Technology Integration for Quality Education
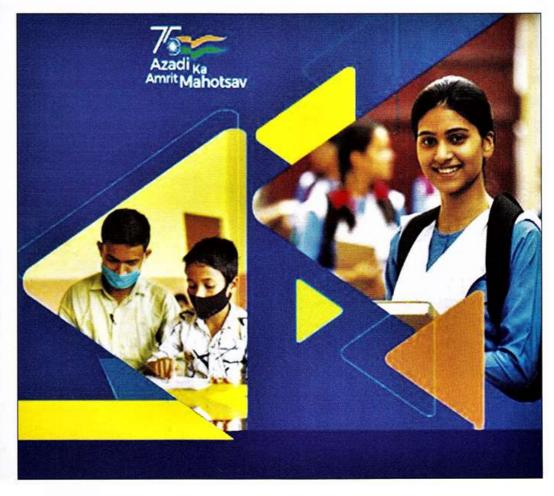
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As per the National Education Policy 2020, "Given the explosive pace of technological development allied with the sheer creativity of tech-savvy teachers and entrepreneurs including student entrepreneurs, it is certain that technology will impact education in multiple ways, only some of which can be foreseen at the present time. New technologies involving artificial intelligence, machine learning, block chains, smart boards, handheld computing devices, adaptive computer testing for student development, and other forms of educational software and hardware will not just change what students learn in the classroom but how they learn, and thus these areas and beyond will require extensive research both on the technological as well as educational fronts." Therefore, the future of the educational system will be determined by the expansion and integration of technology which will serve the purpose of bringing efficiency in educational systems and transformative reforms in the academic sphere.

Technology is the predominant driver of the 21st century which is affecting each and every sphere of human life. The impact of technology is such that the lines between the physical, digital and biological spheres are increasingly blurring and is rapidly changing the way people live, work and communicate. The word governance and e-governance have no longer a clear distinction in terms of policies, institutions, and implementation strategies. With the evolution of digital technologies, both administrations and institutions across the globe have been conclusively transformed structurally and in terms of the relationship between the Governments and citizens. These observations are also drawn from two decades of analytical research and the monitoring of trends within the framework of the United Nations E-Government Survey. While nearly every country is engaged in the process of digitalisation, not all have achieved the same level of development, and while institutions at all levels are committed to modernisation and digital transformation, approaches and outcomes vary greatly. The COVID-19 pandemic has further exposed digital divides between and within countries and various social groups. One of the key lessons learned during the pandemic is that the future is hybrid and not digital. In fact, the primary objective of technology is to recognie and foster human potential and support sustainable human development through digitalisation.

The UNESCO definition (www.unesco.org) of e-governance is stated as "E-governance is the public sector's use of information and communication technologies with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective. E-governance involves new styles of leadership, new ways of debating and deciding policy and investment, new ways of accessing education, new ways of listening to citizens and new ways of organising and delivering information and services. E-governance is generally considered as a wider concept than e-Government, since it can bring a change in the way citizens relate to Government eco system. E-governance can bring forth new concepts of citizenship, both in terms of citizen needs and responsibilities. Its objective is to engage, enable and empower the citizen." The pandemic amplified the importance of e-government and digital technologies as essential tools for communication and collaboration between policy makers, private sectors and societies across the globe. E-governance has become the cornerstone for building effective, accountable, resilient and inclusive institutions at all levels, as called for in Sustainable Development Goal (SDG) 16, and for strengthening the implementation of Goal 17 (UN E-Government Survey, 2022).

With such revolutionary impact of technology, education sector could not be left untouched and during the COVID-19 pandemic, the pace of integration of technology in teaching learning processes has increased exponentially. During the pandemic, digital technology played an indispensable role in holding the civil society together by supporting the provision of basic-fundamental services in the field of health, education, and service sector. National Education Policy (NEP) 2020 gives utmost importance to technology and states that "The thrust of technological interventions will be for the purposes of improving teaching-learning and evaluation processes, supporting teacher professional development, enhancing educational access, and streamlining educational planning, management, and administration etc. It also recognises and addresses the issue of digital divide and elucidates that "the benefits of online/digital education cannot be leveraged unless the digital divide is eliminated through concerted efforts, such

as the Digital India campaign and the availability of affordable computing devices. It is important that the use of technology for online and digital education adequately addresses concerns of equity."

In the school education sector of India, technology has been used both in governance processes to improve the efficiency and effectiveness of schooling system and also for enhancing quality of education. Various governance related technological interventions have been initiated and undertaken by the Government which are given below:

(i) **UDISE**+(https://dashboard.udiseplus.gov. in): It is a well-known fact that timely and accurate data is the basis of sound and effective planning and decision-making. Realising the need of this, Ministry of Education (MoE) had initiated Unified District Information System for Education (UDISE) in 2012-13 integrating DISE for elementary and secondary education which is one of the largest Management Information Systems for School Education covering more than 1.5 million schools, 9.6 million teachers and 264 million children.

UDISE+ is an updated and improved version of UDISE. This is now online and has been collecting data in real-time since 2018-19. UDISE+ provides robust, real-time, and credible information for an objective evaluation of the system, which can be used for designing evidence based specific interventions for improvement in the school education sector.

Further, UDISE+ has a mandate of collecting information from all recognised and unrecognised schools which are imparting formal education from Pre-primary to XII. UDISE+, collects information through an online Data Collection Form (DCF) on parameters ranging from students, schools, teachers, infrastructure, enrolments, examination results etc. Ever since its introduction, UDISE+ has acquired the status of the official database of the MoE and is now operational in all the districts of the country.

(ii) **Performance Grading Index(PGI)** (https://pgi. udiseplus.gov.in): The PGI is a tool to provide insights on the status of school education and to catalyse transformational change in the

States/UTs on the basis of key indicators that drive their performance and critical areas for improvement.It grades all States/UTs on their performance across 77 indicators on school education and helps identify gaps thereby enabling all States/UTs to design appropriate interventions to bridge them. This was introduced from 2018-19.

In addition to the State PGI, around 83 indicators have been developed for Districtsto grade the performance in school education. Combined report for the years 2018-19 & 2019-20 can be accessed at https://pgi.udiseplus.gov.in/#/home.

The exercise envisages that the Index will propel the States/UTs towards undertaking multi-pronged interventions that will bring about the much-desired optimal education outcomes. The purpose of this PGI therefore is to help the States/UTs to pinpoint the gaps and accordingly prioritise areas for intervention to ensure that the school education system is robust at every level.

(iii) **Online survey platform for National Curriculum Framework (NCF):** With the arrival of NEP 2020, the focus of education has move towards learning about how to think critically, solve problems, how to be creative and multidisciplinary, and how to innovate, adapt, and absorb new material in changing fields. Pedagogy is expected to evolve to make education more experiential, holistic, integrated, inquiry-driven, discovery-oriented, learner-centred, flexible, andenjoyable. To make the above expectations a reality, a new NCF is being developed by the NCERT. The development of this framework is unique in many ways as it is adopting a 'bottom-up' approach in which suggestions are invited from all stakeholders on the basis of which new NCF will be developed and on 29 July 2022, a mobile/online survey for NCF was launched.

In addition, drawing insights from citizen-centric process of development of NEP 2020, this framework has also been made consultative. To ensure participation of each and every citizen of the country in this curriculum development process, a citizen-centric Digital Survey for National Curriculum - DiSanc has been launched. Under this survey, suggestions and feedback has been collected from the public at large for the formulation of the NCFs.

(iv) **NDEAR (National Digital Education Architecture)** (https://www.ndear.gov.in) **and Vidya Samiksha Kendra:**

NDEAR has been launched with a larger vision to create a unifying national digital infrastructure to energise and catalyse the education ecosystem. NDEAR has been conceived as a unifying National Digital infrastructure to energise and catalyse the education ecosystem. The core idea of NDEAR is to facilitate achieving the goals laid down by NEP 2020, through a digital infrastructure for innovations in the education ecosystem, ensuring autonomy and participation of all the relevant stakeholders. NDEAR will enable a common set of principles and approaches to be followed in building, using, and re-using technology for education. Further, Vidya Samiksha Kendra (VSK) has been set-up at national level at NCERT and is aimed at leveraging data and technology to bring a big leap in learning outcomes. VSK will include Student, Teacher and School registry which will bring synergy to the work being done in the ecosystem by integrating data from different datasets and empowers students, teachers, and parents to bridge the gap. This will cover the entire data of school eco-system and will analyse by using big data analysis, artificial intelligence and machine learning in order to enhance the overall monitoring of the education system and thereby improving learning outcomes. All States and UTs have been provided financial support under Samagra Shiksha scheme for setting up VSKs.

(v) **PRABANDH** (http://samagrashiksha.in): Department of School Education and Literacy had launched PRABANDH - Project Appraisal, Budgeting Achievements and Data Handling System in 2020. This System has been developed under Samagra Shiksha as a significant step towards leveraging technology to enhance efficiency and manage the implementation of the Centrally Sponsored Integrated Scheme

for School Education. PRABANDH System can be accessed at www.samagrashiksha.in. It has more than 10 lakh activated users and can be accessed from the School, Block, District and State Level.

A data visualisation dashboard has been created in the PRABANDH System for display of monthly status of physical and financial progress under the major interventions of Samagra Shiksha such as text books, uniforms, transport allowance, status of civil works, teaching learning materials etc.

Technology integration has also been an integral part of enhancing quality of education. Various initiatives have been undertaken to tackle this challenging situation which are as follows:

(i) **PM e-Vidya** (https://pmevidya.education.gov.in): The COVID-19 pandemic presented a catastrophe for human civilisation but at the same time it became catalytic in bringing out various new strategies and accelerating the pace of technology intervention. PM e-vidya launched during the time of pandemic is one such comprehensive initiative which ensures coherent access to digital education through multimodal approach. The digital platform of MoE 'DIKSHA' has been declared as 'One Nation, One Digital Platform'. DIKSHA can be accessed by learners and teachers across the country and currently supports 30 Indian languages. Each State/UT leverages this platform in its own way, as it has the freedom and choice to use the varied capabilities and solutions of the platform to design and run programs for teachers, learners and administrators. DIKSHA policies and tools make it possible for the education ecosystem (educationist, experts, organisations, institutions - government, autonomous institutions, non-government and private organisations) to participate, contribute and leverage a common platform to achieve learning goals at scale for the country. In the times of COVID-19 pandemic, the platform has experienced unprecedented rise in access by learners and teachers across the country. There have been more than 5 billion learning sessions, 59 billion learning minutes, 22 billion-page hits. DIKSHA could smoothly handle such traffic owing to its robust tech-stack, futuristic design, and dedicated groups of manpower.

DIKSHA currently hosts over 6,500 textbooks energised with QR codes, including 359 NCERT textbooks and also called Energised Textbooks (ETBs). There are more than 3.01 lakh digital content on DIKSHA which include audio-visual content, reading and practice material, interactive resources and lesson plans. For digital content to aid in the teaching and learning processes, a rich repository of varied resources was contributed by Schools/individual teachers, content partners, NGOs, corporates under CSR under VidyaDaan against the various content requirements of NCERT/CBSE/States/UTs. As on date, more than 40,000 content pieces have been contributed under VidyaDaan. Further, NCERT has recently entered into an MoU with ISLRTC under which sign language videos are being developed jointly. More than 3000 ISL videos have been recorded and about 600 videos have been uploaded on DIKSHA. For Children with Special Needs, 2970 Indian Sign language (ISL) based content, Mukta Vidya Vani, an audio streaming podcast and Radio Vahini, with 24x7 broadcast and talking books (in Daisy format) for learners with Blindness and Low Vision have been prepared and also a total of 3424 Audio Books have been developed. 10,000ISL dictionary words, have been uploaded on DIKSHA.

At present, 12 PM eVIDYA DTH TV channels (One Class, One Channel from classes I to XII), are functioning that delivers class-wise contents on 24x7 basis are linked to DIKSHA through QR codes. A Podcast called Shiksha Vani of the CBSE is also being effectively used by learners of grades 9 to 12.

(ii) **Capacity Building of Teachers through NISHTHA online** (https://itpd.ncert.gov.in): The NEP 2020 clearly focuses on empowering teachers by spelling out the role at different levels of expertise/stage and competencies required. The policy has stated that each teacher will be expected to participate in at least 50 hours of Continuous Professional Development (CPD) program every year for their own professional development, driven by their own interests. CPD will systematically cover the latest pedagogies regarding foundational literacy and numeracy, assessment, competency-based learning, experiential learning, arts-integrated, sports-integrated, and storytelling-based approaches, etc. National Initiative for School Heads' and Teachers' Holistic Advancement (NISHTHA), an integrated training programme was initiated covering all the recommended areas and aims at holistic development of teachers. Under NISHTHA face-to- face training during 2019-20, 23,137 SRGs and 17,74,728 teachers and head teachers working in schools run by States/UTs were covered from 33 States/UTs.During the pandemic, NISHTHA was launched online at DIKSHA to ensure Under NISHTHA 1.0, about 24 lakh school teachers and head teachers at elementary education level (Classes 1-8) across 34 States/UTs and 8 Autonomous Bodies under MoE, Ministry of Defense (MoD) and Ministry of Tribal Affairs (MoTA) had completed training and were certified. Subsequently, NISHTHA 2.0 for Secondary teachers, NISHTHA 3.0 for Foundational stage teachers, and NISHTHA 4.0 for training of master trainers of ECCE have been launched for building capacities of teachers at all levels. Around 7.5 lakh secondary teachers and 12 lakh pre-primary and primary teachers have completed NISHTHA 2.0 and NISHTHA 3.0 training respectively.

Realising the need of digital education during COVID-19, the Government decided that the impetus for the education for 2022-23 would be on digital mode of learning to reverse the learning loss caused by the academic disruption due to the COVID pandemic situation. The following initiatives have been announced in Budget 2022-23 to expand the scale and scope of digital technology and to ensure learning for all, with equity, to cover all students at all levels of education, keeping in view India's scale, diversity, complexity and device penetration.

(i) **200 TV Channels:** Due to learning gaps caused by the pandemic-induced closure of schools, the need to impart supplementary teaching and to build a resilient mechanism for education delivery. For this purpose, the 'one class-one TV channel' program of PM e-VIDYA will be expanded from 12 to 200 TV channels. This will enable all states to provide supplementary education in regional languages for classes 1-12.

(ii) **Virtual Labs:** NEP 2020 recommends creating virtual laboratories so that all students have equal access to quality practical, critical thinking and hands-on experience for teaching-learning of Science, Mathematics and Vocational Skills. To support this around 750 virtual labs in science and mathematics, and 75 skilling e-labs for the simulated learning environment, will be set up in 2022-23.

(iii) **High Quality E-Content:** High-Quality e-content in all spoken languages will be developed for delivery via internet, mobile phones, TV, and radio through Digital Teachers.

(iv) **Competitive Mechanism For E-Content:** A competitive mechanism for the development of quality e-content by the teachers will be set up to empower and equip them with digital tools of teaching and facilitate better learning outcomes.

Conclusion

The NEP 2020 calls for investment in digital infrastructure, online teaching platforms and tools, virtual labs, digital repositories, online assessments, technology and pedagogy for online teaching-

learning etc., with the promotion of multilingualism and the power of language in teaching and learning through innovative and experiential methods, including through gamification and apps, by weaving in the cultural aspects of the languages - such as films, theatre, storytelling, poetry, and music - and by drawing connections with various relevant subjects and with real-life experiences.
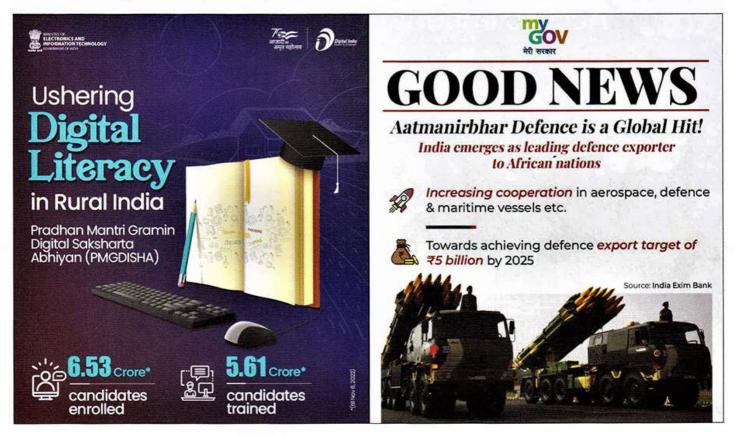
Technology will be integral in developing lifelong learners who have a growth mind-set, innate curiosity, drive to explore and firm belief in ongoing, voluntary, and self-motivated pursuit of knowledge. An inclusive, equitable, affordable and integrated digital ecosystem is needed to facilitate and sustain lifelong learning and to reap the benefits of inclusive technology development so that no one is left behind.

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