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Building Sustainable Digital Education in India: Transformation through Equity, Inclusion and Accessibility

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ABSTRACT

In the contemporary world, sustainable digital transformation involves the judicious application of innovative technologies to enhance the current and future well-being of individuals. This paper explores the transformative trajectory of India's digital policies, such as Aadhaar, Jan-DhanYojna, Bharat Net, and Digital India, demonstrating a dedicated commitment to digital inclusion. However, the World's largest open schooling system, the National Institute of Open Schooling (NIOS), strategically harnessed the technology to enhance equity, inclusion, and accessibility in education. The paper delves into the intersection of digital transformation and education, emphasizing its potential to revolutionize the learning experience, empower learners, and engage society. NIOS's systematic and academic digital initiatives emphasize the importance of e-governance, innovation, and the integration of digital platforms and resources. Through e-governance and innovative approaches, NIOS has streamlined administrative processes, improved transparency, and enhanced accessibility for learners. Academic transformation concentrates on reshaping pedagogical approaches and content delivery. The paper also addresses eSchools' potential to redefine education landscapes and the need for research and development to push the boundaries of digital education. This paper presents insights that contribute to the ongoing discourse on leveraging digital transformation to achieve access to equitable and inclusive education on a global scale.

INTRODUCTION

India, a nation with a rich cultural heritage and a rapidly growing economy, is embracing digital transformation as a key driver of progress and development. The government has implemented a series of policy initiatives aimed at building a robust digital infrastructure and fostering a vibrant technology ecosystem. India's digital infrastructure, including internet connectivity, data centres, computer software and cloud computing services, is rapidly expanding, providing the foundation for a digitally enabled society (IBEF, 2023). These initiatives hold immense promise for revolutionizing various sectors, including education, healthcare, agriculture, and governance.

In particular, the digital transformation holds potential for improving access, equity, and quality of education (OECD, 2016). Technology can provide access to quality education for all learners including those residing in remote areas, personalize learning experiences to meet individual needs, and enhance accessibility for learners with disabilities (Laabidi, Jemni, Ayed, Brahim&Jemaa, 2014). So, digital transformation can promote equity by expanding access to education for underserved communities (Ahuja, 2023). Technology integration can significantly expand access to education for learners in remote areas, underserved communities, and those with limited mobility (Jain, 2023).

Moreover, it can enhance accessibility by providing alternative learning formats for learners with disabilities (Basham, Stahl, Ortiz, Rice, & Smith, 2015), developing assistive technologies and promoting inclusive learning environments (Erdem, 2017). The increasing availability of web-enabled applications and services enables the accessibility of various assistive features in a single or limited number of devices, thereby enhancing affordability, efficiency, and portability (Raja, 2016).

A study by D'Angelo (2018) underscored the importance of aligning education systems with evolving technology trends. He emphasized that integrating technology into the curriculum enhances student engagement, facilitates academic success, and promotes positive attitudes among both students and teachers (D'Angelo, 2018). Other studies have shown that technology can improve student outcomes (Ben Youssef, Dahmani, & Ragni, 2022) and narrow academic achievement gaps (Chiao& Chiu. 2018). In addition, technology extends educational opportunities, enhances access, improves the relevance and quality of education, and transforms the teaching and learning process by fostering a conducive environment, nurturing creative thinking and instilling self-confidence (Das, 2019).

Similarly, the integration of digital technologies has the potential to enhance access, personalize learning, improve accessibility, and foster equity and inclusion in the Open and Distance Learning (ODL) system. Online learning platforms provide a flexible and accessible alternative to traditional classroom-based instruction, enabling learners to engage in education from anywhere with internet connectivity (Fenteng, 2023). This is particularly beneficial for learners in rural areas where access to quality education is often limited. Also, online learning platforms can eliminate physical barriers, making education more accessible for learners with mobility impairments. Hence, digital tools and technologies can facilitate inclusive learning environments that accommodate learners with varying abilities and learning styles.

However, challenges are also present in the form of a persistent digital divide, a lack of digital skills training (Paños-Castro, Arruti, &Korres, 2022; Andone, Mihaescu, Vert, Vasiu & Ternauciuc, 2020), and a lack of ICT infrastructure (Amin, 2023). Other challenges in implementing effective teaching learning strategies through technology are inadequate curriculum integration, lack of teacher preparation, and a lack of systematic approaches for scaling innovative teaching practices (Voogt, Erstad, Dede& Mishra, 2013). Amin (2023) reported that geologically isolated and psychologically separate from conventional population groups presented challenges such as limited accessibility and network connection, insufficient technical support, inadequate training, teachers' competency gaps, poor infrastructure, and ineffective government policies. Addressing these challenges is essential for the successful implementation of technology in education.

In the context of the ODL system in schooling, the National Institute of Open Schooling (NIOS) holds its presence as the world's largest open schooling system. NIOS is an autonomous institution under the Ministry of Education, Government of India, established in 1989. NIOS is considered to be the largest open schooling system in the world with a cumulative enrollment of over 4 million learners. NIOS provides a wide range of educational programs, from elementary to senior secondary level, and vocational courses through open and distance learning (ODL) mode. NIOS has played a significant role in expanding access to education in India, particularly for marginalized communities and learners in remote areas. NIOS has also been a pioneer in the use of technology in the ODL system, and it has developed a number of innovative digital learning resources for its learners. The institute has implemented a range of innovative initiatives to bridge the digital divide, foster inclusive learning environments, and ensure accessibility for all learners.

India's digital policies as well as the initiatives undertaken by the National Institute of Open Schooling (NIOS) have played a pivotal role in enhancing equity, inclusion, and accessibility in education. In a rapidly evolving digital landscape, these efforts have worked in tandem to address the educational needs of diverse populations, ensuring that technology is leveraged to benefit all learners. This approach serves as a model for other nations seeking to enhance educational equity and inclusion in the digital age.

This paper delves into the establishment and progression of digital inclusive infrastructure in India, covering key milestones as well as recent initiatives. Subsequently, the focus shifts to the digital transformation in Education,

emphasizing the pivotal role of technology in fostering equitable and accessible learning environments. The paper also examines strategies to achieve digital education transformation, with a specific emphasis on NIOS initiatives for systematic and academic transformation strategies. Under systematic and academic transformation strategies, NIOS has undertaken initiatives to cater to diverse learners, ensuring inclusive, equitable, and accessible educational experiences. The paper also highlights the future trajectory, outlining the way ahead for continuous integration of technology in education and sustainable digital transformation.

Building Inclusive Digital Infrastructure in India

The roots of our current digital transformation can be traced back to the early years of the 21st century when global awareness of the transformative potential of technology began to take hold. In India, this awareness led to a series of initiatives aimed at building a digital inclusive infrastructure. These initiatives showcase the nation's digital journey and provide insights about how a developing country can embrace digital transformation.

One of the foundational elements of this journey was the introduction of Aadhaar, a digital identity system that was launched in 2010. Aadhar provided millions of Indians with a secure and verifiable digital identity, paving the way for a multitude of digital services. Aadhaar helps streamline government welfare programs by providing a convenient and efficient way for beneficiaries to prove their identity. The use of Aadhaar improves the efficiency and effectiveness of service delivery, curbs leakages, and enables residents to access services without repeatedly providing supporting documents. It serves as a universal proof of identity across the country, allowing for easy verification anytime, anywhere (UIDAI, 2023). In 2011, the Bharat Net project was launched, which aimed to provide high-speed broadband connectivity to the remotest corners of the country. BharatNet aims to provide broadband connectivity to all Gram Panchayats (approx. 250,000). The project enables access to services such as e-health, e-education, and e-governance in rural areas. As of November 2023, over 207,000 Gram Panchayats are connected through BharatNet. This includes laying over 668,000 kilometres of optical fibre cable (OFC), commissioning more than 760,000 Fibre-To-The-Home (FTTH) connections and installing around 104,000 Wi-Fi hotspots for last-mile connectivity (USOF, 2023). Moreover, in 2015, the Digital India initiative was launched which is a comprehensive program that aims to transform India into a digitally empowered society and knowledge economy. This initiative is a beacon for digital transformation, covering areas from e-governance to digital literacy and cybersecurity (GoI, n.a.).

Another remarkable achievement of India's digital transformation journey has been digital financial inclusion. Central to this transformation is the JAM Trinity - Jan Dhan, Aadhaar, and Mobile - laying the foundation for Digital India by directly offering government services to citizens. The focus is on achieving a ‘Faceless, Paperless, Cashless’ system, prioritizing digital payments' widespread adoption. Key initiatives like Bharat Interface for Money-Unified Payments Interface (BHIM-UPI), Immediate Payment Service (IMPS), and pre-paid payment instruments (PPIs) have significantly bolstered digital payments, facilitating contactless transactions (Press Information Bureau, 2022). BHIM-UPI, particularly, has seen a rapid rise, handling billions of transactions monthly. The government continues its efforts to elevate India as a global leader in digital payments, anticipating financial technology's pivotal role in future growth. Its rapid adoption is highlighted by the World Bank's report on financial inclusion in September 2023. It reported that the UPI recorded over 9.41 billion transactions worth approximately Rs 14.89 trillion in May 2023. Interestingly, the total value of UPI transactions accounted for nearly half of India's nominal GDP during the fiscal year 2022-23 (Press Information Bureau, 2023). In November 2023, UPI transactions hit a new record, surpassing Rs 17.4 trillion (Times of India, December 4, 2023).

Thus, these initiatives related to building an inclusive digital infrastructure continue to help bridge the digital divide and serve marginalized communities to gain better access to educational resources.

Digital Transformation in Education

After technology transitions into the realm of transformation in general, the focus is on the specific ways in which technology is reshaping education through quality learning experiences, empowering learners & educators, and engaging them in empowering society. By examining the intersection of technology and education, the possibilities may lead to the holistic development of individuals and the nation which is envisaged in National Education Policy - 2020.

The National Education Policy (NEP - 2020) outlines a comprehensive approach to equitable and inclusive education. It prioritizes universal access and retention, targeting student dropouts, and calls for special measures in areas with a high prevalence of socially and economically disadvantaged groups. NEP 2020 promotes inclusive classrooms, multilingual education, and the creation of a Gender Inclusion Fund for female and transgender children. The policy emphasizes financial support initiatives, infrastructure development, and the integration of technology to provide adaptive learning facilities. Additionally, NEP 2020 stresses the role of career counselling, advocating for informed decisions about educational and professional trajectories. It recommends the integration of vocational education at both school and higher education levels to ensure equitable access to skill development opportunities.

To actualize these NEP-2020 recommendations, it is imperative to devise and implement specific strategies across all levels of education, including formal, informal, and non-formal education. The National Institute of Open Schooling (NIOS) can significantly bolster the open schooling system in this aspect. Through its digital initiatives, NIOS stands poised to make a substantial contribution towards the realization of the goals of equitable, inclusive, and accessible education as outlined in NEP 2020. NIOS is persistently dedicated to fostering sustainable and inclusive education by providing universally accessible and flexible access to quality school education and skill development.

Strategies to Achieve Digital Education Transformation

The journey towards digital education transformation unfolds through a strategic amalgamation of two important components: Systematic Transformation and Academic Transformation. These components are explained in the following sections:

Systematic Transformation through Digital Education

Systematic Transformation, as the first pillar, is integral to the overarching goal of ensuring equity, accessibility, and inclusivity in the educational landscape. This involves the implementation of comprehensive e-governance systems that revolutionize various administrative aspects, such as admission processes, fee payments, accreditation procedures, management of Personal Contact Programs (PCP), and assessment protocols. The infusion of e-governance not only expedites these processes but also reduces bureaucratic complexities, making education more accessible to learners from diverse backgrounds.

NIOS has adopted a systematic approach to digital transformation, encompassing eGovernance and innovation. It has undertaken several initiatives to facilitate a systematic digital transformation in various aspects of its operations. Following are the key initiatives of NIOS showcasing the systematic approach to digital transformation in education:

Admission and Fee Payment: In the realm of admission and fee payment, NIOS has implemented e-services to streamline the process, making it more efficient and accessible for learners. The admissions are made entirely online in all courses of NIOS. Digital payment arrangements are available for fee submission as well. This digital transformation has not only simplified the admission process but has also facilitated online fee payment, reducing the administrative burden on both the institution and the learners.

Accreditation: To support accessibility, NIOS aimed to optimize existing resources by accrediting over 7500 + partner institutions, known as Accredited Institutions (AIs)/ Accredited Vocational Institutions (AVIs)/ Special Accredited Institutions for Education of the Disadvantaged (SAIDS) across the country. NIOS offers the online accreditation process by leveraging technology to enhance the efficiency and transparency of accreditation procedures. The primary objective of the e-accreditation system is to streamline and enhance the accreditation process through an online platform, ensuring adherence to NIOS norms without any bias. It serves as a comprehensive tool for all NIOS stakeholders, allowing them to oversee the accreditation process efficiently.

Management of Personal Contact Programmes (PCPs): In the context of Personal Contact Programmes (PCPs) management, NIOS has embraced technology to optimize scheduling, resource allocation, and communication with learners and tutors. This digital transformation has led to improved coordination and effectiveness in the delivery of PCPs, enhancing the overall learning experience for learners. In addition to in-person Personal Contact Programs (PCPs) held at study centres, online PCPs are conducted through platforms such as YouTube, television, and radio.

Tutor Marked Assignments: NIOS has introduced a fully online Tutor Marked Assignments (TMAs) submission system. It allows learners to download and upload TMAs directly from their online dashboard according to the schedule set by NIOS. The system tracks submission deadlines, TMA allocation, evaluation, and feedback submission by evaluators which enhances the effectiveness and transparency. This ICT-based approach provides significant benefits, relieving learners from the need to physically submit TMAs. It saves time as well as resources. The system ensures transparency and accountability in the TMA submission process. Since its inception, over 2.1 million TMAs, each comprising a minimum of 15 pages have been uploaded and evaluated, contributing to environmental conservation by saving more than 30 million pages.

Question Paper Delivery System: The online delivery system has proven to be a valuable tool for NIOS, ensuring the integrity of the entire question paper delivery process, from pre-exam to post-exam activities. Implementation of the Question Paper Delivery System, utilizing information technology, has not only yielded substantial savings in terms of finances, time, and resources for NIOS but has also alleviated the monitoring burden for officials.

NIOS Web Portal: NIOS is committed to making its website accessible to all users, including those with disabilities. The website has been designed and developed to meet the Web Content Accessibility Guidelines (WCAG) 2.0 Level AA, which is an internationally recognized standard for website accessibility. This will empower individuals with visual impairments to navigate the website through assistive technologies like screen readers.

E-services for Learners: NIOS offers e-services to enable learners to check, track and correct their basic data conveniently. Accessible through the student portal on their dashboard, students can submit correction requests online. Learners receive notifications at each stage of the e-service request movement. Various e-services available include subject addition/change, Transcript application, duplicate result document requests, name correction, date of birth correction, study centre change, and more. These e-services enhance the overall learning experience and academic support for learners.

24 X 7 Grievance Redressal: The Grievance Redressal System aims to address and resolve student grievances effectively, fostering a positive atmosphere. In addressing grievance redressal, NIOS has implemented a digital platform to enable learners to lodge and track grievances seamlessly. The benefits of the NIOS grievance redressal system include user-friendly accessibility, confidentiality, and transparency, encouraging grievance reporting without fear. The system ensures a fair and prompt solution, building trust and openness in the institution. It operates 24/7, offering real-time alerts and systematic reporting for a streamlined grievance management service.

Overall, NIOS has strategically employed digital initiatives to transform various facets of its operations, ranging from admission and fee payment to accreditation, PCP management, TMAs, e-services for learners, and 24x7 grievance redressal systems. These initiatives have not only digitalized processes but have also contributed to greater efficiency, transparency, and learner-centricity within the institution through innovation. Thus, a systematic transformation, reinforced by e-governance and innovative approaches, lays the foundation for a digital education landscape that ensures equitable, accessible, and inclusive education.

Academic Transformation through Digital Education

Academic Transformation is another significant facet of the digital education transformation. It revolves around reshaping pedagogical approaches and content delivery. This entails the integration of digital resources, virtual classrooms, and online collaborative tools to create engaging and interactive learning experiences. Academic transformation also emphasizes the development of curriculum and content that foster critical thinking, creativity, and digital literacy, aligning education with the demands of the 21st-century knowledge economy.

As the world's largest open schooling institution, NIOS continues to embrace digital technologies. This will further ensure more equitable, inclusive, and personalized learning experiences for all learners. Some of the digital initiatives of NIOS that have contributed to academic transformation include:

Energized Self-Learning Materials (SLMs): NIOS has developed energized SLMs, which are engaging and accessible learning materials that cater to diverse learning styles and needs. These resources incorporate multimedia resources such as audio and video in the form of QR code integration in the printed as well as digitally available SLMs.

Digital Certification: NIOS has adopted digital certification processes to ensure secure and transparent credentialing for its learners. Digital certificates are easily verifiable and accessible online, providing a valuable record of academic achievement. NIOS has also embraced the digital infrastructure provided by the Government of India, notably leveraging Digilocker for verifying the details of learners admitted to NIOS from other educational boards. NIOS hosts all result documents on Digilocker, reducing the need for extensive result stationery printing and issuing marksheet-cum-passing certificates exclusively to successful candidates.

DEEP (Digital Education and E-resources Platform): DEEP (Digital Education and E-Resource Platform) is an online repository, accessible at https://digitallibrary.nios.ac.in/. It comprises a diverse collection of materials such as e-journals, e-books, e-databases, magazines, and newspapers. It not only benefits NIOS learners but also extends its advantages to all the students, teachers, and researchers across India and globally who are facing socio-economic constraints. The library resources are available in multiple languages which ensures inclusivity. With user-friendly features like printing and saving options, DEEP also offers valuable reference materials such as dictionaries and encyclopedias. The library has witnessed a significant impact, with over 2,59,000 visitors (NIOS, 2023), emphasizing its role in providing quality resources to diverse learners anytime, anywhere.

Massive Open Online Courses on SWAYAM: The SWAYAM platform offers a wide range of courses from Class 9 to post-graduation, accessible to learners globally. Developed by renowned educators, including over 1,000 faculty members, these courses encompass video lectures, downloadable reading materials, self-assessment tests, and an online discussion forum. NIOS actively contributes to SWAYAM by providing open schooling courses and expanding access to quality education. NIOS offers MOOCs in various disciplines through the SWAYAM platform. These MOOCs provide learners with access to quality education from experts, regardless of their geographical location or financial means. The University Grant Commission (UGC) has released the UGC (Credit Framework for Online Learning Courses through SWAYAM) Regulation 2016, instructing universities to select courses suitable for transferring credits to students' academic records for those completed on SWAYAM. Additionally, the All India Council for Technical Education (AICTE) issued a gazette notification in 2016 and later on, endorsed the adoption of these courses for credit transfer (SWAYAM, 2024).

NIOS's engagement involves e-content, multimedia instructions, lectures, e-contents, self-assessment, and a discussion forum on SWAYAM. Presently, there are more than 42 courses of NIOS at secondary, senior secondary and vocational levels available on the SWAYAM platform, with 15,519 students enrolled (SWAYAM, 2024). The curriculum, delivered in various formats, addresses secondary, senior secondary, and vocational courses, catering to learners and individuals seeking skill enhancement.

Customized Learning Material for CWSN (ISL, DAISY): NIOS has developed customized learning materials in Indian Sign Language (ISL) and DAISY format to cater to the needs of learners with disabilities. Audiobooks are also prepared and uploaded on the NIOS web portal for its learners. These materials ensure that learners with diverse abilities have access to inclusive and accessible educational resources.

Live Learners Support: NIOS has established a live Learners Support system to provide real-time assistance to learners through live video and radio sessions and online as well as offline support. This support system helps learners resolve queries, overcome challenges, and navigate the synchronous learning environment effectively.

Virtual Open Schooling: The Virtual Open Schooling (VOS) initiative of NIOS established an online platform, offering learners access to Self-Learning Materials (SLMs), supplementary educational resources, and multimedia content. VOS is designed to provide learners with a self-paced, interactive, and engaging educational experience, allowing them to study conveniently. VOS introduced various features to enhance the learning journey, including job-oriented courses, live interactive sessions for active learner engagement, and the integration of online Tutor Marked Assignments (TMAs) for streamlined assessment and feedback processes.

DIKSHA: DIKSHA, the Digital Infrastructure for Knowledge Sharing, was officially launched in 2017 as a national platform under the Ministry of Education, GoI, providing access to educational resources in multiple languages. Referred to as 'One Nation, One platform,' DIKSHA offers diverse digital resources, including teaching-learning e-content, teacher professional development modules, and materials for remote learning. NIOS actively contributes quality

educational resources to DIKSHA as a stakeholder, offering digital content like SLMs, videos, audio, and interactive resources for learners, tutors, and parents nationwide. The platform hosts SLMs for secondary, senior secondary, and vocational levels, ensuring personalized learning experiences.

These successful digital initiatives demonstrate NIOS's commitment to providing equitable and inclusive education through technology-driven solutions. By continuously innovating and adapting to the evolving digital landscape, NIOS is setting a benchmark for open schooling in India.

Overall, the Systematic and Academic Transformation form the foundation of a comprehensive strategy for digital education transformation, ushering in an era where education is not only technologically advanced but also accessible, inclusive, and attuned to the evolving needs of learners.

The Way Ahead

The journey ahead is replete with possibilities and opportunities for continued enhancement. In the realm of education technology, governments, national and international organizations, and non-governmental organisations (NGOs) are strategically navigating the future of school education. Emphasizing equity and inclusivity, the focus is on leveraging technology for resilient hybrid learning systems. This includes addressing digital infrastructure issues and reimagining remote learning's role as both crisis insurance and a tool for lifelong education. Efforts extend to recovering learning loss, using data effectively, empowering teachers, expanding content access through open technology, and supporting future skills development.

The paradigm of eSchools is positioned to redefine the educational setups, aligning with the digital era and addressing the varied requirements of learners. The utilization of technology will persist in augmenting education, ensuring that learners have equitable access to cutting-edge tools and resources. E-assessment is required to be integrated seamlessly into the education system to provide streamlined and precise mechanisms for assessing a learner's progress. Online platforms facilitate quick and efficient test delivery and scoring, providing immediate feedback to students and allowing educators to identify areas requiring further attention. Finally, the impetus of research and development will strengthen eGovernance and innovation to push the boundaries of what is achievable in the domain of digital education.

CONCLUSION

The journey towards building sustainable digital transformation for all, underpinned by principles of equity, inclusion, and accessibility, is an ongoing process. It is a journey of empowerment, where every individual, regardless of their background, abilities, or circumstances, has the opportunity to access quality education, participate in the digital economy, and realize their full potential.

The pursuit of digital transformation holds immense promise for improving the lives of people, especially in countries like India, where progress has been marked by remarkable milestones over the past two decades. From the inception of the Aadhar digital identity system in 2010 to the ambitious Digital India infrastructure in 2015, India has been committed to leveraging technology for progress. Initiatives like the Jan Dhan Yojana and the introduction of the Unified Payments Interface (UPI) have propelled India towards greater financial accessibility for its citizens.

However, the field of education stands as a crucial frontier in the quest for equity, inclusion, and accessibility. Access to quality education is not merely a privilege; it is an opportunity to fully participate in the socio-economic fabric of a nation. Equality and equity in education demand fair and just outcomes for all, ensuring that no one is left behind. Inclusion, on the other hand, goes beyond mere access and equality – it embodies a sense of belongingness, where every learner feels valued and respected, regardless of their background or abilities. The success of digital initiatives and the provision of customized learning materials for children with special needs, attest to the commitment to inclusion. Additionally, measures have been taken to address the diverse language and cognitive needs of learners. The digital transformation of education is not just a vision; it is a tangible reality. With equity, accessibility, and inclusion as guiding principles, India is paving the way for providing educational opportunities anytime and anywhere. It offers self-directed, self-paced, learner-centric learning.

As per the future road map, it becomes clear that the journey towards digital education transformation in India is far from over. The eSchool concept, enabling policies for open schooling, extensive use of technology, e-assessment, and

significant focus on research and development all point towards a future of education which is truly a beacon of hope and opportunity for all. This is the path to a more inclusive and accessible future where technology serves as a force for positive change in the lives of every individual, regardless of their background or circumstances.

REFERENCES

Ahuja, V. (2023). Equity and Access in Digital Education: Bridging the Divide. In *Contemporary Challenges in Education: Digitalization, Methodology, and Management* (pp. 45-59). Retrieved from: https://www.igi-global.com/chapter/equity-and-access-in-digital-education/333209

Amin, R (2023). Inclusion of ICT in Education: Its Needs and Challenges in Secondary Schools of Char Areas of Assam. *DogoRangsang Research Journal, 10(18), 284-291.* Retrieved from: https://www.researchgate.net/profile/Ruhul-Amin-61/publication/366791557_Inclusion_of_ICT_in_Education_It's_Needs_and_Challenges_in_Secondary_Schools_of_Char_Areas_of_Assam_II_II_285/links/63b2a72da03100368a476954/Inclusion-of-ICT-in-Education-Its-Needs-and-Challenges-in-Secondary-Schools-of-Char-Areas-of-Assam-II-II-285.pdf

Andone, D., Mihaescu, V., Vert, S., Vasiu, R., &Ternauciuc, A. (2020).Digiculture–the Development of Open Education Learning for Digital Skills Training.In *EDEN Conference Proceedings* 1, 354-363. Retrieved from: https://www.ceeol.com/search/article-detail?id=910850

Basham, J. D., Stahl, W., Ortiz, K. R., Rice, M. F., & Smith, S. J. (2015). Equity matters: Digital and online learning for students with disabilities. *The Center on Online Learning and Students with Disabilities.* Retrieved from: https://kuscholarworks.ku.edu/bitstream/handle/1808/22627/2015_COLSD_Annual-Publication_FULL.pdf?sequence=1

Ben Youssef, A., Dahmani, M., &Ragni, L. (2022). ICT use, digital skills and students' academic performance: Exploring the digital divide. *Information*, *13*(3), 129. Retrieved from: https://www.mdpi.com/2078-2489/13/3/129

Chiao, C., & Chiu, C. H. (2018).The mediating effect of ICT usage on the relationship between students' socioeconomic status and achievement. *The Asia-Pacific Education Researcher*, *27*, 109-121.

D'Angelo, C. (2018). The impact of technology: Student engagement and success. *Technology and the Curriculum: Summer 2018*. Retrieved from: https://pressbooks.pub/techandcurriculum/chapter/engagement-and-success/

Das, K. (2019). The role and impact of ICT in improving the quality of education: An overview. *International Journal of Innovative Studies in Sociology and Humanities*, *4*(6), 97-103. Retrieved from: https://ijissh.org/storage/Volume4/Issue6/IJISSH-040611.pdf

Erdem, R. (2017). Students with special educational needs and assistive technologies: A literature review. *Turkish Online Journal of Educational Technology-TOJET*, *16*(1), 128-146. Retrieved from: https://files.eric.ed.gov/fulltext/EJ1124910.pdf

Fenteng, A. (2023). Online Learning: A Cognitive Tool for Learning, an Alternative to Traditional Learning Style. *Psychology*, *14*(5), 676-686. Retrieved from: https://www.scirp.org/journal/paperinformation.aspx?paperid=125008

GoI (n.a.).Digital India. Ministry of Electronics and IT, Government of India. Retrieved from: https://digitalindia.gov.in/introduction/

IBEF (2023, June 29). Making India a Global Hub for Data Centre and Cloud Solutions.India Brand Equity Foundation. Retrieved from: https://www.ibef.org/blogs/making-india-a-global-hub-for-data-centre-and-cloud-solutions

Jain, D. (2023, January 29). Reshaping Indian education with technology.*Times of India*. Retrieved from: https://timesofindia.indiatimes.com/blogs/voices/reshaping-indian-education-with-technology/

Laabidi, M., Jemni, M., Ayed, L. J. B., Brahim, H. B., &Jemaa, A. B. (2014).Learning technologies for people with disabilities. *Journal of King Saud University-Computer and Information Sciences*, *26*(1), 29-45. Retrieved from: https://www.sciencedirect.com/science/article/pii/S1319157813000347

MoE (2020).National Education Policy 2020.Govt. of India. Retrieved from: https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

NIOS (2021-22). NIOS Academic Prospectus 2021-22. Retrieved from: https://www.nios.ac.in/media/documents/prospectus/2021/Academic_Prospectus-2021-22-final.pdf

OECD (2016).*Innovating Education and Educating for Innovation: The Power of Digital Technologies and Skills,* OECD Publishing, Paris. Retrieved from https://www.oecd.org/education/ceri/GEIS2016-Background-document.pdf

Paños-Castro, J., Arruti, A., &Korres, O. (2022). COVID and ICT in primary education: challenges faced by teachers in the Basque country. *Sustainability*, *14*(16), 10452. Retrieved from: https://www.mdpi.com/2071-1050/14/16/10452

Press Information Bureau (October 3, 2022). Transforming India's Digital Payment Landscape.Ministry of Finance, Govt. of India. Retrieved from https://pib.gov.in/FeaturesDeatils.aspx?NoteId=151163&ModuleId%20=%202

Press Information Bureau (September 8, 2023).G20 document prepared by World Bank lauds India's progress. Ministry of Finance, Govt. of India.Retrieved from https://pib.gov.in/PressReleasePage.aspx?PRID=1955516#:~:text=UPI%3A,percent%20of%20India's%20nominal%20GDP.

Raja, D. S. (2016). Bridging the disability divide through digital technologies. *Background paper for the World Development report*. Retrieved from: https://thedocs.worldbank.org/en/doc/123481461249337484-0050022016/original/WDR16BPBridgingtheDisabilityDividethroughDigitalTechnologyRAJA.pdf

SWAYAM (2024). About SWAYAM. MoE, Govt. of India. Retrieved from: https://swayam.gov.in

Times of India (2023, December 04). UPI payments hit a new record: Here's how much people paid digitally last month. Retrieved from: https://timesofindia.indiatimes.com/gadgets-news/upi-payments-hit-new-record-heres-how-much-people-paid-digitally-last-month/articleshow/105724992.cms

UIDAI (2023).About Aadhaar. Retrieved from https://uidai.gov.in/en/

USOF (2023).BharatNet Project.Department of Telecommunications.Ministry of Communications, Government of India. Retrieved from: https://usof.gov.in/en/bharatnet-project

Voogt, J., Erstad, O., Dede, C., & Mishra, P. (2013).Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of computer-assisted learning*, *29*(5), 403-413.Retrieved from: https://onlinelibrary.wiley.com/doi/abs/10.1111/jcal.12029