



Dealing with online and blended education in India

Rajnish Kumar · R. Selva Ganesh

Accepted: 7 June 2022

© The Author(s) under exclusive licence to Indian Institute of Management Calcutta 2022

Abstract The COVID-19 outbreak has caused disarray in the country's formal school education system (Ministry of Education in Initiatives by School Education Sector in 2020–21 for Continuing Teaching and Learning. https://dse.education.gov.in/sites/default/files/update/covid_initiatives.pdf, 2021). While some children had engaged in learning from home using digital devices, television, radio and also with the guidance of volunteers and peers, dropouts and out of school children have become a major concern as a result of school closures, with other areas of concern also including teaching and learning for children with no access to digital gadgets, continuing learning for children with special needs, teacher's reach/unavailability, access to engaging learning material, internet connectivity, etc., and in this frame of reference, digital divide-free online and blended learning has become a much-needed demand of the hour. Addressing these challenges for a diverse nation, however, necessitates an effective policy and implementation framework to ensure its reach at the grass-roots level while accepting the challenges of operationalization. This paper discusses the challenges of effective digital learning and recommendations for

overcoming the barriers of Online and Blended Learning, with a focus on how technology would then take over and shoot through the roof of learning in the future.

Keywords Online and blended learning · NEP 2020 in digital education · Personalised adaptive learning · Promoting 21st century skills

Introduction

The COVID-19 pandemic exacerbated the country's digital divide, accelerating efforts to give widespread access to digital education. Given the rapid development of digital device access, creating the required digital infrastructure to facilitate learning in this new era is critical.

India's education system must be resilient in the face of an increasingly unpredictable, dynamic and nonlinear world as it continues to develop. Through options like replacing chalkboards with interactive digital whiteboards in classrooms, using students' smartphones or other devices for learning during class time, and also the "flipped classroom" model, where students watch lectures on their digital devices at home and use classroom time for more interactive exercises, the ICT in education has rooted its mark.

Because it is hard to foresee what the future will look like due to the massive speed of global innovation, it is essential to create a system where students

R. Kumar (✉) · R. Selva Ganesh
Department of School Education and Literacy, Ministry of Education, Government of India, New Delhi, India
e-mail: rajnish.kumar1@gov.in

R. Selva Ganesh
e-mail: ganesh001nair@gmail.com

learn how to learn. The twenty-first-century education system needs to shape students for careers that have not yet been created, technologies that have not yet been developed and tasks that have not yet been evaluated (OECD 2018). This can be achieved only if students become lifelong learners who can continuously change in response to their surroundings and difficulties.

Present status

During the COVID pandemic lockdown, many students around the country did not have access to electronic devices. Another issue is the lack of ICT skills among teachers. According to UNESCO's "No Teacher, No Class" state of the education report for India 2021 (UNESCO 2021), half to two-thirds of teachers have basic computer experience and are familiar with how to use and consume digital information on smartphones. However, most lack skills in computer-assisted design and production, as well as interactive software and advanced digital and Internet skills. Although teachers are found to hold the positive view that the use of technology will support students in improving learning, they are concerned about their lack of proficiency, lack of suitable resources and poor infrastructure.

Learning should be holistic, integrated, inclusive, and enjoyable, while also being relevant to contemporary needs. The current curriculum, on the other hand, promotes a "coaching culture" and rote memorization rather than equipping students with twenty-first-century skills such as critical thinking, creativity, problem-solving, ethics, multilingualism, collaboration and digital literacy. Furthermore, the existing curriculum does not place enough emphasis on foundational skills, which leads to rigidities and inflexibility in the subjects available to students.

In this regard, NEP 2020 recommends a shift from the prevailing 10 + 2 structure to a 5 + 3 + 3 + 4 structure, innovative and flexible curriculum design structures with multiple entry and exit points, new opportunities for lifelong learning and so on. Furthermore, revised resources such as teacher handbooks, textbooks, learning content rubrics and so on must be curated.

Major challenges

Although digital education has a lot of potentials, there are various obstacles in India's contemporary technological education scenario. However, when it comes to the future of digital education in India, we may see an increase in access to high-quality ICT-based education in the coming years or decades. In metropolitan regions, digital education is well-established, but, in rural areas, there is still a considerable distance to go because of the hurdles that must be solved.

Following are the key issues of the use of technology in the education sector:

Lack of student/teacher/school registry to support tracking of teaching and learning

- By registry is meant a technology-based solution for an information system with multiple data points related to several areas in one place, to enable easy access to authorized stakeholders to keep track of progress and performance.
- For example, a student registry would not only give a unique ID to the student that they can carry through their continuum of studies at all levels but will also include a record of basic information (date of birth, category, parent's names, address, etc.), benefits (uniform, textbooks, scholarships, transport allowance, CWSN stipend, etc.), a record of attendance/tests/grades, the record of sports/arts/Olympiads and other activities that a student has participated in, the record of migrations, etc.
- In fact, through DigiLocker, each student could have their dashboard too. A teacher registry would also contain such relevant data related to teachers' recruitment, postings, promotions, training, recognition and awards, subject expertise, etc.

Devices—functionality, access, and maintenance

- Across teachers, students and administrators, there is a lack of access to functional ICT infrastructure.
- The gap in the availability of devices has reduced during the pandemic with the distribution of tablets/other targeted schemes; however, there is a sizable population of teachers, parents and students who do not have access to devices.

- With evolving technology, devices often become obsolete if regular maintenance/up-gradation is not taken care of. There are significant maintenance costs associated in addition to the procurement/tender costs of obtaining the devices.

Focus on technology development efforts leading to duplication versus reusability and national infrastructure

- Various entities/institutions/groups have been developing applications/technologies in silos to meet their respective limited objective(s).
- States are investing heavily in developing solutions and not engaging in sharing of ideas/solutions. This disconnect in efforts is resulting in the duplication and existence of multiple data systems that have been developed in silos.

Development of capacities—state, school and teachers

- There is a need for continuous incremental improvement of the technology solutions that are deployed; continuous upgrading and upkeep are required and in essence, this is missing.
- Capacity building at the state level to develop, deploy, maintain and manage technology solutions has not been invested in. There is a need to invest and develop human capital for planning and executing solutions.
- Solutions have to be deployed in schools to automate the workflows, as well as robust devices, have to be provided to administrators and teachers to perform the respective tasks efficiently. Once solutions are deployed, capacity building is required at the school level to leverage these aforementioned solutions in classroom transactions.

Technology in assessments

- Continuous and consistent use of technology in both classroom transactions practice/quizzes/tests and assessments relevant to teacher skilling is currently lacking.

- The instructor spends a lot of time gathering data and then processing it to define insights; with technology integration, these efforts can be considerably reduced with timely tech updates.

Parent engagement

- The first school for a child is at home and the child spends maximum time with their parents at home.
- To make parents active participants in a child's learning journey and build their capacity to help their child learn, technology can be used.

National Education Policy 2020— Recommendations on Technology in Education

- Technology integration is to be done in various areas such as Teaching, Learning & Assessment Education Planning, Administration and Management. Teaching–learning e-content to be developed in regional languages, to enhance educational access to disadvantaged groups.
- The National Educational Technology Forum (NETF) is envisioned in Para 23.3 of NEP 2020 as a platform for the free exchange of ideas on the use of technology to enhance learning, assessment, planning, administration, consult and sharing of best practices, etc.
- To address India's scale, diversity, complexity and device penetration, NEP 2020 Para 24.4 (b) suggests investing in the establishment of open, interoperable, evolvable public digital infrastructure in the education sector that can be used by different platforms and point solutions. As a result, the Ministry of Education devised the National Digital Education Architecture (NDEAR).
- Digital platforms and ongoing ICT-based educational initiatives such as SWAYAM, DIKSHA will be optimized and expanded.

Brief layout on the initiatives of the Ministry of Education

- The National Digital Educational Architecture (NDEAR) takes an ‘Open Digital Ecosystem’ approach and will serve as a model for developing a national digital infrastructure that will energize and stimulate the whole education ecosystem.
- DIKSHA which is India’s Digital Infrastructure for Knowledge sharing in School Education has been made available in both online and offline modes. The content library available on DIKSHA caters to students and teachers and provides content that is suitable for diverse teaching and learning needs. To help the rapid expansion of the content library, VidyaDaan was implemented as a controlled crowdsourcing program. Content sourced from various individuals and organizations was reviewed by experts and was subsequently on-boarded on DIKSHA.
- Other initiatives like PM e-VIDYA have ensured inclusive, equitable access to education for all learners, wherein learning content is broadcasted on a medium such as TV, Radio and Podcasts to improve access to learning. DIKSHA offers skill-building opportunities anytime and anywhere.
- There are various inclusive ICT and digital initiatives undertaken by every State/UT that bridge the digital divide to bring media, internet and digital literacy to all students is recorded in India Report on Digital Education 2020 and 2021.

Possible solutions/action points/recommendations

Understand and use NDEAR

- Like UPI transformed payment systems in India by connecting all stakeholders of the ecosystem, similarly, the NDEAR blueprint for school education is prepared such that NDEAR shall act as a super-connector for all players and requirements of the school education ecosystem, from teaching–learning to assessment, tracking of individual progress, to areas related to administration, governance, monitoring, etc.

- NDEAR is a technology framework that attempts to enable existing systems to be upgraded and made compatible while also providing the building blocks for new tools and solutions to be developed.
- Solutions and ideas that have worked in one State/UT can be reused and reconfigured in another, eliminating the need to start from scratch and solve for India’s scale, diversity, complexity and device penetration, etc.

Invite ecosystem players to the DIKSHA sandbox

- To realize the vision of NDEAR, the Ministry of Education outlays open access to DIKSHA (Digital Infrastructure for Knowledge Sharing), the national platform for school education, for ecosystem players. This will enable ecosystem players to develop innovative, customizable and contextual solutions to address various education and learning needs. Together, a technology framework, an architecture and an ecosystem approach will enable different actors to participate in and create solutions exponentially.
- Following this, DIKSHA consists of a set of microservices available via APIs. The services will be accessible through APIs and can be integrated with third-party applications to provide value-added and contextual solutions extending DIKSHA.

Keeping these in context, it becomes important to increase the reusability of existing solutions and enable cross-sharing of best practices/solutions.

- **Ensuring student, teacher and school registries** take full benefit of the multiple uses of technology. Student registry, in particular, for tracking enrolment and learning levels of every individual child.
- **Ecosystem engagement—catalyze and energize the education ecosystem** through events, hackathons, innovations, fests and other such outreach, engagement and development program.
- **Bridging the digital divide**—to address this challenge, the learning content needs to be made available in both online and offline modes. In addition, DIKSHA can also be accessed in low or no Internet areas through an offline desktop solution. Other components of PM e-VIDYA to

be expanded and coherent access being provided across all mediums.

- **Curriculum**—the curriculum for National Education Policy (NEP) launched in 2020 emphasizes the importance of technology to enhance the learning experience of the students emphasizing effective models of blended and integrated learning. Hence, the existing digital platforms and ongoing ICT-based educational initiatives must be optimized and expanded to meet the current and future digital content needs in providing quality education for all.
- **Online courses for teachers and students (with digital credentials)**—Skill building—anytime, anywhere. Online courses allow the rollout of structured learning programs targeted to build or enhance specific knowledge and skills for learners.
- **Digital teacher with high-quality content**—combining the qualitative e-content in a course/module format for a learner to complete the entire prescribed syllabus of a given subject, including by participating in the assessment, is akin to a digital teacher. It is necessary to ensure that only high-quality content remains in the digital space by employing necessary quality review checks.
- **Content authoring and consumption tool**—creation of interactive content that allows teachers or users, designated by the Central/State departments, to create interactive digital content. Multi-device and multi-modal user access—All Users—be it teachers, students, parents or others, can find and play/access their curriculum-linked digital content, published by the Ministry of Education, States/UTs or Education boards, using any device in online or offline mode.
- **Governance: strengthening capacity and competency at state education department**—States/UTs can set up dedicated IT cells to help govern the technology roll-outs, ensure achievement of the strategic transformation objective(s) and ensure adequate coordination with each associated part of the system to implement Ed-Tech solutions.
- **ICT@Schools scheme**—all hardware infrastructures can be preloaded with DIKSHA or any other NDEAR Compliant app to access content in online as well as offline mode.

Digital technology—vision for the future

The National Education Policy 2020 will guide a revolutionary change in the educational system in the country. The world in the next few decades will be defined by borderless classrooms; education will no longer be restricted to local geographical boundaries or limited by an individual human being acting as a facilitator or educator. Technology will enable all students to access the best educators in the world. While the Internet and Web 2.0 have already made information more accessible, the advent of Web 3.0 will make education more engaging.

To ensure and maximize the potential that evidence and technology backed system holds for our country, it is essential to prioritize achieving universal foundational learning and bridge the digital divide with regard to access and usage of technology.

Technology-focused vision

- **Dedicated ICT/digital unit in the departments at the center and the states/UTs**, with experts from Tech, Admin, Governance, Digital Pedagogy, etc. The aim should be to integrate all the technology happenings in online education and extend the scope and function for effective digital learning.
- **Affordable and maintainable digital device** (inbuilt monitoring mechanism) along with good internet connectivity, for all Students under the Make in India Scheme as all children, have fully adopted the blended mode of learning, and there is no dearth of access or device
- **Availability of all highest quality e-contents** across all digital modes of learning (Web, TV, Radio) for ensuring equitable technology education for the same topics under the Coherence policy of the department of school education with prime focus on quality e-content following guidelines/standards
- **Enhance the reach of digital library, AR/VR, games/simulations** and its mode of learning, regional language contents and prioritizing the tech ruling courses like AI, ML, Robotics, Drone technology, Coding, STEM skills, 3D Printing, creating apps, block chain, skilling courses, etc., and an experiential learning curriculum

- **Development of tools/apps for online classes and to track/monitor** the progress of students
- **Mechanism to ensure cyber-safe smart class** and school environment (sex education/cyber-space awareness)
- **Virtual schooling for all classes** (academic/daily calendar, personalized adaptive learning) and **proctored examinations** in place, Netflix model of learning, on-demand learning, digital laboratory examinations.
- **Digital Learning solutions/applications/devices** for CwSN
- **NDEAR** will play a catalytic role in the achievement of NEP 2020 goals by providing a fertile ground for innovations in the education ecosystem
- **Mechanism to engage students** in problem-solving tasks, virtual tours and hands-on activities, abandon compartmentalized study as school curriculums are likely more decentralized on technological invasion
- **Ensuring no traditional fixed curricula/credits**, as students will engage in agile learning, with courses centered upon competencies and skills rather than book learning.
- **Focus on schools with no Digital Infrastructure** (ICT/Smart classes/Devices) also emphasizing the smart classroom/ICT learning in elementary schools including provision for CWSN
- Curriculum transactions and learning now extend well beyond the schools. Classrooms in 2047 have truly become borderless—boundaries of learning within and outside the classroom have disappeared and students are now able to learn from anywhere and from anyone without having to meet face-to-face or being physically present at the same time and can communicate, foster connection, collaborate, create and share with other students across the globe.
- It is not just the availability of content that is anytime, anywhere, but education itself is taking place anytime, anywhere.

Immersion and personalization of learning

- Customized learning for each student’s strengths, needs, skills and interests.
- Technology has enabled the classroom transactions to be no longer based on a “one size fits all” approach. Instead, the teacher guides each student on an individualized journey.
- Each student gets a “learning plan” that is based on what they know, how they learn best and what their skills and interests are. The what, when, where and how of learning is tailored to meet each student’s strengths, skills, needs and interests.
- Students now work with their teachers to set both short-term and long-term goals for themselves allowing them to take ownership of their learning (Morin 2019).

Technology and data will enable the building of resilient systems

- In the field of education, the effective use of technology has resulted in a paradigm shift. An interactive whiteboard has taken the role of the classic chalkboard. It helps to develop immersive and safe learning environments for students and gather rich data on how each student learns with the help of Web 3.0 and Block chain-based tools.

Education in Future

Classrooms without borders

- The distinction between formal and informal learning has disappeared.

Conclusion

To accommodate the rising demand for quality education, school education systems have risen dramatically in recent decades. Rapid advances in ICT have also aided the sector’s ability to better serve students and teachers. Students will benefit from the concept of “anywhere learning” and using technological breakthroughs for real-time and predictive governance, thereby visioning India as a global super-power in digital education.

Funding The authors have no relevant financial or non-financial interests to disclose.

Declarations

Conflicts of interest The authors declare that they have no conflict of interest.

References

- Ministry of Education (2021) Initiatives by school education sector in 2020–21 for continuing teaching and learning. https://dse1.education.gov.in/sites/default/files/update/covid_initiatives.pdf
- Morin A (2019) Personalized learning: what you need to know. Understood—for learning and thinking differences. <https://www.understood.org/articles/en/personalized-learning-what-you-need-to-know>. Accessed 5 Aug 2019
- OECD (2018) The future of education and skills Education 2030. [https://www.oecd.org/education/2030/E2030%20Position%20Paper%20\(05.04.2018\).pdf](https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf)
- UNESCO (2021) No teacher, no class. State of the Education Report 2021. <https://unesdoc.unesco.org/ark:/48223/pf0000379115/PDF/379115eng.pdf.multi>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.