offer a more

secure reopening plan or a more organised way to learn online. They can also work with other parents in their area to set up "homeschooling pods" or "micro-schools," where they hire qualified educators to teach their kids or switch off teaching duties. Parents who can't afford private schools will put their kids in public schools to avoid COVID (19), or they will have to give up work or social chances to homeschool, which will make things even less fair. Digital technologies are perpetually at our service, engaging our fingertips and functioning continuously in our environment, and the implementation of social policy is not excluded from this phenomenon. Consequently, it is imperative to integrate the 'digital' into 'social policy' (Henman 2).

2 Theoretical Framework-

2.1 Historical context of pedagogy

The idea of pedagogy encompasses classroom interactions (Li), instructional methodologies, subject presentation, and lesson execution (Du and Coghill 6–7; Anderson 45), comprising administration, evaluation techniques, and instructional design. It includes multiple facets, such as classroom settings, student attributes, teaching methodologies, and educator qualifications. When viewed from a wider perspective, pedagogy has been described as "the art and science of teaching" (Matuga 2). Pedagogical knowledge encompasses the understanding of learning and teaching dynamics, practices, strategies, and methodologies within formal educational settings, along with insights regarding the learning, teaching, and assessment objectives pertinent to students engaged in these environments (Mishra and Koehler 1026–27; Harris, Mishra, and Koehler 395–96; Karakus 676–77). Pedagogy has been analysed as a cognitive area by J. Piaget, while J. Bruner has presented it through the lens of social relations, and L. Vygotsky has contributed social and cultural theories of pedagogy. Pedagogies that account for the differentiation of preferred learning methods, learner self-motivation and self-efficacy, the capacity for self-reflection, and the necessity for incubation in the liminal area. Such events will transpire during a personal learning journey, establishing connections both within and outside the classroom.

The term 'pedagogy' has evolved over time, just like the institution of education itself. Recently, pedagogies have incorporated digital, analytical, and creative elements into our curriculum (Howell 3–6). Nonetheless, we must remain cognisant of the foundational traditions of thought and behaviours inherent in teaching. It is the process of supporting learners, demonstrating concern for their well-being, and enlivening the educational experience (Smith).

2.2) Evolution of pedagogy

Traditional Pedagogy

Field	**Content**
Definition	In traditional teaching methods, teachers play the role of knowledge imparts and authority figures. They develop lesson plans, decide on content and methods of instruction, and impart knowledge to students in the classroom. Students, on the other hand, are regarded as passive receivers who receive from the teacher's instruction through listening, memorizing, and retelling.
Advantages	1) focus on imparts theoretical knowledge to students. 2) Teachers introduce various concepts, principles and facts to students through lectures and demonstrations. 3) Students learn by accepting and memorizing this knowledge to meet the requirements of exams and assessments.
Limitation	1) lack students' active participation. passively accept teachers' guidance and knowledge. 2) Lack the opportunity to think and explore actively.

Field	Content
	3) Teaching limits students' Creativity and development of critical thinking, and fails to stimulate their interest and motivation in learning. 4) Lack personalized teaching. 5) Rely on external rewards and punishments to stimulate students' learning motivation, while ignoring the intrinsic learning interest and motivation.
Theories	Socrates Methods and Gurukul System.
Reference	(Yue, 2024)

Progressive Pedagogy

Field	Content
Definition	Students, rather of passively receiving knowledge, are encouraged to actively participate in the learning process through the use of progressive pedagogy,
Advantages	1) Based on the brain: helping people remember things in the long run. 2) Constructivism: Connecting new learning to prior learning. 3) practical and Active: The students are fully involved in the tasks they are doing to learn. 4) Metacognition: Learning is improved by learner reflection.
Limitation	1) There is no single method of teaching or learning a concept.

Field	Content
	2) It is difficult to teach disciplines such as humanities and critical reading. 3) With so many children in the public school system, one instructor could not control the turmoil and noise in the classroom. 4) It takes a lot more effort for the teacher to plan a lesson aim and a range of exercises to make the chaos more structured.
Theories	Dewey, Piaget & Vygotsky

Digital Pedagogy

Field	Content
Definition	Denotes a pedagogical approach that prioritises the advancement of teaching and learning across the entire classroom experience, facilitated by technological advances. It emphasises not just teachers' knowledge and skills in digital education but also students' abilities to utilise technology for interaction, teamwork, development, research, and administration.
Advantages	1)Personalised Learning. 2) Gamified Learning. 3) Competency-Based Learning. 4) Full-Time Access to Materials. 5) Increased Engagement and Interactivity. 6) Accessibility and Flexibility. 7) Enhanced Collaboration and Communication.

Field	Content
	8) Cost-Effectiveness and Resource Efficiency.
Limitation	1) Digital Divide 2) Design Issues 3) Cultural and epistemological Issue. Because of fully online courses, the benefits of online learning are less clear.
Theories	Online Platform, AI, VR, Gamification and Personalised Learning.
Reference	(Class Ace, 2024)

Critical Pedagogy

Field	Content
Definition	Educational approach that aims to empower students by encouraging them to think critically, question assumptions, and engage in social and political analysis. It emphasizes the importance of understanding and challenging societal inequalities and power dynamics. Developed by educators like Paulo Freire, critical pedagogy seeks to foster active, conscious, and informed participation in both the educational process and society at large. (Brainely, 2023)
Advantages	1) Empowerment of students: Encourages critical thinking in the classroom question the status quo, and become active agents in their own learning process.

Field	Content
	2) Social justice: Aims to address social inequalities and injustices in education, helping to develope a more equitable and inclusive educational atmosphere. 3) Culturally relevant teaching: Emphasises including varied experiences and viewpoints in the curriculum to make education more meaningful for all students. 4) Critical thinking and problem-solving: Teaches contemporary success skills including innovative thinking, figuring out solutions, and analysis.
Limitation	1) Resistance and pushback: Implementing critical pedagogy can be met with resistance from some educators, parents, and students who may be uncomfortable with questioning traditional educational beliefs and practices. 2) Lack of standardised assessment: Critics say critical pedagogy may not match standardised evaluation and assessment procedures, making it hard to quantify student development. 3) Time-consuming: Critical pedagogy takes time and resources, which may deter certain educators and institutions. 4) Potential for bias and subjectivity: Critical pedagogy allows teachers to bring their own thoughts and beliefs into the classroom, according to some detractors.
Theories	Paulo Freire

Field	**Content**
Reference	(Class Ace, 2024)

2.3 Transformative Role of Technology in Modern Education

Recent technological advancements are revolutionising education, shown by the emergence of new "Artificial Intelligence (AI) Chatbots" such as 'ChatGPT' and the increasing accessibility of "virtual-reality" tools that broaden the scope of the classroom. Mentors fundamentally want for every learner to receive an equitable opportunity to cultivate the skills necessary for success. However, that promise is not devoid of its drawbacks (Stanford Report). In the digital age, learning is always changing, so K–12 teachers are using technology tools more and more to make teaching and learning better. These instruments, encompassing interactive whiteboards, instructional applications, and virtual learning platforms, integrate conventional procedures with novel strategies.

The incorporation of technology in the classroom enhances digital literacy and promotes collaborative and individualised learning settings. K-12 technology solutions, including gamified educational applications and online resources tailored to various learning styles, enable instructors to develop interactive courses, monitor student progress, and adjust teaching tactics in real-time. Adopting these tools not only equips students for a technology-oriented future but also enhances the educational experience with creativity and efficiency (eSchool News).

In spite of fact, the integration of fully immersive technologies such as "Augmented Reality," "Virtual Reality," and "Mixed Reality" is expected to rise in educational settings, particularly with the introduction of more prominent devices using these technologies in 2025. Side by side, the educational opportunities now extend beyond merely donning a headset to engage with life in a remote locale. Utilising contemporary technology, students can generate their own unique engaging "360-degree scenarios" with merely a cell phone or an affordable camera, alongside basic online resources. "This industry is going to grow a lot over the next few years," said Kristen Pilner Blair, who is in charge of "Research for the Stanford Accelerator for Learning's Digital Learning project".

This initiative is looking into how "Virtual Field Trips" can be used to improve education.

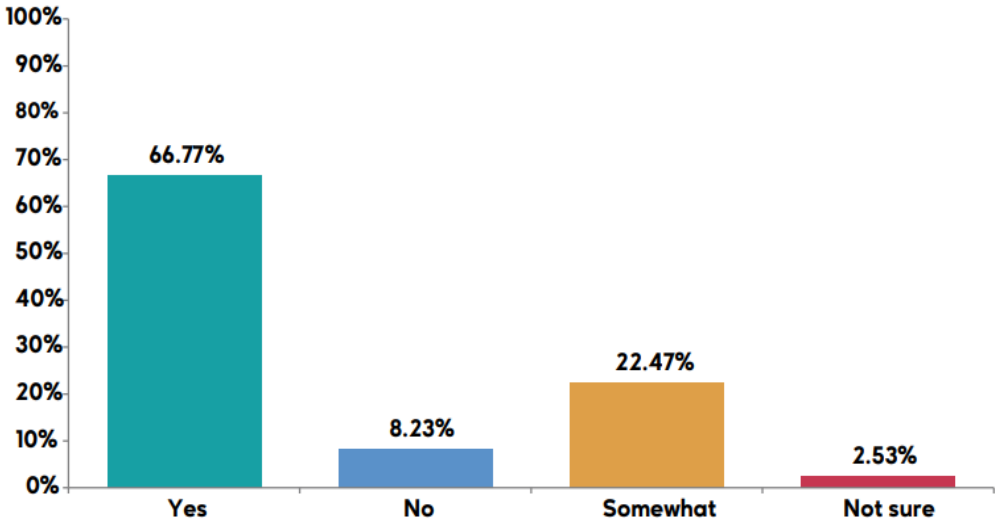
Schwartz asserted that the integration of "Machine Intelligence" (AI) into virtual world might imminently enhance the experience considerably. “Should your VR experience transport me to a redwood tree, a window could emerge enabling me to pose enquiries about the tree, with AI providing the responses” (Stanford Report). Stephen Hawking once stated, “The Internet enables global collaboration and knowledge sharing, thereby creating new opportunities for learning and discovery.” It has been a benefit to society and humanity. The adoption of immersive technologies, including “Augmented Reality,” “Virtual Reality,” and “Mixed Reality,” is expected to rise in educational environments, especially with the launch of new significant devices featuring these technologies in 2024 (Stanford Report).

70% of people think that generative AI will have a greater impact than the smartphone revolution.
54% of educators consider AI training for teachers very essential, highlighting the importance of teacher readiness in AI integration.
63% view Generative AI as crucial for preparing students for an AI-dominated future, emphasizing the need for AI literacy and skills.
35% of educators report that Generative AI tools have significantly reduced their class preparation time, enhancing efficiency in resource
61% are actively using Generative AI tools for teaching and preparation, indicating significant adoption and perceived benefits in educational
64% of educators recognize the potential benefits of Generative AI in enhancing learning experiences, offering personalized education, and

Source: (Team Lease EdTech 3)

Consequently, the study shows that 64% of educators recognize generative AI's potential for personalizing learning experiences, and 61% are utilizing AI tools. 35% report reduced class preparation time, indicating AI integration for improved education.

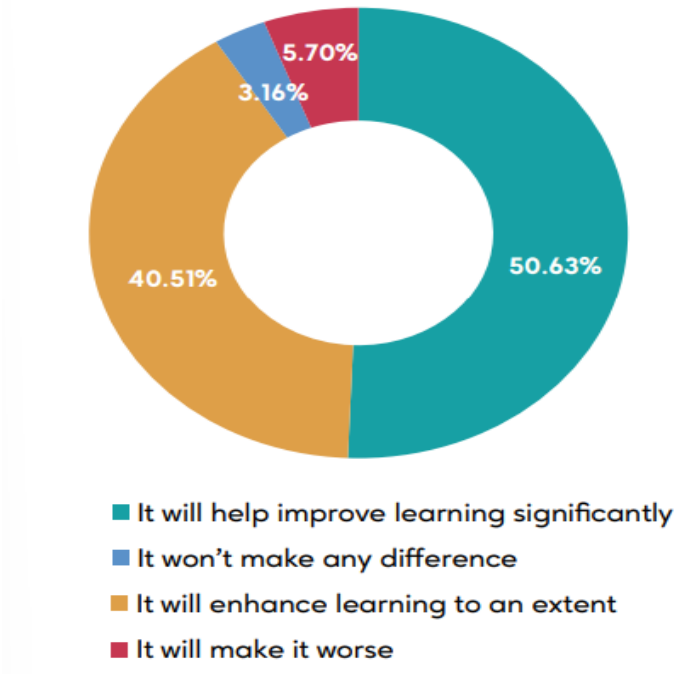
2.3.A Generative AI as a mechanism to augment thinking critically and solving problems



Source: (Team Lease EdTech 6)

The majority of educators- 66.77% believe Generative AI tools can enhance solving problem skills and strategic thinking, despite concerns about potential dependency on technology and the potential for students to develop independent thinking and analysis, with a scepticism rate of 8.23%.

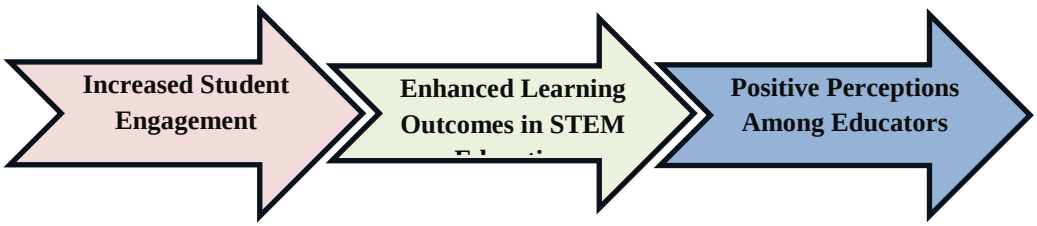
2.3.B) The Effects of Generative AI on Learning and Student Engagement Over the Long Run



Source: (Team Lease EdTech 12)

Over half of respondents believe Generative AI will significantly improve learning, with interactive, personalized capabilities. However, effectiveness depends on implementation strategy, technological integration, and subject matter nature. Overall, 50.63% and 40.51% of respondents believe AI will enhance learning.

2.4) VR- Virtual Reality



A comprehensive survey involving 25,000 Indian students revealed that 47.20% of those familiar with VR rated its educational potential as "very promising." This suggests that VR can significantly enhance student interest and participation in the learning process (Swargiary and Roy 4).	A comparative analysis indicated that integrating VR technology into STEM (Science, Technology, Engineering, and Mathematics) education led to improved learning outcomes. Students using VR demonstrated better understanding and retention of complex concepts compared to traditional teaching methods	A study surveying 2,000 educators across India found that a majority acknowledged the potential benefits of VR in classrooms. They reported that VR could facilitate immersive learning experiences, making abstract or challenging subjects more accessible to students (Swargiary 1).

Market Growth and Potential:

The Indian education market is projected to reach USD 313 billion by 2030, with gamified learning playing a pivotal role in this expansion. By incorporating elements of fun and interactivity, gamification caters to students' intrinsic desires for achievement and self-fulfilment, leading to higher engagement and improved retention (India Today).

Enhanced Student Performance:

A study highlighted that challenge-based gamification can improve student performance by 89.45% compared to traditional lecture-based education. Overall student performance increased by 34.75% when gamified elements were integrated into the learning process (Verma).

Positive Impact on Learning Outcomes:

Research indicates that gamification in education enhances student involvement, confidence, and career readiness. By integrating game design elements like points, badges, and leaderboards, educators can create more engaging and effective learning experiences (Satheeshkumar et al. 3673).

Increased User Engagement:

Implementing gamification strategies led to a 65% rise in user engagement and a 300% increase in online activity for certain users. This surge indicates that gamified learning environments can significantly boost student participation and motivation (Verma).

2.6 Evolution of social policies

The social policy is defined as an initiative by the government to achieve social welfare goals through the redistribution of resources among the population (Baldock et al. 6). In the late 1940s, three distinct developments and interventions emerged: first, Mahatma Gandhi, who emphasised the disorder of markets and the necessity for development rooted in local resources; second, Jawaharlal Nehru, who advocated for national development through public sector industrialisation; and third, B.R. Ambedkar, who proposed a development model centred on social justice. Although, the Indian developmental model prior to the 1980s was predominantly characterised by the Fabian Society's interpretation of socialism (Pellissery 82). Until the 1990s, social welfare policy focused mostly on food security. To a great extent, in the early 2000s, "rights-based" legislative reforms—the right to food, work, and education—along with separate efforts by state governments put social aid programs at the centre of national policy discussions (Rahman).

Fortunately, in 1995, during the World Summit for Social Development in Copenhagen, a global consensus was reached to prioritise individuals in development efforts. This vision continues to be pertinent today and is central to the 2030 Agenda for Sustainable Development, which commits to inclusivity. It acknowledges the potential of new information technologies in achieving social development objectives and underscores the necessity of providing access to these technologies for all, especially for individuals in poverty and vulnerable circumstances (OECD). In the last three decades, information and digital technology have transformed our lifestyles, social interactions, and professional environments (UNCTD).

Initially, in the implementation and execution of social policy, computerisation was employed to automate regular, clearly defined tasks, including the maintenance of databases for people' national insurance contributions, disbursement of benefits, generation of statistics, and computation of payments. Additionally, automation is progressively expanding into new domains of activity and facilitating novel methods of social policy administration (Henman 3). Bovens and Zouridis (2002) have delineated a progressive transition from 'street-level' to 'screen-level' and finally to ‘system-level bureaucracy’ as computers increasingly assume a vital role in front-line activities and subsequently in automated systems. Technology has dual implications; whereas the codification of regulations restricts discretion, technology has significantly elucidated citizens' eligibility and social rights (Henman 5).

Secondly, digital technology has facilitated alterations in the essence of social policy. Alongside the transition to more structured social policy, the implementation of policy has become increasingly diversified, individualised, and personalized—illustrated by the establishment of varying payment rates for distinct sub-populations, geographical regions, or risk/need profiles (Henman 9). Moreover, networked computer systems have progressively facilitated an expanding conditionality of social policy. As a result, the conditionality of social policy has progressively interconnected two distinct policy domains and intersected several policy objectives, such as the withdrawal of child benefits from parents whose children are truant or unimmunized (Henman 9). Likewise,

computer modelling and simulation tools have facilitated the formulation of intricate policies and augmented policymakers' ability to devise more sophisticated, visionary, and impactful policies (Harding).

According to Bellamy and Taylor (1998), computerisation encompasses both automation and informatisation, specifically the generation of data, information, and subsequently knowledge. This knowledge is increasingly vital to the governance of social policy for operational management, comprehending citizens' wants and trends, and evaluating and amending social policy (Henman 8). Paul Natorp (1899), a prominent philosopher and social pedagogical theorist of the nineteenth century, articulated: The term social pedagogy signifies that individual education is invariably influenced by social factors, while conversely, the effective organisation of social life is fundamentally reliant on the proper education of the individuals seeking to engage in it.

3 The Impact of Technology on Social Policy

All participants in the global economic system and the bedrock of societal advancement today rely on digital technologies, and network effects for their socioeconomic, political, and cultural lives. The majority of nations are about to experience a new technological revolution, which will bring about a new civilisation. This new civilisation will be defined by the centrality of information, science, technology, and knowledge in every aspect of society (Borodin et al.). This study's importance lies in the fact that it aims to fill a gap in our current understanding of the digital age by investigating the social transformation policies that have emerged in response to the dramatic shifts in global and Indian social development since the turn of the millennium.

According to the report of the secretary general (OECD), digital technologies have enormous promise for social policy, are crucial in addressing pressing social issues, and can help build environments where people can reach their full potential. However, society and the state deliberately use a specific welfare paradigm. Concurrently, it is developing towards the goal of promoting and recognising the inherent human values of fairness, equality, democracy, social solidarity, and the rule of law on a global scale. As a result, social policy is

quickly rising to the position of paramount institution within this value system, actively shaping societal advancement and the expansion of prosperity (Borodin, et. al.). Additionally, government operations can be made more efficient through digital transformation on a global and national scale, which in turn improves social welfare. Governments may optimise operations, cut down on mistakes, and save money by using digital technologies including automation, big data analytics, and cloud computing (Malla and Jorasia b891). Yet, various actions have been done by governments worldwide in response to this scenario, including the following:

3.1 Global Perspective on Digital Social Policy Transformation

1 OECD's Digital Welfare Policies

Field	**Content**
S. no.	1)
Digital Social Policy	OECD's Digital Welfare Policies
Policy Overview	When it comes to technological transformation, the OECD is there to assist policymakers in creating a future that is trustworthy, sustainable, and equitable. Connection, confidentiality, transmission of data, AI and emerging tech, security, privacy, and policy design at the crossroads of digital and other policy domains are just a few areas where the OECD is helping countries cope with the massive impacts of the digital revolution through 'evidence-based policy analysis' and its role as a worldwide standard setter.
Impact	1) Digital platforms have made public services more accessible and efficient.

Field	Content
	2) AI-powered tools help analyze big data for better policymaking. 3) Digital social safety nets (such as e-welfare payments) ensure transparent and quick fund transfers.
Reference	(OECD)

2 UNESCO's Digital Transformation in Education Policies

Field	**Content**
S. no.	2)
Digital Social Policy	UNESCO's Digital Transformation in Education Policies
Policy Overview	UNESCO advocates for digital education policies that enhance learning outcomes through AI, VR, and gamification.
Impact	1) Countries adopting AI-based tutoring have seen improved student engagement. 2) VR simulations in classrooms are being used to increase knowledge retention.
Reference	(UNESCO)

3 World Bank's Digital Inclusion Policies

Field	**Content**
S. no.	3)

Field	Content
Digital Social Policy	World Bank's Digital Inclusion Policies
Policy Overview	The World Bank supports digital infrastructure development in developing countries, ensuring equal access to education, healthcare, and governance services.
Impact	1) Over 1 billion people worldwide have gained internet access due to government-funded digital initiatives. 2) AI-driven remote education platforms have improved school participation rates in developing nations.
Reference	(World Bank Digital Development Report)

4 Brookings Institution’s Cybersecurity and Data Protection

Field	Content
S. no.	4)
Digital Social Policy	Brookings Institution’s Cybersecurity and Data Protection
Policy Overview	This policy focuses on protecting citizen data in digital governance frameworks, ensuring privacy and security in social services.
Impact	1) Countries with strong data protection laws (like the EU’s GDPR) have higher citizen trust in e-

Field	Content
	governance. 2)India and other developing nations are now introducing data localization laws to protect personal data
Reference	(brookings.edu)

By investing in digital infrastructure and fostering the development of digital competencies, governments can cultivate a more conducive environment for innovation and discoveries, while also offering new avenues for individuals to enter the smart education sector or enhance their careers (Malla and Jorasia b892). Conversely, the COVID-19 pandemic revealed longstanding structural vulnerabilities and exacerbated existing disparities. The pandemic adversely affected all individuals, but its detrimental repercussions disproportionately impacted underprivileged and marginalised groups and communities. In the absence of alternative income, savings, or social protection, millions of at-risk workers and their families are descending farther into adversity, negating decades of progress in poverty alleviation. For instance, more than 81 million jobs were eliminated in the Asia Pacific area, and significant decreases in working hours relegated millions to working poverty.

The COVID-19 epidemic has simultaneously prompted an unparalleled initiative by authorities to cater to the particular requirements of the most vulnerable populations. Digital technologies provided solutions by enhancing the efficiency and efficacy of service delivery. Digital platforms provide integrated online databases to improve the design and implementation of social protection programs (Department of Economic and Social Affairs). Wealth, health, and education, therefore. Three elements by which national digital transformation is said to enhance societal wellbeing, hence benefiting humanity (Malla and Jorasia b893).

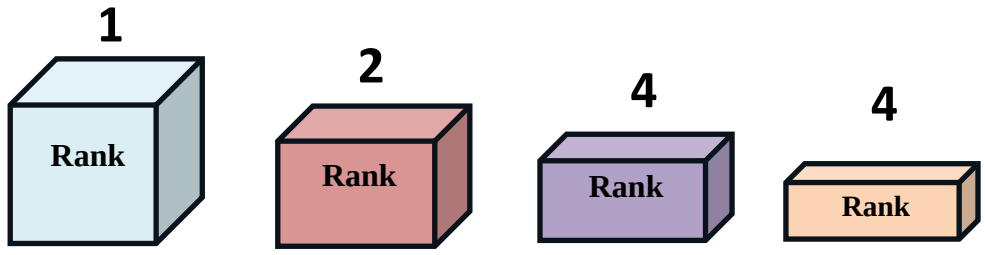
Digitalisation, as demonstrated by India's digital programs and initiatives, is expressly associated with inclusivity. The program's initiatives to deliver digital

access, resources, and services to all individuals, particularly in remote regions, underscore inclusivity. Digitalisation fosters a more inclusive and empowered society by bridging the digital divide, providing digital literacy, preserving data protection, and promoting cashless transactions, thereby enabling marginalised people to benefit from digital technologies. The Indian government has enacted numerous laws to realise this vision, aiming to alter the nation and generate opportunities for its population through the application of ICT tools. The policies are as follows:

S. No.	Policies for Digital Education in India	Objectives	Features	Reference
1)	National Education Policy - 2020	Extensive framework revolutionising the field of education with technology integration across all levels.	Establishes National Educational Technology Forum (NETF) for technology-based education Promotes digital infrastructure for online and blended learning models Supports development of content in Indian languages	(MOE and GOI)
2)	National Digital Education policy	Framework establishing standards and regulations for digital education ecosystem.	Regulatory framework for EdTech companies in education sector Standards for digital content quality and interoperability Support for AI-driven personalized learning systems	(MOE)
3)	Educational Data Management Policy	Framework for responsible collection, storage, and	‘Academic Bank of Credits’ (ABC) for digital preservation of	(National Academy of Governance)

		usage of educational data.	academic credits Unified digital identity for students throughout educational journey Protocols for data sharing with privacy protections	
4)	Digital Education Content Accessibility Policy	Guidelines ensuring digital education is accessible to differently-abled students	WCAG 2.1 compliance requirements for educational content Sign language interpretation and transcription standards Support for assistive technologies in educational institutions	(DEPwD)
5)	Rural Digital Education Access Policy	Framework addressing digital education needs of rural and remote areas	Digital Education Hubs" in rural community centers Offline access solutions for limited connectivity areas Mobile digital labs serving multiple remote schools	(MoRD)
6)	PM e-VIDYA Policy	Unified digital education initiative to ensure continued learning during and after COVID-19 pandemic	DIKSHA portal providing e-content for state/UT school education "One Class, One Channel" program with dedicated TV channels for grades 1-12 Special e-content for visually and hearing-impaired students	(MOE)

Fortunately, India has risen to 49th position in the Network Readiness Index 2024, indicating its growing role in digital transformation. The country's improved score of 53.63, attributed to robust government initiatives, reflects enhanced technological, governance, and infrastructural capabilities. This rise is a result of government policies aimed at enhancing connectivity, innovation, and digital services.



AI Scientific Publications, AI Talent Concentration and ICT Services Exports (GOI; MIB; PIB).	FTTH (Fiber to the Home) / Building Internet Subscriptions, Mobile Broadband Internet Traffic within the Country, International Internet Bandwidth (GOI; MIB; PIB).	Domestic Market Scale (GOI; MIB; PIB).	Annual Investment in Telecommunication Services (GOI; MIB; PIB).

In the process of recovery, it is imperative to confront the fundamental causes of escalating inequality and to advocate for a more human-centric strategy to attain the Sustainable Development Goals (UN and CSD).

4 Challenges and Ethical consideration

4.1 Digital exclusion and accessibility issues

Exclusion or restricted access to the digital realm results in the forfeiture of opportunities, resources, and advantages across several aspects of daily life that are otherwise unattainable. The fundamental dimensions of social disparities in society, such as social and economic standing, race, and age-related educational attainment (Van Dijk 2; van Deursen et al. 5), impact individuals' utilisation of ICTs, Internet usage, and digital skills, consequently affecting the advantages gained from the use of technology. The self-reinforcing effects of digital and

social exclusion: The cycle of inequality. While internet connectivity and speed are primarily regarded as issues in rural areas, inadequate broadband access in urban and suburban locales remains a significant worry (Leckie et al. 29–32).

Moreover, physical, psychological, and social impediments to digital utilisation significantly affect digital inclusion, including difficulties with dexterity and visual acuity, as well as apprehensions regarding self-efficacy, trust, security, and insufficient social capital. The realm of digital technology is continually evolving. These challenges underscore the diverse inequities and factors that exacerbate the risk of digital exclusion, including low socioeconomic level, less educational achievement, advanced age, health conditions, disabilities, and English as a second language. These inequalities intensify digital disparities, which in turn increase current health and socioeconomic disparities, hence affecting opinions of social marginalization (Helsper 406–409).

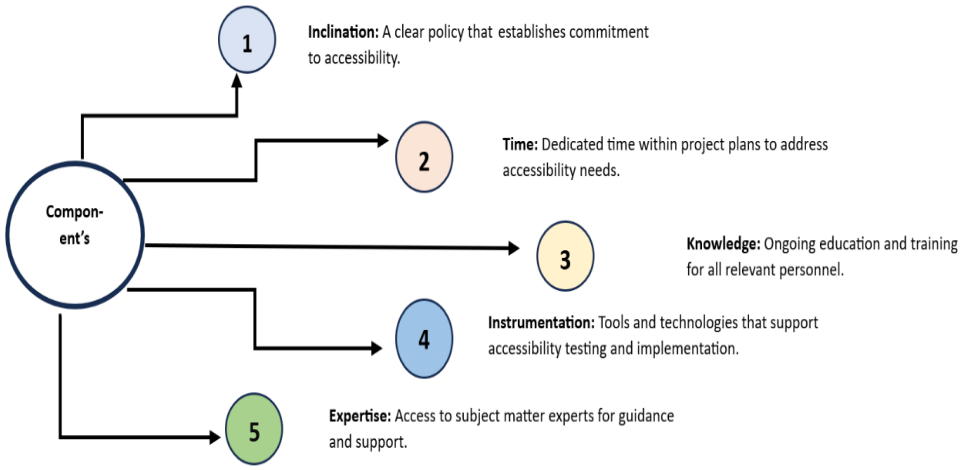
Furthermore, comprehending individuals' perspectives on digital resources is essential for examining the digital divide. Digital attitudes encompass individuals' readiness to utilise digital assets and their general perceptions of advantages and disadvantages of technology advances (van Deursen and Helsper 31–32). These attitudes shape the patterns of digital interaction between and within communities (Choi and DiNitto 2–3) In addition, examining digital attitudes aids politicians and educators in formulating more precise policies and activities to mitigate the digital divide and foster fair access to technology and its advantages (Wilson-Menzfeld et al. 12–13).

In 2021, Citizens Advice stated that approximately 5% of adults do not utilise the internet, and about 20% of adults lack critical digital skills for daily living, such as utilising email or search engines. Citizens Advice observed that a lack of digital skills can hinder individuals from fully utilising digital services (Saran). on the other side, the "Unified District Information System for Education Plus (UDISE+) 2023-2024 report" underscores a dual narrative of advancement and ongoing obstacles within India's educational system. While over ninety percent of schools offer fundamental necessities such as electricity and particular restrooms, sophisticated resources including functional PCs, web browsing, and staircases with supports remain infrequent.

Only fifty-seven percent of schools has operable computers, fifty-three percent have internet connectivity, and fifty-two percent are equipped with stairs, underscoring significant shortcomings in accessibility and technical readiness. The distribution of educators and the pupil-teacher ratio (PTR) remain critical issues. Jharkhand, Bihar, and West Bengal surpass the National Education Policy's prescribed (30 students per teacher) secondary pupil-teacher ratio, whilst Delhi and Chandigarh maintain optimal pupil-teacher ratios. Nevertheless, other regions (Assam, Odisha, and Karnataka) contend with underutilised infrastructure.

The ‘NEP-2020’ underscores participation and equity investments, whereas 'UDISE+' data offers a comprehensive illustration perspective. Females account for 48 percent of total registrations, while minorities constitute 20 percent, with Muslim students making up 79 percent of this group. Data about classifications in society reveals that 45 percent of students are categorised as OBC, 18 percent as SC, and 9.9 percent as ST. however, states like Meghalaya-24 percent, Bihar-38 percent, and Manipur-51 percent lag considerably, which may impact targeted activities.

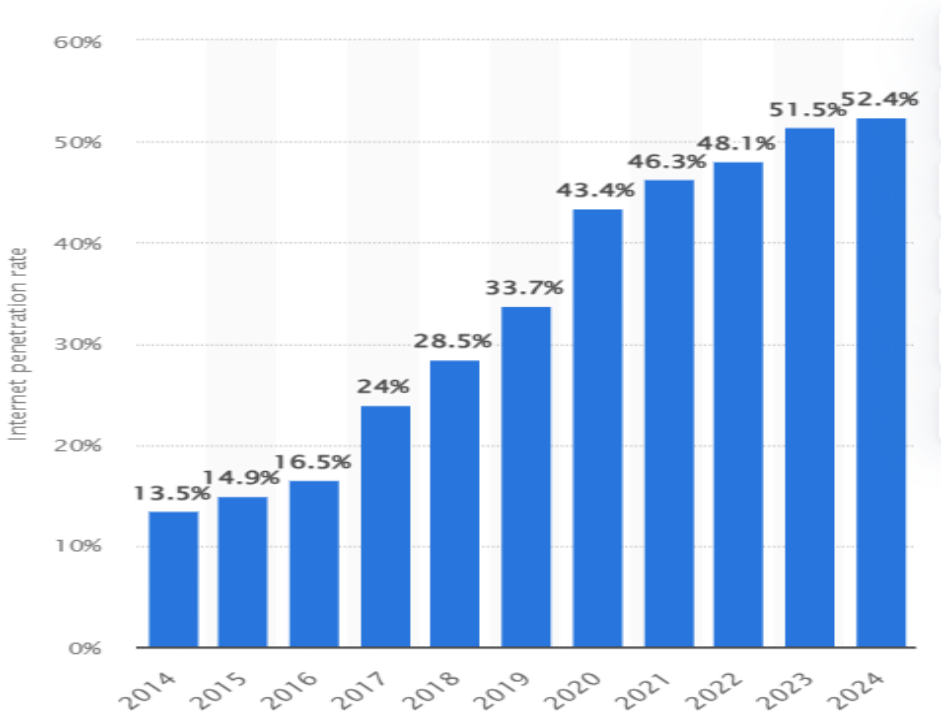
These figures underscore systemic barriers to student retention and the promotion of uninterrupted educational progression. The 'UDISE+' report serves as a stimulus for improving facilities, improving teacher placement, and addressing disparities in registration and engagement. The above steps are essential for achieving the ‘NEP-2020’ goal of democratic and universal education by 2030 (India Today). Subsequently, formulating explicit, practical rules is a crucial measure for every government aspiring to establish digital accessibility. To establish a sustainable and effective digital accessibility approach, consider these five fundamental components:



Into the bargain, ensure that your policy requirements do not exceed your capabilities. The allure of implementing extensive, significant change is ever-present; nonetheless, establishing too ambitious goals may predispose teams to failure. Accessibility is a continuous endeavour, and each advancement will facilitate further progress. Policies may be revised as your organisation and digital accessibility initiatives progress. The objective is to establish a policy that stimulates teams while offering achievable goals. This approach facilitates the establishment of a continuous cycle of good development (Williams).

5) Future Outlook and Policy Recommendations

Digital education, defined as the integration of digital resources in the pedagogical process, is frequently referenced in contemporary policy texts and has emerged as a strategic focus in nearly all OECD nations (van der Vlies 7). In education, digital resources can be used in many ways to promote inclusiveness and fairness. The use of digital curricula, scaffolding instruments, increased opportunities for evaluation and correction, local and global community development, and teacher retraining to promote a student-centered pedagogy are all examples (Gottschalk and Weise 22). As of 2018, more than over ninety- of teens in OECD nations had access to the Internet at home, up from eighty-five percent in 2009 (OECD). The "Internet penetration rate" increased to over 52 percent in 2024, up from approximately 14 percent in 2014.



Source: (Basuroy)

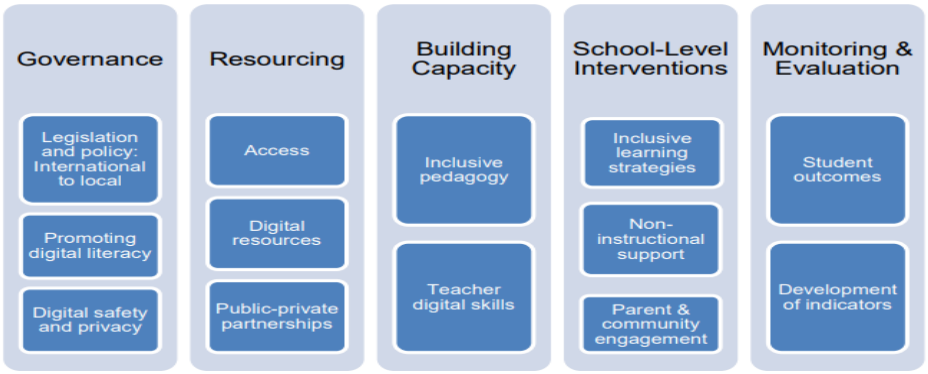
As of April 2024, of the 6.44 lakh villages in India, 6.12 lakh possess 3G/4G cell phone service, signifying that 95.1% of localities have connection to the internet. Over the past decade, there has been substantial expansion of telecom networks throughout Bharat, encompassing tier-2 and tier-3 cities as well as rural areas.

	31st March 2014	31st March 2024	% Increase
Definition of Broadband	>= 512 Kbps	>= 2 Mbps	300
India ranking in avg Internet Download Speed [Ookla speed test]	130	16	Improved by 114 ranks
Average Download Speed (Mbps) [Ookla speed test]	4.18	105.85	2432.29
Internet Subscribers (in mn)	251.59	954.40	279.34
Total Subscribers (in mn)	933	1199.28	28.54
Urban Tele-density	145.78%	133.72%	-8.27
Rural Tele-density	43.96%	59.19%	34.64
Overall Tele-density	75.23%	85.69%	13.90
Average Data Cost/GB (in Rs)	268.97	9.18	-96.58
Average Data Consumption (in GB)	0.26	20.27	7696

Source: (MoC and PIB)

The increasing prominence of digital solutions in everyday life necessitates systemic reform rooted in digital transformation, particularly within inclusive education systems. The 'European Agency for Special Needs and Inclusive Education' asserts that the principal aim of accessible schools is to ensure that each of the learners, irrespective of their age, obtain significant, superior educational possibilities within the community where they live, alongside their peers. This necessitates a structural transformation that encompasses all tiers of the education system (Inclusive Digital Education).

In an increasingly digital society, we must endeavour to enhance the accessibility of computers and software by utilising the most advanced technologies at our disposal (Saran). This strategy aims to empower individuals with disabilities to fully participate in the digital domain and reduce inequalities in accessibility, skills, and use of technology. Similarly, other theoretical frameworks about digital exclusion highlight the importance for accessibility to digital devices, technical skills, and the impact of optimism (Wilson-Menzfeld et al. 1652). In this Scenario, when utilising digital technology, one must take into account both small and large factors, including factors like locality and expenses, as well as equipment and the accessibility of digital services (Government Digital Service 8). And concentrated on essential policy domains of:



(Above figure provides a high-level overview of common policies for digital tools in education, not a comprehensive catalogue.)

Blessedly, with a 20-year legacy of "Inspiring Young Lives," the focus is on making AI a primary focus to continue inspiring and preparing young people for the future, given the increasing importance of technology.

5.1 7 Reasons why it's important to teach young people about AI

Future-Proofing Careers	Encouraging Innovation	Promoting Ethics	Enhancing Digital Literacy	Building Confidence	Preparing for Collaboration	Empowering Diversity
Learning AI equips young people with skills for future jobs, including technical and critical thinking skills, keeping them competitive in a changing job market.	AI education fosters creativity and problem-solving, empowering young people to innovate and drive progress in various fields.	Teaching AI includes ethical discussions on privacy, bias, and societal impact, encouraging responsible technology use.	Understanding AI is crucial for digital literacy, helping young people navigate and interact with technology effectively.	Introducing AI sparks curiosity and confidence, engaging students in STEM and complex subjects.	Learning AI helps young people to understand human-machine collaboration, enhancing human capabilities.	Accessible AI education promotes inclusivity, bridging the digital divide and democratising opportunities.

Source: (Gregory Mason).

5.2 Recommendations/ Suggested Approaches-

Policies at the International and Regional level

International and regional policies for digital inclusion should not be limited by country borders due to the globalised Internet. National directives are also influenced by international and regional policies and incentives (Gottschalk and Weise 12). Digital curriculum

A well-designed digital curriculum may benefit all students by addressing access and digital skill challenges, enabling full engagement with the material. Policy makers can co-create a digital curriculum with minority learners, teachers, and leaders as change agents to prevent marginalising them (Schonfeld).

Inclusive digital technology legislation and policy

Education systems increasingly value inclusive education, which is sometimes recognised by particular legislation. However, this typically goes beyond digital inclusion in education (UNESCO). Legislation requiring digital education tools for inclusive education is rare.

Fragmented policy spheres

Complex and global digital landscape challenges policy makers across government departments and requires coordination with public and commercial sectors. Education, health, and justice ministries share control or have separate responsibilities. Coordination issues can lead to overlap and gaps in other areas, resulting in incorrect or missing measures (Burns and Gottschalk 18).

Student digital literacy

Digital literacy refers to the knowledge, abilities, and conduct used by students to access, interpret, and create digital media (Reedy and Parker 7). If pupils lack the technical skills to operate gadgets successfully, digital technologies may not improve outcomes. Technology may increase the gap between kids with and without digital abilities.

Digital Safety

Digital privacy and safety legislation may overlap with policy issues beyond education, as they encompass data governance, cyberbullying, and other digital safety concerns. Some nations have a comprehensive digital strategy to protect privacy and security that involves all government agencies and improves coordination (OECD). General tactics may not address the unique digital privacy and security needs of children, which differ from those of adults. They may also fail to consider children's awareness (or ignorance) of their digital privacy and security; without child-friendly formatting, children may find it difficult to comprehend their rights and identify whom to approach for assistance. This is particularly vital for children from diverse backgrounds who do not know the local language or own materials in minority languages.

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6 Conclusion

The incorporation of digital technology in India's educational framework poses both a notable potential and a considerable problem. This study illustrates that technological improvements have significantly altered teaching methodologies and learning experiences, shifting from traditional pedagogical approaches to creative digital paradigms that prioritise personalisation, engagement, and accessibility. The 'COVID-19' epidemic expedited digital revolution while concurrently revealing profound systemic disparities. Notwithstanding governmental measures such as the National Education Policy 2020 and several digital education regulations, the UDISE+ 2023-2024 study indicates alarming deficiencies in infrastructure implementation, with only 57% of schools possessing operational computers and 53% having internet connectivity. These discrepancies disproportionately impact rural regions, marginalised populations, and pupils from lower socioeconomic strata.

To fully harness the promise of digital education in India, a comprehensive strategy is essential. Initially, policy frameworks must be harmonised across international, national, and local levels to guarantee coherence and thorough implementation. Secondly, digital curricula must be constructed inclusively, engaging a variety of stakeholders to avert more marginalisation. Third, improving digital literacy for both students and educators is essential to close the skills gap that risks exacerbating existing educational disparities.

The future of education in India relies on the implementation of strong digital safety measures, guaranteeing fair access to technology, and formulating pedagogies that adeptly incorporate emerging technologies such as "Artificial Intelligence," "Virtual Reality" (VR) and "Gamification". The Team Lease EdTech's 2024 report demonstrates that these technologies provide prospective avenues for the enhancement of critical thinking and problem-solving skills when applied judiciously. The technological innovation serves not just as a tool but also as a transformational agent in education. By tackling the issues of digital exclusion through comprehensive policy reforms and focused interventions, India can establish an inclusive educational framework that enables all students to succeed in a progressively digital environment. The aspiration for egalitarian, accessible, and high-quality education for everyone can only be achieved when technical progress is accompanied by a dedication to digital inclusion.

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