

NEP, 2020 : Curricular and Pedagogical Reforms for Online and Digital Education

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ABSTRACT

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The paper presents curricular and pedagogical reforms for online and digital education. It develops a platform for open online courses supported by various portals in improving the quality of education with the initiatives of NEP, 2020 policy. The recent rise in epidemics and pandemics necessitates that HEI's are ready with alternative modes of quality education whenever and wherever traditional and in-person modes of education are not possible. In this regard, the NEP, 2020 recognizes the importance of online and digital education.

Keywords : NEP-2020, Curricular Reforms, Pedagogical Reforms, Online and Digital Education.

I. INTRODUCTION

Over the years, Government has been able to enhance access and familiarity to ICT among the students and teachers. As far as e-content is concerned, the Digital Infrastructure for Knowledge Sharing (DIKSHA) is being envisaged as One Nation, One Digital Platform. This will be a single point access of all e-content. E-pathshala, NROER and similar other portals hosting e-content and digitised textbooks are being integrated with DIKSHA. This platform is a central infrastructure built on sophisticated technology which incorporates the latest in AI/ML and other internet technologies, including telemetry which captures detailed usage data. It has browser and app capabilities. Tools, such as, two-way video and two-way-audio interface for holding online classes and online assessment will be possible due to adjustable

nature of platform. The platform takes advantage of latest AI/ML technologies integrating platforms such as Tensor flow and other open-source capabilities to perform supervised and unsupervised learning, neural networks, predictions, recommendations, machine transactions for Indian languages, video/text translations, etc.

The vision statement of the National Policy of ICT in School Education (2012) states that : "It aims at preparing youth to participate creatively in the establishment, sustenance, and growth of a knowledge society learning to all round socio-economic development of the nation and global competitiveness". The introduction of ICT requires a digital infrastructure which entails : (i) each trainee has a laptop or tablet with an inbuilt software ; (ii) libraries are digitalized ; (iii) sufficient number of e-

readers ; and (iv) digital contents be customized in local languages.

The above mentioned policy document suggests that ICT literacy may be categorized in three levels :

i. Basic Level : Trainees to be acquainted with the basics of computers and search engines to the extent : familiarize themselves with Word and data-processing tasks, use and troubleshoot storage, input and output devices, connect to the Internet, use email, and different social media.

ii. Intermediate Level : Teachers and trainees learn to create and manage content, tools and resources and to learn software applications.

iii. Advanced Level : Trainees learn to use different software applications to enhance self-learning, create and participate in web-based networks for cooperative and collaborative learning, and know issues of cyber-security, copy right, and plagiarism, etc.

The successful completion of each stage depends on the local situation and availability of the digital environment, digital tools and technology, and willingness of students, teachers, and educational administrators to participate in the process.

CURRICULAR AND PEDAGOGICAL REFORMS

According to Chatterjee (2021), ICT creates a learner-centric teaching – learning environment. Students are encouraged to ‘construct’ meaning or new knowledge based on their prior knowledge and experience and develop into active learners. They are involved in knowing certain information intentionally and enthusiastically. They are aware of what information they need, why they need it, how to access that information, and how much of that information they can understand and internalize.

Researches in cognitive neuroscience shows that active learning generates deeper grasp of subjects, lower the rate of forgetting, and increases the possibility of transfer of knowledge to new situation. Keeping this in view, Chatterjee (2021) propagated that, active learning leads to independent learning. Students can access whatever information they need for their assigned projects through the Internet. They learn to manage projects on their own and they become self-motivated, responsible knowledge – seekers who are likely to utilize available resources to the maximum extent.

They learn to adapt themselves to changed knowledge situations and are able to respond to new information by using different digital platforms, such as blogs, tweets, chatrooms, etc. They need not have to wait for the publication of revised texts since with the advancement of digital media, printed resources are easily available on online (Chatterjee, 2021).

II. OPEN ONLINE COURSES

Chatterjee (2021) envisages that, for the democratic expansion of education, ICT can play a very significant role in expanding global learning networks by launching Massive Open Online Courses (MOOCs). These courses are designed for large number of participants, that can be accessed by anyone anywhere, without any entry qualifications or fees for complete course. Open Online Courses are labelled as ‘massive’ since these courses caters to the large number participants. In a massive course, the number of participants may easily exceed 150 even though there is bound to be some technical resource constraint. ‘Open’ implies the freedom from constraints of space, time, and pace. Suppose, if course offers complete experience of a particular course then there is no starting and ending dates. If a course is a partial requirement of acquiring a degree, then the pace becomes somewhat predetermined. All courses offered through MOOCs are not meant for

beginners. Therefore, any advanced course should be preceded by an introductory course in the same area.

Chatterjee (2021), considers such courses as 'online' courses since the digital content is devised, delivered, and assessed through the Internet. The digital content may consist of videos, audios, texts, games including simulations, animations, and social media. Online interaction can take place through various social media channels, blogs, and forums. Feedback can be received through online from peers and teachers through chatrooms. Assessment may be, if required, through quizzes. Sometimes, online course may be supplemented by some offline face-to-face activities. Usually, a Certificate of Completion will be given to all participants in MOOC Courses.

There are several MOOC platforms in India launched by academic institutions. Top institutes, such as the IITs, IIMs, IISc have launched MOOCs. Initially the platforms like edX, Coursera, Udacity, and Khan Academy concentrated more on creating and providing e-resources and consolidating network connectivity. The Government of India also supported initiatives taken by some academic institutions and universities to offer online courses.

National Programme on Technology Enhanced Learning (NPTEL) is one such joint initiative of seven IITs and IISc funded by MHRD for offering courses on Engineering and Science. NPTEL has offered online courses on computer science, electrical, mechanical, and marine engineering and some courses on management, humanities, and music. Using open source technology, it offers course contents mainly in video format along with text meta data for possible conversions to all Indian languages. Although these courses were not sufficiently interactive in the beginning, the quality and interactivity of the courses have improved with time. NPTEL is planning to operate as a MOOC provider by introducing assessment and tests (Chatterjee, 2021).

mooKIT : In 2014, IIT, Kanpur introduced mooKIT, a MOOC management system, to offer 15 courses. This system has been specially designed to tackle the problems arising out of low-bandwidth and low-computing power. The system can provide alternative resources in audio format along with slides in place of video resources. If the bandwidth is low even for audio texts, a learner can use just a basic phone for audio lessons and learn. This benefits rural learners who do not have good Internet connectivity or high bandwidth. mooKIT also uses open source technology and its core engine runs on Java Script based technology.

IIT Bombay X : IIT Bombay developed this non-profit MOOC system around the same time, using the open source platform Open edX. This system offers blended learning MOOCs and by using this platform some Indian universities are running open online course for local college students. Hence, course completion is compulsory for those who opt for these MOOCs.

SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds) : SWAYAM platform was launched in 2016 by MHRD for offering courses on an independent platform in collaboration with Microsoft. The purpose was to combine both on-line and off-line education. Around 2000 open on-line courses offered by SWAYAM are credit courses with a provision of transfer of credits between the institutions. The UGC made a provision that any academic institute in India would be allowed to offer upto 20 per cent of its syllabus through SWAYAM platform.

The course hosted on SWAYAM platform are offered by following National Coordinations :

- i. AICTE (All India Council for Technical Education) for self-paced international courses
- ii. NPTEL (National Programme on Technology Enhanced Learning) for Engineering
- iii. UGC (University Grants Commission for non-technical post-graduate education)
- iv. CEC (Consortium for Educational Communication) for under-graduate education
- v. NCERT (National Council of Education Research and Training) for school education
- vi. NIOS (National Institute of Open Schooling) for school education
- vii. IGNOU (Indira Gandhi National Open University) for out-of-school students
- viii. IIMB (Indian Institute of Management, Bangalore) for management studies
- ix. NITTR (National Institute of Technical Teachers Training and Research) for Teacher Training Programme

Chatterjee (2021) reveals that, the Government of India has taken special initiatives to provide the necessary technological support for launching MOOCs. It may even invite public private-partnership projects for creating the necessary infrastructure. We hope that connectivity and bandwidth especially in rural remote areas will improve in the near future. IIT, Kanpur has developed mookIT especially to address this issue. The Government is also partnering with specialized academic institutions and universities in creating content. SWAYAM will allow for both English and Hindi languages to discourse the courses. It is hoped that in due course of time the platform will be available in other Indian languages also.

III. THE CHALLENGES

Chatterjee (2021), reiterates that, inspite of all advantages, there are some challenges in the implementation of ICT in education. They are

- Managements are least enthusiastic because of heavy initial expenditure involved and also because easy Internet access to essential materials for students.
- Many teachers are afraid that ICT will undermine their role in the classroom and are afraid of becoming superfluous and eventually, losing their jobs.
- Teachers of older generation do not have sufficient exposure to new technologies, nor do they receive immediate technical support when they get struck in the classroom (Chatterjee, 2021).

All these challenges can be overcome, when teachers are properly trained in handling new technologies and hands-on technical support is provided in the classrooms. Further, teachers are need to be convinced that ICT can never replace a teacher ; however, the role of teacher will be changed in the new environment. They need to perform multi-tasks such as facilitators, supervisors and instruction provides in the learning process (Chatterjee, 2021). Management have to make all concerned to be aware of the principles of Internet ethics and thus reduce the possibility of its misuse. They can block access to pornographic sites from the institutional LAN by using filters and site-blockers.

PROVISIONS FOR ONLINE AND DIGITAL EDUCATION UNDER NEP, 2020

The NEP, 2020 is grounded on the principles of Access, Equity, Quality, Affordability and Accountability. Keeping this in view the policy emphasizes on the following :

- Moving towards a more holistic undergraduate education ;
- Enabling faculty and institutional autonomy ;
- Revamping of curriculum pedagogy, assessment and student support ;
- Reaffirming the integrity of faculty positions and institutional leadership ;
- Establishing a National Research Foundation (NRF) ;
- Enabling increased access, equity, and inclusion through a range of measures, including greater opportunities for outstanding public education ;
- Moving towards a more multidisciplinary under-graduate education ;
- Providing all infrastructure and learning materials accessible and available to learners with disabilities ;
- Ensuring governance by independent boards with autonomy ;
- Ensuring a substantial increase in public investment in education by both the Central Government and all State Governments ;
- Enforcing 'light but tight' regulation by a single regulator for higher education ; and
- Moving towards a HES consisting of large, multidisciplinary universities and colleges. (Sridhar and Singai, 2021)

Keeping this in view, the NEP, 2020 proposes the following policy issues :

IV. NEP, 2020: POLICY ISSUES

New circumstances and realities require new initiatives. The recent rise in epidemics and pandemics necessitates that we are ready with alternative modes of quality education whenever and wherever traditional and in-person modes of education are not possible. In this regard, the National Education Policy 2020 recognizes the importance of leveraging the advantages of technology while acknowledging its potential risks and dangers. It calls for carefully designed and appropriately scaled pilot studies to determine how the benefits of online/digital education can be reaped while addressing or mitigating the downsides. In the meantime, the existing digital platforms and ongoing ICT-based educational initiatives must be optimized and expanded to meet the current and future challenges in providing quality education for all. (NEP Para 24.1)

However, 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. (NEP Para 24.2)

Teachers require suitable training and development to be effective online educators. It cannot be assumed that a good teacher in a traditional classroom will automatically be a good teacher in an online classroom. Aside from changes required in pedagogy, online assessments also require a different approach. There are numerous challenges to conducting online examinations at scale, including limitations on the types of questions that can be asked in an online

environment, handling network and power disruptions, and preventing unethical practices. Certain types of courses/subjects, such as performing arts and science practical have limitations in the online/digital education space, which can be overcome to a partial extent with innovative measures. Further, unless online education is blended with experiential and activity-based learning, it will tend to become a screen-based education with limited focus on the social, affective and psychomotor dimensions of learning. (NEP Para 24.3)

Given the emergence of digital technologies and the emerging importance of leveraging technology for teaching-learning at all levels of education NEP, 2020 recommends the following initiatives:

(a) Pilot studies for online education: Appropriate agencies, such as the NETF, CIET, NIOS, IGNOU, IITs, NITs, etc. will be identified to conduct a series of pilot studies, in parallel, to evaluate the benefits of integrating education with online education while mitigating the downsides and also to study related areas, such as, student device addiction, most preferred formats of e-content, etc. The results of these pilot studies will be publicly communicated and used for continuous improvement.

(b) Digital infrastructure: There is a need to invest in creation of open, interoperable, evolvable, public digital infrastructure in the education sector that can be used by multiple platforms and point solutions, to solve for India's scale, diversity, complexity and device penetration. This will ensure that the technology-based solutions do not become outdated with the rapid advances in technology.

(c) Online teaching platform and tools: Appropriate existing e-learning platforms such as SWAYAM, DIKSHA, will be extended to provide teachers with a structured, user-friendly, rich set of assistive tools for monitoring progress of learners. Tools, such as, two-way video and two-way-audio

interface for holding online classes are a real necessity as the present pandemic has shown.

(d) Content creation, digital repository, and dissemination: A digital repository of content including creation of coursework, Learning Games & Simulations, Augmented Reality and Virtual Reality will be developed, with a clear public system for ratings by users on effectiveness and quality. For fun based learning student-appropriate tools like apps, gamification of Indian art and culture, in multiple languages, with clear operating instructions, will also be created. A reliable backup mechanism for disseminating e-content to students will be provided.

(e) Addressing the digital divide: Given the fact that there still persists a substantial section of the population whose digital access is highly limited, the existing mass media, such as television, radio, and community radio will be extensively used for telecast and broadcasts. Such educational programmes will be made available 24/7 in different languages to cater to the varying needs of the student population. A special focus on content in all Indian languages will be emphasized and required; digital content will need to reach the teachers and students in their medium of instruction as far as possible.

(f) Virtual Labs: Existing e-learning platforms such as DIKSHA, SWAYAM and SWAYAMPRAKHA will also be leveraged for creating virtual labs so that all students have equal access to quality practical and hands-on experiment based learning experiences. The possibility of providing adequate access to SEDG students and teachers through suitable digital devices, such as tablets with pre-loaded content, will be considered and developed.

(g) Training and incentives for teachers: Teachers will undergo rigorous training in learner-centric pedagogy and on how to become high-quality online content creators themselves using online teaching platforms and tools. There will be emphasis on the

teacher's role in facilitating active student engagement with the content and with each other.

(h) Online assessment and examinations: Appropriate bodies, such as the proposed National Assessment Centre or PARAKH, School Boards, NTA, and other identified bodies will design and implement assessment frameworks encompassing design of competencies, portfolio, rubrics, standardized assessments, and assessment analytics. Studies will be undertaken to pilot new ways of assessment using education technologies focusing on 21st century skills.

(i) Blended models of learning: While promoting digital learning and education, the importance of face-to-face in-person learning is fully recognized. Accordingly, different effective models of blended learning will be identified for appropriate replication for different subjects.

(j) Laying down standards: As research on online/digital education emerges, NETF and other appropriate bodies shall set up standards of content, technology, and pedagogy for online/digital teaching-learning. These standards will help to formulate guidelines for e-learning by States, Boards, schools and school complexes, HEIs, etc. (NEP Para 24.4)

Creating a Digital Infrastructure, Educational Digital Content and Capacity : Technology in education is a journey and not a destination and capacity will be needed to orchestrate the various ecosystem players to implement policy objectives. A dedicated unit for the purpose of orchestrating the building of digital infrastructure, digital content and capacity building will be created in the Ministry to look after the e-education needs of both school and higher education. Since technology is rapidly evolving, and needs specialists to deliver high quality e-learning, a vibrant ecosystem has to be encouraged to create solutions that not only solve India's challenges of scale, diversity, equity, but also evolve in keeping with the

rapid changes in technology, whose half-life reduces with each passing year. This centre will, therefore, consist of experts drawn from the field of administration, education, educational technology, digital pedagogy and assessment, e-governance, etc. (NEP Para 24.5)

V. PROGRAMME OF IMPLEMENTATION

The implementation plan for NEP, 2020 regarding Online and Digital Education proposes the following strategies :

Pilot Studies : CIET/NCERT/SCERT will conduct various pilot studies to evaluate the benefits of integrating education with online education while mitigating the downsides and also to study related areas. The results of these pilot studies will be publicly communicated and used for continuous improvement.

Addressing the Digital Divide : CIET/NCERT/SCERTs will ensure that e-learning resources for preschool to grades 12 are made available centrally, as well as by states/UTs in local languages. This content will be prepared with the central idea of focusing on competencies and the attainment of outcomes of learning. Therefore, DIKSHA will contain e-resources under six component categories to begin with. These categories will be expanded and diversified as per need. In the backdrop of the pandemic, it is essential that states/UTs ensure that e-content for learners is uploaded on DIKSHA by them as soon as possible, but not later than 21-22 academic session.

The six categories of components under DIKSHA are as follows:

Part A - Content based on SCERT Textbooks for grades 1 to 12 in local medium/s of instruction – including, E-content tagged to the QR codes of Energized Textbooks or ETBs, and

chapter/module/topic wise content for all subjects/grades to study each topic as a course; this will be prepared by the SCERTs.

Part B – Content based on NCERT/NIOS Textbooks for grades 1 to 12 in Hindi and English – including, E-content tagged to the QR codes of Energized Textbooks or ETBs, and chapter/module/topic wise content for all subjects/grades to study each topic as a course; this will be prepared by NCERT (along with CBSE/KVS/JNV/CTSA) and NIOS

Part C - Standardized criterion referenced test items, and item banks of questions based on higher order thinking prepared by the Central and state level to test achievement of Learning Outcomes in each grade, to be released from time to time.

Part D- Systematic teacher capacity building modules by NCERT and SCERTs

Part E – Virtual Laboratories and other e-content based on AR/VR will also be prepared by NCERT and SCERTs.

Part F – Vidyadaan or portal for states/UTs to call for systematic contribution of identified category of e-content from individuals, organisations, teachers, experts, etc.

For ensuring equity in educational technology, it will be ensured that the same e-contents are available across all digital modes (portals, Apps, TV, radio) for the same topic/s under the Coherence policy of DoSEL. For this, concerted efforts will be made by all states/UTs in consultation with NCERT through DIKSHA. States/UTs will prepare strict action plans for achieving this not later than 2021-22 academic session.

One class, one channel through Swayam Prabha will be activated with high quality e-learning content by NCERT and SCERTs not later than 2021-22 academic session.

Digital Devices : The schools in the Special Education Zones and Aspirational districts will be integrated

with digital devices on priority by states/UTs under the strengthened ICT scheme (as mentioned in Task 278). States/UTs will plan accordingly for projecting before the Samagra Shiksha PAB from 2021-22 financial year onwards.

The Ministry will pursue with MEITY and Commerce Ministries for the Make in India scheme to be aligned to produce and market a useful, affordable, maintainable digital device. These devices once made available, can be considered for partial sponsoring to meritorious students from SEDG categories.

Digital Infrastructure : As mentioned in Task 280, DoSEL will collaborate with NIC and MEITY to provide open, interoperable, evolvable, public digital infrastructure in the education sector that can be used by multiple platforms and point solutions, to solve for India's scale, diversity, complexity and device penetration. This will ensure that the technology-based solutions do not become outdated with the rapid advances in technology.

Online Teaching Platform and Tools : To begin with, DoSEL will pursue with MEITY for facilitating development of tools, such as, two-way video and two-way-audio interface for holding online classes along with other tools to track and monitor progress of learners.

Training and Incentives for Teachers : NCERT and SCERT will arrange for teachers to undergo rigorous online training in learner-centric pedagogy and on how to become high-quality online content creators themselves using online teaching platforms and tools. There will be emphasis on the teacher's role in facilitating active student engagement with the content and with each other by building AI based solutions. The created content will have a mechanism for evaluation so that there is incentive for better creations and it can also weed out extra content not useful to children.

Content Creation, Digital Repository, and Dissemination : Aside from undertaking e-content creation based on NETF recommendations and pilot studies, digital repository of innovative content will be created, including creation of coursework, Learning Games & Simulations, Augmented Reality and Virtual Reality, with a clear public system for ratings by users on effectiveness and quality. For fun-based learning student-appropriate tools like apps, gamification of Indian art and culture, in multiple languages, with clear operating instructions, will also be promoted. This work will be undertaken by NCERT and SCERT in collaboration with Commerce Ministry, MEITY, etc. over a period of time.

Virtual Labs : NCERT and SCERTs will leverage existing e-learning platforms such as DIKSHA, SWAYAM and SWAYAMPURABHA for creating virtual labs so that all students have equal access to quality practical and hands-on experiment-based learning experiences.

Online Assessment and Examinations : The proposed National Assessment Centre or PARAKH, CBSE, NIOS, BOAs and NTA will design and implement assessment frameworks encompassing design of competencies, portfolio, rubrics, standardized assessments, and assessment analytics. Mechanisms will be developed for online assessment and examinations for both summative and formative assessment.

Blended Learning : The COVID-19 pandemic has taught many lessons regarding how to build resilience in education. One very strong learning is that online education must be continued in a blended mode in all grades at all times, so that transition to fully online education is smooth in case of a challenging situation like the present pandemic. For ensuring this, NCERT will recommend the approach for the phased-manner of introduction, percentage, manner, format, etc., of blended education through discussions with experts

in the National Curriculum Framework. CBSE, KVS, JNV and CTSA will initiate implementation as soon as NCFSE is launched by NCERT.

Based on the NCFSE recommendations for continuing blended learning, SCERTs will suitably incorporate the same in their curriculum, in a phased manner and initiate implementation immediately thereafter.

Laying down Standards : DoSEL will take up with NETF, after its formation by DoHE, the matter of setting standards of content, technology, and pedagogy for online/digital teaching-learning in school education. These standards will help to formulate guidelines for e-learning by States, Boards, schools and school complexes, HEIs, etc.

Creating a Digital Infrastructure, Educational Digital Content and Capacity : A dedicated Online and Digital Education unit will be created in the Ministry consisting of experts drawn from the field of administration, education, educational technology, digital pedagogy and assessment, e-governance, etc. for the purposes mentioned in NEP 2020.

VI. CONCLUSION

Chatterjee (2021) suggests that, although through online courses, students will have access to information, however, it is transformed into knowledge only through interaction with teachers and peer-group. Secondly, dissemination of information in online courses takes place only through printed media which will not develop oral communication skill. Due to aloofness learners feel de-motivated and drop-out of the courses. In order to overcome these two barriers SWAYAM encourages blended learning. After digitally accessing online courses, learners can attend their colleges. Further, the quality of SWAYAM courses is monitored by experts, however, MOOCs do not take

away the right of the teachers to restructure / design courses in accordance with the need of the learners. The same quality academic modules will be made available to all types of learners across the country through MOOCs. These courses have been a great help to professionals and students in engineering and technology courses to upgrade their existing knowledge-base. But it has become difficult to sustain them. Therefore, the assessment mode for these courses has to be standardized and they are to be supplemented with laboratory experiments and hands-on training. Now MOOCs 2.0 is in vogue offering a mix of free and paid courses, which is known as the freemium model.

Since open online courses are the most potent means for democratizing higher education and bridging the gaps across many barriers, the Government of India is still supporting MOOCs as free courses. Of course, ICT and virtual-learning space will not solve all epistemological, moral and economic problems. But we must endeavour to provide the best for Higher Education by the judicious application of ICT sticking to our motto of providing quality education for all (Chatterjee, 2021).

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