

**EMPLOYING DIGITAL TECHNOLOGIES IN SCHOOL EDUCATION OF
INDIA WITH SPECIAL REFERENCE TO NATIONAL EDUCATION POLICY**

2020 and UNION BUDGET (2022-23)

**A Dissertation for the award of Master Diploma in Public Administration (MDPA)
in partial fulfillment of the requirement for the Advanced Professional Programme
in Public Administration (APPPA)**

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Certificate

I have the pleasure to certify that Shri Prashant Agarwal has pursued his research work and prepared the dissertation titled “ Employing Digital Technologies in School Education of India with special reference to National Education Policy (NEP) 2020 and Union Budget 2022-23” under my guidance and supervision. The same is the result of research done by him and to best of my knowledge; no part of the same has been part of any monograph, dissertation or book earlier. This is being submitted to the Indian Institute of Public Administration, for the purpose of Master’s Diploma in Public Administration, in partial fulfillment of the requirement for the Advanced Professional Programme in Public Administration of Indian Institute of Public Administration, New Delhi.

I recommend that the dissertation of Shri Prashant Agarwal is worthy of consideration for the award of Master’s Diploma of Indian Institute of Public Administration.

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Glossary of Terms

| | |
|----------|--|
| AI | Artificial Intelligence |
| API | Application Programming Interface |
| CBSE | Central Boards of Secondary Education |
| CIET | Central Institute of Educational Technology |
| CL | Collaborative Learning |
| COL | Commonwealth of Learning |
| CPD | Continuous Professional Development |
| CSR | Corporate Social Responsibility |
| CwSN | Children with Special Needs |
| DAISY | Digitally Accessible Information System |
| DIKSHA | Digital Infrastructure for Knowledge Sharing |
| DIP | Digital India Program |
| DoP&T | Department of Personal and Training |
| DoT | Department of Telecommunications |
| DSE&L | Department of School Education and Literacy |
| DT | Digital Technology |
| DTH | Direct to Home |
| Edo-BEST | Edo Basic Education Sector Transformation |
| EDUFI | Finnish National Agency for Education |
| GER | Gross Enrollment Ratio |
| GoI | Government of India |
| HEIs | Higher Education Institutions |
| ICT | Information and Communication Technology |
| IGNOU | Indira Gandhi National Open University |
| IIT | Indian Institute of Technology |
| IoT | Internet of Things |

| | |
|----------|---|
| ISL | Indian Sign Language |
| KVS | Kendriya Vidyalaya Sangathan |
| LCD | Liquid Crystal Display |
| LMS | Learning Management System |
| MeitY | Ministry of Electronics and Information Technology |
| MHRD | Ministry of Human Resource and Development |
| MoE | Ministry of Education |
| MOOC | Massive Open Online Courses |
| NATs | New Age Technologies |
| NCERT | National Council of Educational Research and Training |
| NCFSE | National Curriculum Framework for Secondary Education |
| NDEAR | National Digital Education Infrastructure |
| NEP 2020 | National Education Policy 2020 |
| NETF | National Education Technology Forum |
| NIOS | National Institute of Open Schooling |
| NISHTHA | National Initiative for School Heads and Teachers Holistic Advancement |
| NMEICT | National Mission on Education through ICT |
| NIT | National Institute of Technology |
| NRF | National Research Foundation |
| NTA | National Testing Agency |
| OECD | Organization for Economic Co-operation and Development |
| OLABS | Online Labs |
| PARAKH | Performance Assessment, Review and Analysis of Knowledge for Holistic Development |
| PPP | Public Private Partnership |
| QR Code | Quick Response Code |
| RPWD Act | Right of Persons with Disability Act |
| SDG | Sustainable Development Goal |

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|--------|--|
| SWAYAM | Study Webs of Active Learning for Young Aspiring Minds |
| TEL | Technology Enhanced Learning |
| TTS | Text to Speech |
| UBEC | Universal Basic Education Commission |
| UNESCO | United Nations Education, Scientific and Cultural Organization |
| UT | Union Territories |
| VSK | Vidya Sameeksha Kendra |
| WEF | World Economic Forum |

Executive Summary

Digital technology has played a significant role in the education system, particularly in school education in India. The integration of digital technology in education has transformed the traditional method of teaching and learning, making it more interactive, engaging, and effective for students. The use of digital technology has provided students with various benefits such as access to vast amounts of information, improved communication, and collaboration, and increased flexibility in learning.

National Education Policy (NEP), 2020 and Union Budget 2022-23 sufficiently emphasizes the use of Digital Technology in School Education. NEP, 2020 mentions that while education will play a critical role in digital transformation of country, technology itself will play an important role in the improvement of educational processes and outcomes.

Objectives for study of the topic are enumerated as under:

- 1) To understand the role of digital technology in education, particularly in school education in India from the perspective of the students.
- 2) To describe some of the global best practices of developing countries elsewhere for implementing digital technologies in education, particularly in school education.
- 3) To comprehend the emphasis of NEP 2020 and Union Budget (2022-23) on application of digital technologies, particularly in school education in India.

- 4) To understand the challenges that could impede the successful implementation of digital technologies in education, particularly in school education in India from the perspective of the students.
- 5) To suggest policy recommendations for overcoming the challenges impeding the successful implementation of digital technologies in school education in India from the perspective of the students.

Secondary data was analyzed to substantiate research objective 1, 2 and 3 whereas objective 4 was validated using primary survey employed on various stakeholders including students, teachers, parents and school administration. The recommendations for the report (objective 5) were addressed using both of secondary as well as primary data collected from various stakeholders.

Four sets of questionnaires were designed each for parents, students, teachers and school administration that encompassed several multiple-choice questions. Sample size with 95 % confidence level, 5 % margin of error, 50 % population proportion and infinite population size comes out to 385. Data was collected from various stakeholders from 15th January'23 to 15th February '23. Total of 436 responses were received against the questionnaires deployed. All the responses received were complete and valid and hence all of them were considered for analysis. The demography of students reveals that most of them are from English medium schools and studying in private schools. Demography of parents suggested that most of them are postgraduate or above, studying in urban areas, working in govt/ private sectors, annual income > Rs 8 lakhs, and their ward goes to private schools. This means that this is a representation of affluent parents. With regard

to teachers, most of them are from private schools. However, the school administration is consisting mainly govt schools.

The summary of analysis with respect to students, parents, teachers and school administration highlighted the following:

- 1) Access to digital device is limited and challenges are also being faced while using online mode of learning.
- 2) Schools are lacking in infrastructure facilities required for online education such as latest platforms, better internet connectivity, smart boards etc.
- 3) All stakeholders *i.e.* students, teachers, parents and school administration are need to be trained/ taught about cyber hygiene/ cyber security.
- 4) Peer learning/ collaborative learning, gamification etc are needs to be embedded in online learning.
- 5) There need to focus on better mode of online assessments and online labs.
- 6) There is a strong need for training of teachers for better pedagogy in digital education and also in the field of cyber hygiene/ cyber security.
- 7) Schools and parents need to ensure that adequate safeguards are inbuilt in the process of online education such as screen guard on desktop/ laptop, comfortable ergonomics etc.
- 8) Parents need to be taught about parental control and adequate utilities to monitor internet uses by their ward.
- 9) To avoid any physical, social damages and mental repercussion of the online learning, there is a need to inculcate better broad based mechanisms.

- 10) There is a need to sensitize the schools, teachers, parents and students regarding the schemes of Government of India such as DIKSHA, NISHTHA, SWAYAM-Prabha, SWAYAM, Radio / community radio and so on.

India has made substantial progress in last few years in the era of digital education as government has taken/ taking many initiatives for implementation of use of digital technology in education as envisaged in NEP, 2020 and budget announcement 2022-23. These initiatives includes PM *e-Vidya* (which includes DIKSHA, SWAYAM Prabha, extensive use of Radio/ community radio/ podcast e-content for CwSN, NDEAR *etc.*), NISHTHA, OLABS, *e-Pathshala*, *Vidya Sameeksha Kendra* and so on. However, there is still a long way to go, and it is important to ensure that digital technology is accessible to all students, regardless of their socio-economic status or geographical location. The analysis done in this study focuses on several areas, already indicated afore.

For the ease of summarizing, the key takeaways of the study have been encapsulated herewith:

1. The study clearly points out that India has made substantial progress in implementing digital technologies in urban school education; however there is a significant digital divide between urban and rural areas. To address this divide, there is a need for adopting a multi-pronged strategy that should encompass equal emphasis on varied aspects *viz.* building digital infrastructure, training of teachers, designing relevant content, and monitoring and evaluating the impact of digital education programs on continuous basis. This would ensure equitable access to digital education for all students, regardless of their socio-economic status or geographical location.

2. To mitigate the digital divide, it is equally imperative to focus on hardware-manufacturing within the country itself. This would also guarantee that all students have access to affordable as well as reliable digital learning tools. The related work has already been initiated by government through its prestigious 'Make in India' program that strives to promote the development of a strong technology ecosystem in the country to curate '*Aatmnirbhar Bharat*' (self-reliant India).
3. The lack of infrastructure facilities in schools can be a significant challenge for online education in India. However, solutions such as government support, public-private partnerships, philanthropy, donations and so on may be implemented to address this issue. By investing in the necessary infrastructure facilities, it can be ensured that all students have access to high-quality online education.
4. Educating students and teachers about topics associated with cyber hygiene / cyber security is crucial in today's digital age. It is essential to ensure that they are aware of all aspects of online threats and are equipped with the knowledge and skills to protect themselves and stay safe online. This can be achieved through awareness campaigns, workshops, and training programs conducted by schools and other educational institutions.
5. To ensure successful implementation of digital education in the Indian schooling system, a single platform of 'One Nation, One Learning Platform' may be

designed. A comprehensive platform that integrates all educational activities can be a game changer for Indian education.

- a. The platform should be compatible with all available devices and support all major regional languages.
- b. Additionally, the platform should be designed with interesting gamification strategies to maximize its usage and must inculcate a user-centric approach and accessibility in mind for CwSN (children with special need) too.
- c. Personalization, contextualization, and multilingualism are essential components of such a system.
- d. To defeat digital fatigue, ‘Peer learning’ and ‘business-games for learning’ are two powerful strategies that must be embedded in online education. Peer learning would help to create an engaging and interactive learning environment, as well as motivate the students to stay engaged with online education and help in knowledge retention. Business games for learning is to provide students with a safe environment to practice their decision-making skills, test their business acumen, and learn from their mistakes without real-world consequences.
- e. Improving online assessment is crucial to the successful implementation of digital technology in school education in India. By using a variety of assessment modes, developing standardized tests, using assessment tools, providing clear instructions, ensuring security, and providing feedback,

schools can ensure accurate, reliable, and fair evaluation of students' learning outcomes.

6. Apart from teaching the students through this platform, there is a need for better modes of online-labs / virtual-labs that are interesting and engaging for students for various subjects particularly science. By using interactive simulations, augmented reality, and collaborative learning during practical sessions, schools can make online labs more interesting and effective for students, and enhance the quality of education in the country.
7. This platform could also exclusively provide an option for training the teachers. This facility would help to connect teachers with trainers and mentors and provide them with easy access to high-quality content and resources. The training should also be designed to provide teachers with hands-on experience and access to the necessary technology and infrastructure. To train the massive workforce of teachers in the Indian school education system effectively, training strategies need to be innovated to go more digital and multi-lingual in nature. Online courses for teachers should be designed to cover various topics, including cyber hygiene.
8. Schools and parents need to take adequate measures to ensure that online education is safe and comfortable for students. This includes using screen guards, providing comfortable ergonomics, limiting screen time, monitoring online activity, and providing emotional support to students. By taking these measures, we can ensure that students have a positive and healthy online learning experience.

9. All these efforts shall not fructify, if the beneficiaries are not aware about various digital advents of the government. Therefore, it is pertinent to sensitize all the stakeholders including the schools, teachers, parents, and students about the various digital schemes launched by the government. By creating awareness and by regular dissemination of this information, government can ensure that all these stakeholders are able to avail this. The same responsibility is on the shoulders of the school authorities too so that their staff and students are empowered enough to take advantage of these schemes and enhance the quality of education in the country.

We are celebrating '*Azadi ka Amrit Mahotsav*' to commemorate 75 years of independence and next 25 years are marked as '*Amrit Kaal*', which represents a significant milestone in India's journey towards progress and development. One of the main objectives of the *Amrit Kaal* is to accelerate India's progress towards becoming a developed nation. This includes improving the country's infrastructure, boosting economic growth, and promoting social and cultural development. As such, the future education system in India also needs to be designed to meet the needs of a rapidly changing world. There should be a real equity across all socio- economic divides; all children above three years of age should be in schools, availability and accessibility of quality education resources for all to be ensured and so on. All efforts are to be taken to make our education system amongst the best in the world. In the year 2047, India will celebrate its 100 years of independence and all the sectors, particularly education should strive to make India a global knowledge superpower and to restore India's glory as a great centre of learning.

Chapter- 1

Introduction

1.0 Introduction

Every element of modern life has been touched by digital technologies, and education is no different. The advent of particularly new age technologies (NATs) and internet, as well as the growing demand for a digital ready workforce has accelerated the application of digital technologies in education.

Technology can deliver new educational opportunities for everyone. Digital education is the innovative use of digital tools and technologies during teaching and learning and is also referred to as Technology Enhanced Learning (TEL) (Kirkwood & Price, 2014). TEL has various advantages for both the learners and the educators such as it gives learners chance to study flexibly and from a location that suits and so on. Educators also get an opportunity to design engaging learning opportunities in the courses they teach to curate ‘blended’ or fully ‘online courses and programs’ (McLaughlin, 2018).

“The global education development agenda reflected in the Goal 4 (SDG4) of the 2030 agenda for sustainable development seeks to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” by 2030” (Chapter- Introduction, pg no. 3, NEP 2020). The fulfilment of the same for a diverse and developing country like India is possible, only if prudent application of digital technologies is adopted in education sector.

The use of digital technology in education has provided students with access to a vast amount of information. With the internet, students can access online resources such as e-books, videos, and articles, which can enhance their understanding of a particular subject. This has been particularly beneficial for students in rural areas who may not have access to traditional libraries or resources. Moreover, students can use digital technology to access various educational platforms which provides free online courses on various subjects. These platforms have been particularly beneficial for students who may not have access to quality education or cannot afford to attend expensive institutions.

Digital technology has also improved communication and collaboration among students. With the use of digital tools such as email, instant messaging, and video conferencing, students can communicate with their teachers and classmates, regardless of their location. This has been particularly beneficial for students who may not be able to attend physical classes due to various reasons such as distance, illness, or disability. Students can also collaborate with their classmates on various projects and assignments, which can enhance their understanding of a particular subject.

For these reasons even the emerging policy framework such as NEP 2020 and Union Budget 2022-23 of India have emphasized the inculcation of digital technology in education domain. Both these relevant policy instruments have augured the continuing importance of leveraging technology for teaching-learning at all levels from school to higher education. NEP 2020 goes a step further to delineate the anticipated challenges/risks in successful implementation of technology in education in Indian context. Both these instruments, therefore, form very important part of any study that has

to focus on uptake of digital technologies in education domain, which is the aim of the present study.

1.1 About National Education Policy, 2020

The National Education Policy (NEP), 2020 is a policy document released by the Government of India in July 2020. It is a comprehensive framework that aims to transform the Indian education system from its current form to a more inclusive, equitable, and holistic one. The policy has been formulated after extensive consultations with education experts, stakeholders, and the general public. The NEP, 2020 aims to address the existing gaps and challenges in the education system and to provide a quality education to all students, regardless of their socio-economic backgrounds. It proposes several measures to ensure the universalization of education, the promotion of multidisciplinary education, the integration of vocational education, and the use of digital technology in education and so on. The NEP, 2020 envisions India as a global knowledge superpower by providing a world-class education system that fosters innovation, creativity, and critical thinking.

The policy recognizes the value of using innovation's benefits while acknowledging its impending challenges and hazards in this way. To ascertain how the advantages of online/digital education might be attained while attending to or limiting the drawbacks, carefully planned and scaled pilot studies are needed. Reforming and modernizing the country's educational infrastructure is an important objective of NEP 2020. Another important area of concentration is the creation of a public, digital, and interoperable framework that may be applied at various stages.

One of the most significant changes in the educational system's backdrop over the past few years has been the incorporation of Information and Communication Technology (ICT) in various facets of education. The government introduced the 'Digital India' programme in 2015 to create a 'digitally enabled society and knowledge economy'. For distance and in-depth learning, improved classroom interactions, more developed instructional methods, changeable educational programmes, and adaptable links between students and teachers, digital innovation has become increasingly crucial.

India has become a "data driven society" during the past few years, and there is an increasing need to embrace the use of innovation in the field of education. One of the guiding concepts for the educational framework, according to the policy, will be the "broad use of innovation in teaching and learning, decreasing linguistic barriers, extending access as well as education arranging and the executives". Students and teachers are forced to reconsider traditional learning and teaching approaches in the current "pandemic settings," where virtual learning is replacing in-person learning encounters.

The internet prepared both those seeking education and those offering it, then brought them together under one virtual roof. As a result, the idea of the virtual classroom is currently being advocated all over the world. Due of its adaptability, online educational innovation has become increasingly popular in the current era and is essential for delivering education.

The policy acknowledges the importance of innovation in supporting educators, crossing the language barrier between them and their students, building digital libraries,

accelerating language acquisition, and ensuring more deserving students have access to education. Additionally, it is advocated that schools emphasise coding as a crucial ability that students should acquire in their class plans. The policy also encourages the use of innovation stages for online teacher training and emphasises that innovation may be a helpful instrument in assisting teacher education.

The policy emphasizes the necessity to adapt to changes brought about by this rising employment of artificial intelligence (AI) in a range of disciplines and predicts challenges resulting from its broad application. The policy is innovative because it recognises the necessity of fostering mindfulness and direct examination on various aspects of the emerging problematic innovations, including concerns relating to information handling and insurance, while also taking into account the ‘troublesome advances’ that are occurring.

The policy urges teachers to receive excellent training in creating online content, improve online teaching platforms and tools, build virtual labs and digital repositories, plan and carry out online evaluations, and establish standards for content, innovation, and instructional methodology for online teaching-learning.

The use of digital technologies in education can improve access to quality education, especially for students in remote and underprivileged areas. It can also help to promote interactive and personalized learning, and provide opportunities for collaboration and communication. Additionally, digital technologies can support the development of 21st century skills such as critical thinking, problem-solving, and creativity.

1.2 About Union Budget 2022-23

Union Budget, 2022-23 emphasizes strongly on the use of technology in education. For universalization of quality education, the budget emphasizes on to expand ‘One Class One Channel’ programme of PM e-*Vidya* from 12 to 200 channels by acknowledging the learning loss due to closure of schools induced by the pandemic. This will enable the states to provide supplementary education on regional languages for class 1 to 12. Budget also proposed to develop the high quality e-content in all spoken languages for delivery via internet, mobile phones, TV and Radio through digital teachers.

A competitive mechanism for development of quality e-content by the teachers also proposed to be set-up to empower and equip them with digital tools of teaching and facilitate better learning outcomes. Virtual labs and skilling e-labs are also proposed to be set up to promote critical thinking skills and simulated learning environment in the Budget 2022-23.

1.3 Statement of Problem

Acknowledging and emphasizing the importance of use of digital technology in education, the NEP, 2020 states, *“While education will play a critical role in this transformation, technology itself will play an important role in the improvement of educational processes and outcomes; thus, the relationship between technology and education at all levels is bidirectional”* (Para 23.1, pg no. 56, NEP 2020) .

It further affirms, *“Given the explosive pace of technological development allied with the sheer creativity of tech-savvy teachers, it is certain that technology will impact education in multiple ways, only some of which can be foreseen at the present time”* (Para 23.2, pg

no. 56, NEP 2020). Very pragmatically, the policy also recommends to focus on creation of digital infrastructure, online teaching platform and tools, design of suitable content as well as an equal emphasis on building digital repositories and so on. This inevitably draws attention to mechanisms that would help to bridge the digital divide so that the blended models of learning could be successfully implemented.

This emphasis is also obvious from the paragraph, where NEP 2020 states “... *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*” (Para 24.1, pg no. 57, NEP 2020).

Similarly the Union Budget (2022-23) has also focused on important aspects of digital learning. A review of Union Budget spotlight (<https://www.india.gov.in/spotlight/union-budget-fy-2022-2023>) reflected its emphasis on important concepts such as virtual labs, universalization of quality education through TV channels and so on. Some such aspects of Union Budget (2022-23) are- establishment of ‘One class-One TV channel programme of PM *e-Vidya* (to be expanded to two hundred TV channels)’, ‘Virtual labs and skilling e-labs to promote critical thinking skills and simulated learning environment’ as well as emphasis on design and development of ‘High-quality e-content for delivery through digital teachers’ and many more.

A macro overview of these documents clearly emphasis a need to analyses the existing policy directions of Government of India (GoI) to map the country's efforts of implementing digital technology in education. Further, this policy formulation should be responsive to the needs and aspirations of the major and most critical stakeholders of education sector i.e. 'the students'.

Also the education sector encompasses various levels including school education, higher education and so on, the present study intents to focus on just the former *viz.* the school education with emphasis on perspectives of the students only.

1.4 Objectives

The research objectives of the study are

- 1) To understand the role of digital technology in education, particularly in school education in India from the perspective of the students.
- 2) To describe some of the global best practices of developing countries elsewhere for implementing digital technologies in education, particularly in school education.
- 3) To comprehend the emphasis of NEP 2020 and Union Budget (2022-23) on application of digital technologies, particularly in school education in India.
- 4) To understand the challenges that could impede the successful implementation of digital technologies in education, particularly in school education in India from the perspective of the students.

- 5) To suggest policy recommendations for overcoming the challenges impeding the successful implementation of digital technologies in school education in India from the perspective of the students.

1.5 Rationale or Justification

“..Providing universal access to quality education is the key to India’s continued ascent, and leadership on the global stage in terms of economic growth, social justice and equality, scientific advancement, national integration, and cultural preservation. Universal high-quality education is the best way forward for developing and maximizing our country’s rich talents and resources for the good of the individual, the society, the country, and the world. The gap between the current state of learning outcomes and what is required must be bridged through undertaking major reforms that bring the highest quality, equity, and integrity into the system, from early childhood care and education through higher education” (Chapter- Introduction, pg no. 3, NEP 2020).

NEP, 2020 also converges its key action points around this aim, as is validated by the NEP excerpts mentioned herewith:

- 1) Dedicated institution for EdTech in education (National Education Technology Forum, NETF) (NEP Para 23.3, 23.4, 23.8, 23.12,24.2,24.4)
- 2) Expanded scope of EdTech to cover tech for teachers, tech for students, tech for assessments (NEP Para 5.3, 5.7, 23.5)
- 3) EdTech solutions need to be available for all stakeholders in vernacular languages (NEP Para 2.6, 2.8, 4.12, 4.19, 6.11, 23.6, 24.4)

- 4) Different approaches of online assessments to be piloted and tested for scale and efficacy (NEP Para 24.3, 24.4)
- 5) Increased focus on emerging disruptive technologies in education (NEP Para 23.2, 23.7, 23.8)
- 6) Dedicated institute for research and development in EdTech (National Research Foundation, NRF) (NEP Para 23.9)
- 7) Blended learning model approach for classroom learning (NEP Para 4.18, 4.23, 4.26, 23.12, 23.13 , 24.3, 24.4)
- 8) Increased importance of Ed-tech for continued at-home learning for all students (NEP Para 4.46, 6.12, 24.1, 24.2, 24.4)
- 9) Building capacity of teachers and school leaders for effective use of technology in education (NEP Para 5.15. 5.16, 5.24, 6.13, 24.3, 24.4)
- 10) Dedicated unit for building of world class, digital infrastructure, educational digital content and capacity (NEP Para 24.4, 24.5)

Union Budget (2022-23) also emphasized on to build a resilient mechanism for education delivery by proposing to expand TV Channels from twelve to two hundred. To promote crucial critical thinking skills and to give space for creativity, virtual labs are also proposed to be set up. Development of high quality e-content is also stressed upon in the Union Budget.

With such kind of global and national focus on digital learning, it becomes quite imperative to analyze the present context of our country, its preparedness as well as propose a way forward that learns from global best practices but stays relevant and contextual to India.

1.6 Research Strategy and Research Design

This study adopted mixed of quantitative and qualitative research strategy to conduct the research. In consonance with research strategy, explanatory and descriptive research design is used for analysis.

1.7 Research Questions

Following research questions are formulated to attain the objectives of the study:

Q.1 What are the global best practices in developing countries elsewhere for implementing digital technologies in school education?

Q.2. What are the core highlights in NEP 2020 and Union Budget (2022-23) with regard to application of digital technologies in education with special reference to school education- from a student's perspective?

Q3. What steps Government of India (GoI) has already initiated to implement the provisions of NEP 2020 and Union Budget (2022-23) with specific reference to students' convenience to use application of digital technologies in education, particularly school education?

Q.4 What are the main challenges faced by Indian school students while using online education methods?

Q.5 What is the way forward to eliminate the challenges in implementation of the provisions regarding digital technologies in education contained in NEP 2020 and Union Budget (2022-23)?

Chapter 2

Literature Review

2.1 Significance and impact of digital education in learning

In the 21st century, technology is crucial to everyone's ability to live. Technology has proven to be a boon for the educational industry ever since Covid-19 took place. Although educators were already aware of the importance of digitization, this pandemic gave it an abrupt push and boost.

NEP 2020 has a thorough list of suggestions for promoting online education that will guarantee readiness with substitute modes of high-quality education whenever and wherever traditional and in-person modes of education are impractical. According to NEP 2020, a specialized architecture will be developed to manage the development of digital infrastructure, digital content, and capacity building to meet the requirements of both school and higher education in terms of e-education (Para 24.5, pg no 60, NEP, 2020).

The goals of access, quality, and equity can all be achieved through excellent education with the help of technology. Numerous alterations brought about by the Covid-19 pandemic were previously regarded as impossibilities. One such shift that was already underway and was made prominent by the pandemic is the digitalization and use of technology in education. Technology's significance is one element of the 20th century that cannot be ignored in any way, and the same is true of education (Pendor, 2022).

Literature affirms (for instance, Diah et al., 2019) that:

- 1) When compared to classes without digital modules, the learning success of physics is higher in classes using them in terms of instructor and student activity.

2) Students who use digital modules see a moderate improvement in their problem-solving abilities, whereas students who don't use digital modules see a middling improvement in their problem-solving abilities.

(3) There is a distinction between the students who use digital modules and those who do not in terms of their ability to solve problems. This is due to the fact that students can easily understand the phenomena presented during learning through the digital module because they are closely linked to daily life.

Many students are slowly but steadily converting to online classes in almost every subject area, including business, the arts, engineering, as well as programming languages and technical tools, in this digital age. There are numerous courses accessible online in every field, and students are eagerly filling the classrooms. With the help of modern technology, digital learning gives students a lot of flexibility. They can study whenever they want, from wherever they are, at their own pace, and without having to think about deadlines or schedules. Students are free to seek both the knowledge they want and the knowledge they do not. New changes in how education is delivered and viewed are being brought about by the growth of technological advancements. With the digitalization of education, the scope of educational initiatives improves every day. The overall learning process is being improved by the new opportunities that digital education is giving both teachers and students to teach, learn, and develop (Kumar, 2020).

The future of education on the region will be heavily influenced by digital learning, especially in India. It is surprising to see how advanced technologies are transforming the nation's general educational system. Digital education's uptake in remote and hinterland areas is rapidly changing. Rural students now have access to affordable high-

speed internet and direct-to-device technologies, which enable them to take online classes and advance their skills and knowledge. The industry is presently dealing with serious problems like outdated teaching techniques, a teacher shortage, an insufficient student-teacher ratio, and a lack of instructional materials. However, as education has become more digitized, pupils in less developed educational systems are now being taught using the most up-to-date resources and methods, including LCD screens, videos, and other things. Teachers are able to interact with students who are spread out across multiple locations thanks to technology. In the near future, interactive digital media will undoubtedly contribute to addressing the nation's teaching shortage. (Kulkarni, 2019).

Further Damarin (2000) asserts that the 'digital divide' is a binary construct that misrepresents the issue of equity in relation to educational technology by categorizing people into two groups based on whether they 'have' or 'have not' access to computers and related communications capabilities. A 'digital differences' perspective along multiple dimensions related to the user's requirements and the hardware-software-network configuration at her disposal is a much more suitable way to look at the situation educators are in.

Nicholas (2003) concluded that it is crucial that we consider those transferable principles of our work that will be helpful to others as we engage in eLearning. Research is necessary to develop theories, not assessments, principles, not practices, and methods, not applications. Only after that will a body of literature be created that can be used in various educational settings and organizations are be developed that can be applied across multiple institutions and education settings.

Lim, et al. (2013) mentioned that there are two important technological gaps in schooling that need to be filled. First, there is a utilization gap. Today's pupils use technology much less intensively and extensively inside of the classroom than they do outside of it. An outcome difference is the second factor. The gains in terms of decreased costs and increased productivity achieved by schools are significantly smaller than the results gained through investment in technology in sectors outside of education. They went on to talk about the reasons behind these two gaps and offered solutions for closing them, including having conversations about successful teaching methods and committing to technology planning.

Henriksen et al. (2016) suggested that at the levels of teacher preparation, assessment, and educational policy, successful integration of creativity and technology in education must be taken into account. To promote discussion about the integration of technology and creative thinking in 21st-century educational systems, they present research and practical consequences with broad suggestions across these three areas.

Ozerbas and Erdogan (2016) indicated that academic achievement favors the experimental group significantly more than the control group. However, research has shown that there is no appreciable change in students' self-efficacy with online technologies. The findings of this study should be helpful in illuminating how schools are utilizing digital classrooms. Additionally, when considering the significance that the digital classroom provided to parent-school communication, including parents in the research process may help to clearly see the shortcomings and develop the digital classroom.

According to an OECD Survey (2020) countries usually used several tools in order to support students' learning while they were unable to come to school- from textbooks, worksheets and printouts to radio education, educational television and online instructional resources. The most popular tool used by OECD and partner countries during school closures were online platforms (Reimers and Schleicher, 2020).

To assist partners in keeping the doors to learning open for everyone, the Commonwealth of Learning (COL) stepped forward to offer its knowledge and resources. Policymakers, school and college managers, teachers, parents, and students have access to a curated list of resources that will support student learning while educational institutions are closed. (COL, 2020).

As per World Economic Forum (2020), in response to significant demand, many online learning platforms are offering free access to their services. The World Economic Forum (WEF) also states that -while some believe that the unplanned and rapid move to online learning – with no training, insufficient bandwidth, and little preparation – will result in a poor user experience that is un-conducive to sustained growth, others still believe that a new hybrid model of education will emerge, with significant benefits.

2.2 Impact of peer learning/ collaborative learning (CL) in digital education

With regard to the peer/ collaborative learning, Raymond et.al (2016) in their research highlighted that the majority of research participants (66%) preferred the method of online peer learning. Peer learning online reduced the online loneliness that remote or online students frequently experience. They further observed that by combining group online learning with conventional face-to-face instruction, students have access to a wider range of learning strategies, which improves their experience learning as a whole. It is

also concluded that the most frequent reasons given for liking peer online learning were convenience and simplicity, which is appropriate given that students are demanding more adaptable programs and instructional strategies.

Further Laal, M. & Ghodsi, S. M. (2012) in their literature concluded that collaborative learning (CL) has many advantages in comparison to competitive and individualistic efforts. It usually leads to higher success and productivity, more loving, supportive, and committed relationships, as well as improved psychological health, social skills, and self-esteem.

2.3 Highlights of report of department related parliamentary standing committee on education, women, children, youth and sports

2.3.1 The Standing Committee on Education, Women, Children, Youth, and Sports in its report on ‘Plans for bridging the learning gap caused due to school lockdown as well as review of online and offline instructions and examinations and plans for re-opening of schools’ submitted on August 6, 2021 noted and recommended the following:

1) Remote learning: The Committee noted that digital mode of education would continue to be the ‘new normal’ even after the pandemic. It recommended: (i) increasing investment in electrical (including non-conventional sources), communication (satellite TV and radio), and digital infrastructure to enable access to digital education, (ii) distributing subsidised internet connections and content pre-loaded devices to students from backward sections of society, and (iii) developing tools for monitoring students’ learning progress and interactive learning (through virtual reality and augmented reality).

- 2) Accessible educational content: To ensure that students understand the educational content being provided, the Committee recommended: (i) developing an integrated learning management system to track availability and delivery of online educational modules (including virtual lab simulations) across languages, and (ii) creating special content and textbooks for differently-abled children through audio-books and using Sign Language in regional languages
- 3) Teaching: The Committee recommended training of teachers in: (i) creating digital content through modern tools, (ii) using digital devices to deliver online content, and (iii) interacting with students in the online mode. Additionally, teachers from backward areas may be given incentives (including internet packages and free devices) to shift to digital education. It recommended assessing teachers on their ability to handle audio-visual tools.
- 4) Blended education: The Committee recommended developing a long-term strategy to ensure continued access to digital education. It also suggested remodeling education to incorporate greater use of digital education.
- 5) Examination: The Committee recommended establishing a uniform system of continuous assessments, over and above the board exams. To do this, it suggested using workbooks and topic-wise exercises. Further, it recommended using experiential learning, and alternative evaluations based on presentations and other methods.

2.3.2 The Standing Committee in its report on the ‘Reforms in content and design of school text books’ submitted on November 30, 2021, recommended that textbooks should

contain separate elements spreading awareness against internet addiction and other aspects harmful to the society.

2.2.3 The Standing Committee in its 345th report submitted on 19th December 2022, noted and recommended the following:

While noting the steps being taken for strengthening digital education in India, committee observed that increasing digital education in the country will also help the government to improve accessibility in rural areas and impart quality education to students in small towns and villages. It is also observed by the committee that increased adoption of digital education in India is also attracting global key players to offer online courses to students and extend opportunities to learn new skills. The Committee recommended that through such digital courses or avenues of education, the department should also focus on getting students industry-ready by evaluating their competencies and helping them get aligned with industry-based skills. Besides this, the Committee also recommended to identify the means and evolve new collaborative mechanisms in various sectors to further support and strengthen digital education initiatives which will prove beneficial to India, such as leveraging space technology and specifically satellite communication techniques for beaming educational content in the digital form, in coordination with concerned space application institutes.

2.4 Basic infrastructure (related with digital education) available in schools in India

The Indian school education system is one of the largest in the world with nearly 14.89 lakh schools, more than 95 lakh teachers and nearly 26.52 crore students of preprimary to higher secondary level from varied socio-economic backgrounds as per the UDISE

(Unified District Information System for Education) report 2021-22. The analysis of these reports for last few years revealed the following with reference to the availability of functional computers and internet connection in the schools:

Table- 1: Schools with functional computer facility:

| Year | All management (%) | Govt (%) | Govt Aided (%) | Private unaided recognized (%) | Others (%) |
|---------|--------------------|----------|----------------|--------------------------------|------------|
| 2018-19 | 33.49 | 27.18 | 55.16 | 51 | 20.9 |
| 2019-20 | 37.13 | 28.55 | 61.84 | 58.48 | 28.88 |
| 2020-21 | 39.88 | 31.11 | 60.44 | 62.7 | 31.21 |
| 2021-22 | 45.8 | 35.8 | 67.5 | 71.9 | 39 |

Table-2: Schools with Internet facility:

| Year | All management (%) | Govt (%) | Govt Aided (%) | Private unaided recognized (%) | Others (%) |
|---------|--------------------|----------|----------------|--------------------------------|------------|
| 2018-19 | 18.73 | 9.78 | 38.58 | 43.41 | 18.12 |
| 2019-20 | 22.28 | 11.58 | 42.18 | 50.16 | 21.42 |
| 2020-21 | 24.51 | 13.64 | 43.81 | 52.96 | 22.66 |
| 2021-22 | 33.9 | 24.2 | 53.1 | 59.6 | 28.8 |

The above data shows that India has done numerous progresses in these areas in last few years; however, there is much needs to be done to fill the available gap for successful implementation of digital technologies.

With reference to orientation on cyber safety to the students, as per UDISE report 2021-22, only 12.5 % government and government aided schools have provided the same to their students. With reference to peer learning, 51% of such schools have introduced such programmes in their schools.

To conclude, the literature review indicates that digital technology has the potential to revolutionize the school education system in India. With the introduction of the National Education Policy 2020, there has been a renewed focus on implementing digital technology to enhance the quality of education. The use of digital technology can help to personalize learning, promote multilingualism, and provide access to a wide range of educational resources. However, there are challenges to be addressed, such as the digital divide, teacher training, and cyber-security concerns. “Competitiveness roadmap for India @ 100” mentioned that India can draw an example like Peru for focusing on improving education in the country. Therefore, a comprehensive and integrated approach is required to ensure the effective implementation of digital technology in school education, which can lead to better outcomes for students and a more inclusive and equitable education system.

Chapter 3

Research methods and Collection of Data

3.1 Methodology

Research methodology is an essential component of any dissertation, as it outlines the overall approach and methods that is used to collect and analyze data. In this chapter, designing of questionnaires based on the research objectives, data collection methods, sample size and scope/ limitations/ de-limitation are discussed.

3.1.1 Designing of Questionnaire

This research is designed:

- 1) To understand the role of digital technology in education, particularly in school education in India from the perspective of the students.
- 2) To describe some of the global best practices of developing countries elsewhere for implementing digital technologies in education, particularly in school education.
- 3) To comprehend the emphasis of NEP 2020 and Union Budget (2022-23) on application of digital technologies, particularly in school education in India.
- 4) To understand the challenges that could impede the successful implementation of digital technologies in education, particularly in school education in India from the perspective of the students.

- 5) To suggest policy recommendations for overcoming the challenges impeding the successful implementation of digital technologies in school education in India from the perspective of the students.

Secondary data was analyzed to substantiate research objective 1, 2 and 3 whereas objective 4 was validated using primary survey employed on various stakeholders including students, teachers, parents and school administration. The recommendations for the report (objective 5) were addressed using both of secondary as well as primary data collected from various stakeholders. Four sets of questionnaires were designed each for parents, students, teachers and school administration that encompassed several multiple-choice questions.

Questionnaire for students consist two parts: Part-I regarding demography of respondent, Part-II- Questions about employing digital technology and other related issues. Part-I consists of 7 questions and Part-II consists of 21 questions.

Questionnaire for parents consist two parts: Part-I regarding demography of respondent, Part-II- Questions about employing digital technology and other related issues. Part-I consists of 11 questions and Part-II consists of 21 questions.

Questionnaire for teachers consist two parts: Part-I regarding demography of respondent, Part-II- Questions about employing digital technology and other related issues. Part-I consists of 8 questions and Part-II consists of 21 questions.

Questionnaire for school administration consist two parts: Part-I regarding demography of respondent, Part-II- Questions about employing digital technology and other related issues. Part-I consists of 8 questions and Part-II consists of 21 questions.

Further, informal discussions and focused group discussions were held with policy makers and implementers i.e. officials of Department of School Education and Literacy, Ministry of Education, Govt of India to understand the various steps/ initiatives already undertaken/ being undertaken by the GoI to implement related aspects of NEP 2020 and Budget document 2022-23.

3.1.2 Data Collection

Sample size with 95 % confidence level, 5 % margin of error, 50 % population proportion and infinite population size comes out to 385. Data was collected from various stakeholders from 15th January’23 to 15th February’23. Following responses were received:

Table- 3 Data Collection

| Questionnaire for | No of responses received |
|--------------------------|---------------------------------|
| Parents | 129 |
| Students | 173 |
| Teachers | 99 |
| School Administration | 35 |
| Total | 436 |

3.1.3 Scope/Limitation/ Delimitation

The scope of this study is limited to the provisions contained in NEP 2020 and Union Budget (2022-23) with reference to digital technology in education. Though the education sector encompasses various levels including school education and higher education, the present study intends to focus on just the former *viz.* the school education with emphasis on perspectives of the students only. Further the demography of students

reveals that most of them are from English medium schools and studying in private schools.

Demography of parents suggested that most of them are postgraduate, studying in urban areas, working in govt/ private sectors, annual income > Rs 8 lakhs, and their ward goes to private schools. This means that this is a representation of affluent parents. With regard to teachers, most of them are from private schools. However, the school administration is consisting mainly govt schools. Hence this study is limited with respect to this demography only.

It is also pertinent to point that while this study was being prepared for final publication, Union Budget 2023-24 was introduced in February, 2023, however, the related paras of the budget have not been considered for obvious deadline constraints.

Chapter 4

Analysis and Discussion

The research questions related to objectives were to be addressed on the basis of primary data, secondary data and combination of both. The research questions accordingly being discussed in subsequent paras.

4.1 Analysis

The National Education Policy 2020 (NEP 2020) is a landmark policy document that aims to transform the Indian education system. One of the key pillars of NEP 2020 is the integration of digital technology in education. The policy recognizes that digital education has the potential to revolutionize the way students learn and teachers teach, providing access to quality education irrespective of geographic location and financial status. The pandemic-induced lockdowns have further accelerated the adoption of digital education in India, with schools and universities across the country transitioning to online learning. However, the implementation of digital education in India is not without challenges. With this reference, this chapter will elaborate the various best practices adopted by developing countries elsewhere across the globe. The detailed aspect of digital technology in NEP, 2020 and Budget document 2022-23 will be dwelled upon in this chapter. The action taken by Government of India for implementation of digital technologies in education will also be discussed. Further, this chapter aims to analyze the impact of employing digital education in India by exploring the effectiveness of various digital education tools and strategies, and identify the challenges and opportunities in implementing the same in the Indian education system.

4.2 Research Question: What are the global best practices in developing countries elsewhere for implementing digital technologies in school education?

Digital technologies are increasingly becoming a ubiquitous part of our daily lives, and education is no exception. As technology continues to evolve, it presents opportunities for schools to enhance the learning experience and provide students with the necessary digital skills for the modern world. However, in many developing countries, there are various challenges that hinder the effective implementation of digital technologies in school education. Therefore, it is crucial to identify and understand the global best practices that have been successful in implementing digital technologies in school education in developing countries. This chapter aims to explore and provide insights into the effective use of digital technologies in school education, drawing from successful practices from various countries around the world.

Peru: ‘Innova Schools’ is a network of private schools in Peru that offers high-quality education at an affordable price, using an innovative, technology-driven approach to education. The schools are known for their use of technology, with each student having access to a tablet or laptop for their learning. The idea behind ‘Innova Schools’ was to provide affordable quality education to the masses, especially those from low-income backgrounds. The founder realized that many students in Peru were not getting access to high-quality education due to financial constraints. Hence, they started ‘Innova Schools’ with the aim of providing affordable education to all, using technology to enhance the learning experience. ‘Innova Schools’ uses a blended learning model, combining traditional classroom teaching with digital resources and online learning platforms. The schools have a standard curriculum, but students also have access to digital resources,

including interactive whiteboards, online assessments, and educational videos. The schools have a strong focus on critical thinking, problem-solving, and digital literacy skills. Each student is provided with a tablet or laptop to use during their studies, which allows them to access educational materials, communicate with teachers, and collaborate with other students. Teachers use the digital platform to monitor student progress and provide personalized feedback. Overall, 'Innova Schools' is a significant player in the Peruvian education landscape, offering an innovative, technology-driven approach to education. While there are concerns and criticisms, the network has achieved impressive academic results and is providing affordable education to thousands of students who would otherwise not have access to it.

Finland: According to the current National Core Curriculum, ICT and mobile learning are key parts of versatile learning environments. The diverse media culture is taken into consideration in the development of learning environments. The pupils' own ICT devices were used to support learning in a manner that is subject to agreement with their guardians. It is ensured that all pupils are provided with the opportunity to make use of ICT in basic education. Since 2007, EDUFI (Finnish National Agency for Education) has granted state subsidies for the development of learning environments in Finnish schools. Only municipalities and private education providers were eligible for funding, but the projects involved cooperation between many different stakeholders, such as other public authorities, local companies and universities. The main goal of the projects has been to prepare Finnish schools for implementing ICT competence and mobile learning in teaching, as outlined in the National Core Curriculum. All projects that are granted funding are obliged to develop the pedagogical use of ICT and mobile learning, and to

include a plan for distributing the outcomes of the project regionally and even nationally. EDUFI has also supported local education providers in supplying schools with ICT equipment and internet connections. This was also a part of the strategy to prepare Finnish schools for new ways of teaching and mobile learning. In 2018, 99 per cent of Finnish schools had a broadband internet connection available. Most of the Finnish schools are equipped with stable Wi-Fi connections and the students are able to use laptops or tablets provided by the school. The programmes and learning environments used vary from school to school, but mainly cloud computing and different digital textbooks and other learning materials are used.

Nigeria: Nigeria, which has the largest population in Africa, already confronted the challenge of having more than 13 million out-of-school children, or about 20% of all out-of-school children worldwide, even before COVID-19. Insurgent activities and attacks on schools that have specifically targeted women and girls pose another ongoing danger to education. Nigeria's federal Ministry of Education (MoE) halted all schools in the middle of March 2020 to stop the spread of COVID-19. The Ministry of Education and the Universal Basic Education Commission (UBEC) formed a task team to create this decision's education response plan to COVID-19. States like Lagos, as well as other states, issued educational radio and television programs at the same time to counteract learning loss brought on by the closure of school buildings. The state of Edo launched Edo-BEST@Home, a mobile-based remote learning programme that extends the pre-existing Edo Basic Education Sector Transformation (Edo-BEST) programme, a Public-Private Partnership (PPP) between the Edo State Basic Education Board, the World Bank, and Bridge International Academies. The EdoBEST@Home remote learning programs

were commonly used by about 30% of Nigerian primary school students. Students can learn at home using free materials that can be downloaded from an online repository thanks to the remote learning program. The EdoBEST@Home mobile-based unimodal remote learning program includes interactive audio lessons, digital self-study activity packets, digital storybooks, mobile interactive quizzes, learning guides for parents, and virtual classrooms that allow interaction between instructors and students. To foster effective use of the educational resources provided and to ensure learning, EdoBEST@Home focused on four key aspects: first, providing engaging programming focused on content aligned to the curriculum; second, constant support from teachers and parents to students; third, formative assessment in the form of interactive quizzes; and fourth, on-going support to teachers through virtual coaching.

Brazil: Brazil has implemented a nationwide e-learning program called "e-MEC" which provides students with access to digital resources and tools to enhance their learning experiences. Additionally, the government has invested in the development of digital resources and tools for teachers, including interactive whiteboards and tablets. Brazil also has a program called "Proinfo", which provides training to teachers on the use of technology in education.

Mexico: Mexico has implemented a nationwide e-learning program called "Aprende en Línea" which provides students with access to digital resources and tools to enhance their learning experiences. Additionally, the government has invested in the development of digital resources and tools for teachers, including interactive whiteboards and tablets. Mexico also has a program called "Programa de Fortalecimiento de la Educación", which

provides funding for schools to improve their technology infrastructure and digital resources.

Egypt: Egypt has implemented a nationwide e-learning program called "E-Learning Egypt" which provides students with access to digital resources and tools to enhance their learning experiences. Additionally, the government has invested in the development of digital resources and tools for teachers, including interactive whiteboards and tablets.

Turkey: One of the biggest projects in Europe and Central Asia is the safe schooling and distance education project. It finances: (i) the expansion of Turkey's EBA (Eğitim Bilişim Ağı) e-learning platform from 300,000 users to 1 million users; (ii) the development of IT infrastructure for the new digital education system that will increase capacity from 1 million to 5 million concurrent users; (iii) the development of distance education content; and (iv) the development of an education technology ecosystem to promote innovative technologies and pedagogical tools to support the transition towards blended learning. The initiative seeks to increase EBA coverage among the underprivileged while also addressing any technical problems and boosting school resilience. The EBA also defines the responsibilities of school principals, teachers, parents, and students in the provision of learning support in a digital world, as well as give teachers better direction on remote teaching and pedagogy. The project's components are as follows:

- a) Emergency Connectivity and IT Infrastructure for Education in Emergencies
- b) Digital Content for Safety and Quality
- c) Institutional Capacity for Education Technology Resilience

In general, these developing countries have implemented programs to increase the use of technology in education and provide students and teachers with access to digital resources and tools. Additionally, these countries have also invested in teacher training programs to ensure that teachers are equipped to effectively use technology in the classroom. The use of technology in education can help bridge the gap between developed and developing countries and provide equal opportunities for students in terms of education.

4.3 Research Question: What are the core highlights in NEP 2020 and Union Budget (2022-23) with regard to application of digital technologies in education with special reference to school education- from a student's perspective?

This chapter will delve into the core highlights of the NEP 2020 and Budget document 2022-23 on digital education and examine the various measures proposed by the policy to transform the Indian education system using digital technology.

4.3.1 Provisions in NEP, 2020

The National Education Policy (NEP) 2020 is based on the principles of inclusivity, equity, quality, and innovation and is aimed at providing a holistic and multidisciplinary education to students. One of the key focus areas of the NEP 2020 is the integration of digital technology in education. The policy recognizes the potential of technology in providing an inclusive, equitable, and quality education system and proposes several measures to ensure its effective use in the education sector. These measures are mentioned below along with the related paras as mentioned in NEP, 2020:

4.3.1.1 NETF: A Dedicated Institution for Technology in Education in India

The NEP 2020 highlights the need to create the National Education Technology Forum (NETF) for school education and higher education which champions EdTech vision and strategy at a national level.

NEP paras that particularly underline this have been reproduced herewith:

“23.3. An autonomous body, the National Educational Technology Forum (NETF), will be created to provide a platform for the free exchange of ideas on the use of technology to enhance learning, assessment, planning, administration, and and so on , both for school and higher education. The aim of the NETF will be to facilitate decision making on the induction, deployment, and use of technology, by providing to the leadership of education institutions, State and Central governments, and other stakeholders, the latest knowledge and research as well as the opportunity to consult and share best practices. The NETF will have the following functions:

- a) provide independent evidence-based advice to Central and State Government agencies on technology-based interventions;*
- b) build intellectual and institutional capacities in educational technology;*
- c) envision strategic thrust areas in this domain; and*
- d) articulate new directions for research and innovation”.*

(Para no. 23.3, pg no .56-57, NEP-2020)

“23.4. To remain relevant in the fast-changing field of educational technology, the NETF will maintain a regular inflow of authentic data from multiple sources including educational technology innovators and practitioners and will engage with a diverse set of researchers to analyze the data. To support the development of a vibrant body of knowledge and practice, the NETF will organize multiple regional and national conferences, workshops, etc. to solicit inputs from national and international educational technology researchers, entrepreneurs, and practitioners”.

(Para no. 23.4, pg no .57, NEP-2020)

“23.8 One of the permanent tasks of the NETF will be to categorize emergent technologies based on their potential and estimated timeframe for disruption, and to periodically present this analysis to MHRD. Based on these inputs, MHRD will formally identify those technologies whose emergence demands responses from the education system”.

(Para no. 23.8, pg no .57, NEP-2020)

“23.12 In school, the study of current affairs and ethical issues will include a discussion on disruptive technologies such as those identified by NETF/MHRD. Appropriate instructional and discussion materials will also be prepared for continuing education”.

(Para no. 23.12, pg no .58, NEP-2020)

*“24.4. (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”.*

(Para no. 24.2, pg no .59, NEP-2020)

*“24.4 (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”.*

(Para no. 24.4, pg no .60, NEP-2020)

4.3.1.2 Expanded scope of EdTech to cover tech for teachers, tech for students, tech for assessments

The NEP 2020 has expanded the use cases of EdTech to cover tech for students, tech for teachers, and tech for assessments besides being used for administration purposes.

NEP paras that particularly underline this, have been reproduced herewith :

“23.5. The thrust of technological interventions will be for the purposes of improving teaching- learning and evaluation processes, supporting teacher preparation and professional development, enhancing educational access, and streamlining educational planning, management, and administration including processes related to admissions, attendance, assessments, etc”.

(Para no. 23.5, pg no .57, NEP-2020)

“5.3. The harmful practice of excessive teacher transfers will be halted, so that students have continuity in their role models and educational environments. Transfers will occur in very special circumstances, as suitably laid down in a structured manner by State/UT governments. Furthermore, transfers will be conducted through an online computerized system that ensures transparency”.

(Para no. 5.3, pg no .20, NEP-2020)

“5.7. A technology-based comprehensive teacher-requirement planning forecasting exercise will be conducted by each State to assess expected subject-wise teacher vacancies over the next two decades. The above described initiatives in recruitment and deployment will be scaled as needed over time, to fill all vacancies with qualified teachers, including local teachers, with suitable incentives for career management and progression as described below. Teacher education programmes and offerings will also align with the vacancies thus projected”.

(Para no. 5.7, pg no .21, NEP-2020)

4.3.1.3 EdTech solutions need to be available for all stakeholders in vernacular languages

The policy emphasizes on creation of content in all Indian languages and making them accessible for all students through platforms like DIKSHA/SWAYAM etc.

NEP paras that particularly underline this have been reproduced herewith:

“2.6. A national repository of high-quality resources on foundational literacy and numeracy will be made available on the Digital Infrastructure for Knowledge Sharing (DIKSHA). Technological interventions to serve as aids to teachers and to help bridge any language barriers that may exist between teachers and students, will be piloted and implemented”.

(Para no. 2.6, pg no .9, NEP-2020)

“23.6. A rich variety of educational software, for all the above purposes, will be developed and made available for students and teachers at all levels. All such software will be available in all major Indian languages and will be accessible to a wide range of users including students in remote areas and Divyang students. Teaching-learning e-content will continue to be developed by all States in all regional languages, as well as by the NCERT, CIET, CBSE, NIOS, and other bodies/institutions, and will be uploaded onto the DIKSHA platform. This platform may also be utilized for Teacher’s Professional Development through e-content. CIET will be strengthened to promote and expand DIKSHA as well as other education technology initiatives. Suitable equipment will be made available

to teachers at schools so that teachers can suitably integrate e-contents into teaching-learning practices. Technology-based education platforms, such as DIKSHA/SWAYAM, will be better integrated across school and higher education, and will include ratings/reviews by users, so as to enable content developers create user friendly and qualitative content”.

(Para no. 23.6, pg no .57, NEP-2020)

*“24.4.(d) **Content creation, digital repository, and dissemination:** A digital repository of content including creation of coursework, Learning Games and 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”.*

(Para no. 24.4, pg no .59, NEP-2020)

*“24.4. (f) **Virtual Labs:** Existing e-learning platforms such as DIKSHA, SWAYAM and SWAYAMPBHA 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 preloaded content, will be considered and developed”.*

(Para no. 24.4, pg no .59, NEP-2020)

“2.8 Enjoyable and inspirational books for students at all levels will be developed, including through high-quality translation (technology assisted as needed) in all local and Indian languages, and will be made available extensively in both school and local public libraries. Public and school libraries will be significantly expanded to build a culture of reading across the country. Digital libraries will also be established. School libraries will be set up - particularly in villages - to serve the community during non-school hours, and book clubs may meet in public/school libraries to further facilitate and promote widespread reading. A National Book Promotion Policy will be formulated, and extensive initiatives will be undertaken to ensure the availability, accessibility, quality, and readership of books across geographies, languages, levels, and genres”.

(Para no. 2.8, pg no .9, NEP-2020)

“4.12 As research clearly shows that children pick up languages extremely quickly between the ages of 2 and 8 and that multilingualism has great cognitive benefits to young students, children will be exposed to different languages early on (but with a particular emphasis on the mother tongue), starting from the Foundational Stage onwards. All languages will be taught in an enjoyable and interactive style, with plenty of interactive conversation, and with early reading and subsequently writing in the mother tongue in the early years, and with skills developed for reading and writing in other languages in Grade 3 and beyond. There will be a major effort from both the Central and State governments to invest in large numbers of language teachers in all regional languages around the country, and, in particular, for all languages mentioned in the Eighth Schedule of

the Constitution of India. States, especially States from different regions of India, may enter into bilateral agreements to hire teachers in large numbers from each other, to satisfy the three-language formula in their respective States, and also to encourage the study of Indian languages across the country. Extensive use of technology will be made for teaching and learning of different languages and to popularize language learning”.

(Para no. 4.12, pg no .13, NEP-2020)

“4.19 For the enrichment of the children, and for the preservation of these rich languages and their artistic treasures, all students in all schools, public or private, will have the option of learning at least two years of a classical language of India and its associated literature, through experiential and innovative approaches, including the integration of technology, in Grades 6-12, with the option to continue from the middle stage through the secondary stage and beyond”.

(Para no. 4.19, pg no .15, NEP-2020)

“6.11 Different categories of children with disabilities have differing needs. Schools and school complexes will work and be supported for providing all children with disabilities accommodations and support mechanisms tailored to suit their needs and to ensure their full participation and inclusion in the classroom. In particular, assistive devices and appropriate technology-based tools, as well as adequate and language-appropriate teaching-learning materials (e.g., textbooks in accessible formats such as large print and Braille) will be made

available to help children with disabilities integrate more easily into classrooms and engage with teachers and their peers. This will apply to all school activities including arts, sports, and vocational education. NIOS will develop high-quality modules to teach Indian Sign Language, and to teach other basic subjects using Indian Sign Language. Adequate attention will be paid to the safety and security of children with disabilities”.

(Para no. 6.11, pg no .26, NEP-2020)

4.3.1.4 Different approaches of online assessments to be piloted and tested for scale and efficacy

The policy talks about the need to take innovative measures for conducting online assessments.

NEP paras that particularly underline this have been reproduced herewith :

“24.3. 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”.

(Para no. 24.3, pg no .58, NEP-2020)

*“24.4.(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”.*

(Para no. 24.4, pg no .60, NEP-2020)

4.3.1.5 Increased Focus on emerging disruptive technologies in Education

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| <p>The policy highlights the need to keep up the pace with the upcoming technologies and understand the implications it can have on education.</p> |
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NEP paras that particularly underline this, have been reproduced herewith :

“23.2. 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”.

(Para no. 23.2, pg no .56, NEP-2020)

“23.7. Particular attention will need to be paid to emerging disruptive technologies that will necessarily transform the education system. When the 1986/1992 National Policy on Education was formulated, it was difficult to predict the disruptive effect that the internet would have brought. Our present education system's inability to cope with these rapid and disruptive changes places us individually and nationally at a perilous disadvantage in an increasingly competitive world. For example, while computers have largely surpassed humans in leveraging factual and procedural knowledge, our education at all levels excessively burdens students with such knowledge at the expense of developing their higher-order competencies”.

(Para no. 23.7, pg no .57, NEP-2020)

“23.8. This policy has been formulated at a time when an unquestionably disruptive technology - Artificial Intelligence (AI) 3D/7D Virtual Reality - has emerged. As the cost of AI-based prediction falls, AI will be able to match or outperform and, therefore, be a valuable aid to even skilled professionals such as doctors in certain predictive tasks. AI's disruptive potential in the workplace is clear, and the education system must be poised to respond quickly. One of the permanent tasks of the NETF will be to categorize emergent technologies based on their potential and estimated timeframe for disruption, and to periodically present this analysis to MHRD. Based on these inputs, MHRD will formally identify those technologies whose emergence demands responses from the education system”.

(Para no. 23.8, pg no .57, NEP-2020)

4.3.1.6 Dedicated Institute for research and development in EdTech

With the increased focus on new disruptive technologies, the NEP 2020 also calls out the the creation of a National Research Foundation for school and higher education

NEP paras that particularly underline this, have been reproduced herewith :

“23.9. In response to MHRD's formal recognition of a new disruptive technology, the National Research Foundation will initiate or expand research efforts in the technology. In the context of AI, NRF may consider a three-pronged approach: (a) advancing core AI research, (b) developing and deploying application-based research, and (c) advancing international research efforts to address global challenges in areas such as healthcare, agriculture, and climate change using AI”.

(Para no. 23.9, pg no .57, NEP-2020)

4.3.1.7 Blended learning model approach for classroom learning

The policy also shifts focus to a blended learning model approach and calls out that the education curriculum should also prioritizes awareness of disruptive technologies in school.

NEP paras that particularly underline this, have been reproduced herewith :

“4.18. India also has an extremely rich literature in other classical languages, including classical Tamil, Telugu, Kannada, Malayalam, Odia. In addition to these classical languages Pali, Persian, and Prakrit; and their works of literature

too must be preserved for their richness and for the pleasure and enrichment of posterity. As India becomes a fully developed country, the next generation will want to partake in and be enriched by India's extensive and beautiful classical literature. In addition to Sanskrit, other classical languages and literatures of India, including Tamil, Telugu, Kannada, Malayalam, Odia, Pali, Persian, and Prakrit, will also be widely available in schools as options for students, possibly as online modules, through experiential and innovative approaches, to ensure that these languages and literature stay alive and vibrant. Similar efforts will be made for all Indian languages having rich oral and written literatures, cultural traditions, and knowledge”.

(Para no. 4.18, pg no .14-15, NEP-2020)

“4.23. While students must have a large amount of flexibility in choosing their individual curricula, certain subjects, skills, and capacities should be learned by all students to become good, successful, innovative, adaptable, and productive human beings in today's rapidly changing world. In addition to proficiency in languages, these skills include: scientific temper and evidence-based thinking; creativity and innovativeness; sense of aesthetics and art; oral and written communication; health and nutrition; physical education, fitness, wellness, and sports; collaboration and teamwork; problem solving and logical reasoning; vocational exposure and skills; digital literacy, coding, and computational thinking; ethical and moral reasoning; knowledge and practice of human and Constitutional values; gender sensitivity; Fundamental Duties; citizenship skills and values; knowledge of India; environmental awareness including water and

resource conservation, sanitation and hygiene; and current affairs and knowledge of critical issues facing local communities, States, the country, and the world”.

(Para no. 4.23, pg no .15, NEP-2020)

“4.26 Every student will take a fun course, during Grades 6-8, that gives a survey and hands-on experience of a sampling of important vocational crafts, such as carpentry, electric work, metal work, gardening, pottery making, etc., as decided by States and local communities and as mapped by local skilling needs. A practice-based curriculum for Grades 6-8 will be appropriately designed by NCERT while framing the NCFSE 2020-21. All students will participate in a 10-day bagless period sometime during Grades 6-8 where they intern with local vocational experts such as carpenters, gardeners, potters, artists, etc. Similar internship opportunities to learn vocational subjects may be made available to students throughout Grades 6-12, including holiday periods. Vocational courses through online mode will also be made available. Bagless days will be encouraged throughout the year for various types of enrichment activities involving arts, quizzes, sports, and vocational crafts. Children will be given periodic exposure to activities outside school through visits to places/monuments of historical, cultural and tourist importance, meeting local artists and craftsmen and visits higher educational institutions in their village/Tehsil/District/State”.

(Para no. 4.26, pg no.16, NEP-2020)

“23.12. As disruptive technologies emerge, schooling and continuing education will assist in raising the general populace’s awareness of their potential

disruptive effects and will also address related issues. This awareness is necessary to have informed public consent on matters related to these technologies. In school, the study of current affairs and ethical issues will include a discussion on disruptive technologies such as those identified by NETF/MHRD. Appropriate instructional and discussion materials will also be prepared for continuing education”.

(Para no. 23.12, pg no .58, NEP-2020)

“23.13. Data is a key fuel for AI-based technologies, and it is critical to raise awareness on issues of privacy, laws, and standards associated with data handling and data protection, etc. It is also necessary to highlight ethical issues surrounding the development and deployment of AI-based technologies. Education will play a key role in these awareness raising efforts. Other disruptive technologies that are expected to change the way we live, and, therefore, change the way we educate students, include those relating to clean and renewable energy, water conservation, sustainable farming, environmental preservation, and other green initiatives; these will also receive prioritized attention in education”.

(Para no. 23.13, pg no .58, NEP-2020)

“24.3 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”.

(Para no. 24.3, pg no .58-59, NEP-2020)

*“24.4. (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”.*

(Para no. 24.4, pg no .60, NEP-2020)

4.3.1.8 Increased importance of EdTech for continued at-home learning for all students

Given the COVID-19 pandemic situation, the NEP has recognized the urgent need of leveraging technology for education

NEP paras that particularly underline this, have been reproduced herewith :

“24.1. 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”.

(Para no. 24.1, pg no .58, NEP-2020)

“24.2. 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”.

(Para no. 24.2, pg no .58, NEP-2020)

*“24.4. (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”.*

(Para no. 24.4, pg no .59, NEP-2020)

“4.46. Once internet-connected smart phones or tablets are available in all homes and/or schools, online apps with quizzes, competitions, assessments, enrichment materials, and online communities for shared interests will be developed, and will work to enhance all the aforementioned initiatives, as group activities for students with appropriate supervision of parents and teachers. Schools will develop smart classrooms, in a phased manner, for using digital

pedagogy and thereby enriching the teaching-learning process with online resources and collaborations”.

(Para no. 4.46, pg no .20, NEP-2020)

“6.12. Home-based education will continue to be a choice available for children with severe and profound disabilities who are unable to go to schools. The children under home-based education must be treated as equal to any other child in the general system. There shall be an audit of home-based education for its efficiency and effectiveness using the principle of equity and equality of opportunity. Guidelines and standards for home-based schooling shall be developed based on this audit in line with the RPWD Act 2016. While it is clear that the education of all children with disabilities is the responsibility of the State, technology-based solutions will be used for the orientation of parents/caregivers along with wide-scale dissemination of learning materials to enable parents/caregivers to actively support their children’s learning needs will be accorded priority”.

(Para no. 6.12, pg no .27, NEP-2020)

4.3.1.9 Building capacity of teachers and school leaders for effective use of technology in education

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| <p>The policy emphasizes on the need to up skill teachers to use technology in education and learn relevant pedagogical techniques.</p> |
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NEP paras that particularly underline this, have been reproduced herewith :

“24.3. 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. 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”.

(Para no. 24.3, pg no .58-59, NEP-2020)

*“24.4.(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.*

(Para no. 24.4, pg no .59, NEP-2020)

*“24.4. (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”.*

(Para no. 24.4, pg no .59, NEP-2020)

“5.15. Teachers will be given continuous opportunities for self-improvement and to learn the latest innovations and advances in their professions. These will be

offered in multiple modes, including in the form of local, regional, state, national, and international workshops as well as online teacher development modules. Platforms (especially online platforms) will be developed so that teachers may share ideas and best practices. Each teacher will be expected to participate in at least 50 hours of CPD opportunities every year for their own professional development, driven by their own interests. CPD opportunities will, in particular, systematically cover the latest pedagogies regarding foundational literacy and numeracy, formative and adaptive assessment of learning outcomes, competency-based learning, and related pedagogies, such as experiential learning, arts-integrated, sports-integrated, and storytelling-based approaches, etc”.

(Para no. 5.15, pg no .22, NEP-2020)

“5.16. School Principals and school complex leaders will have similar modular leadership/management workshops and online development opportunities and platforms to continuously improve their own leadership and management skills, and so that they too may share best practices with each other. Such leaders will also be expected to participate in 50 hours or more of CPD modules per year, covering leadership and management, as well as content and pedagogy with a focus on preparing and implementing pedagogical plans based on competency-based education”.

(Para no. 5.16, pg no .22, NEP-2020)

“5.24 All B.Ed. programmes will include training in time-tested as well as the most recent techniques in pedagogy, including pedagogy with respect to

foundational literacy and numeracy, multi-level teaching and evaluation, teaching children with disabilities, teaching children with special interests or talents, use of educational technology, and learner-centered and collaborative learning”.

(Para no. 5.24, pg no .23, NEP-2020)

“6.13 Most classrooms have children with specific learning disabilities who need continuous support. Research is clear that the earlier such support begins, the better the chances of progress. Teachers must be helped to identify such learning disabilities early and plan specifically for their mitigation. Specific actions will include the use of appropriate technology allowing and enabling children to work at their own pace, with flexible curricula to leverage each child’s strengths, and creating an ecosystem for appropriate assessment and certification. Assessment and certification agencies, including the proposed new National Assessment Centre, PARAKH, will formulate guidelines and recommend appropriate tools for conducting such assessment, from the foundational stage to higher education (including for entrance exams), in order to ensure equitable access and opportunities for all students with learning disabilities”.

(Para no. 6.13, pg no .27, NEP-2020)

4.3.1.10 Creating a Dedicated Unit for Building of World Class, Digital Infrastructure, Educational Digital Content and Capacity

The policy stresses on the urgent need for the Ministry to create a dedicated unit for the purpose of orchestrating the building of digital infrastructure, digital content and capacity building to look after the e-education needs of both school and higher education.

NEP paras that particularly underline this, have been reproduced herewith :

*“24.4.(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”.*

(Para no. 24.4, pg no .59, NEP-2020)

“24.5 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”.

(Para no. 24.5, pg no .60, NEP-2020)

4.3.2 Key highlights of Union Budget- 2022-23

Union Budget 2022-23 was presented by Hon’ble Finance Minister on 1st Feb, 2022 in the Parliament. The key highlights from the speech of Hon’ble Finance Minister with reference to the subject are mentioned below.

4.3.2.1 Universalization of Quality Education

“Due to the pandemic-induced closure of schools, our children, particularly in the rural areas, and those from Scheduled Castes and Scheduled Tribes, and other weaker sections, have lost almost 2 years of formal education. Mostly, these are children in government schools. We recognise the need to impart supplementary teaching and to build a resilient mechanism for education delivery. For this purpose, ‘one class-one TV channel’ programme 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”.

“In vocational courses, to promote crucial critical thinking skills, to give space for creativity, 750 virtual labs in science and mathematics, and 75 skilling e-labs for simulated learning environment, will be set-up in 2022-23”.

“High-quality e-content in all spoken languages will be developed for delivery via internet, mobile phones, TV and radio through Digital Teachers”.

“A competitive mechanism for 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.”

As detailed above, the National Education Policy (NEP) 2020 is a comprehensive policy document that outlines the vision and direction for the transformation of the Indian education system. The policy proposes several measures to promote the integration of digital technology in education, to provide an inclusive and quality education to all students. Further Union Budget (2022-23) also emphasized sufficiently on implementation of digital technology in education.

4.4 Research Question: What steps Government of India (GoI) has already initiated to implement the provisions of NEP 2020 and Union Budget (2022-23) with specific reference to students’ convenience to use application of digital technologies in education, particularly school education?

In recent years, digital education has emerged as a crucial component of the Indian education system, particularly in the wake of the COVID-19 pandemic. With the shift to online learning, Government of India has implemented various measures to ensure that students have access to quality digital education. In this context, it is essential to examine the measures implemented/ being implemented by the Central Government for implementing digital education in school education. This will not only shed light on the

current status of digital education in India but also provide insights into the strategies that can be effective in promoting digital education in the future.

4.4.1 DIKSHA (Digital Infrastructure and Knowledge Sharing):

DIKSHA is a national platform for school education, an initiative of National Council for Educational Research and Training (NCERT), under the aegis of the Ministry of Education (MoE), GoI. DIKSHA can be accessed by learners and teachers across the country and supports 36 Indian languages. Each State/UT leverages the DIKSHA 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, organizations, institutions - government, autonomous institutions, non-govt and private organizations) to participate, contribute and leverage a common platform to achieve learning goals at scale for the country.

Language-wise, class-wise, subject wise and topic wise contents and chapter wise, explanation video by the teacher for the given topic, videos on hard spots, slides, concept maps, additional resources for extra learning, test items, worksheets *etc.* including e-content for energized textbooks, graphic novels, are made available on DIKSHA with a feature of Radio and TV coherence.

Since the start of the pandemic, DIKSHA has experienced an unprecedented utilization with an average daily page hit of 3.2+ Crore. The National Education Policy (NEP) 2020 emphasizes DIKSHA's significance as a unified platform for the dissemination of teaching and learning solutions in a consistent way. DIKSHA has been designated as

‘One Nation, One Digital Platform’ under the PM e-*Vidya* program of the GoI, as a component of ‘*Aatmnirbhar Bharat*’.

As per the website <https://diksha.gov.in/data/>, 522.18 Crore number of times learning activities were undertaken using DIKSHA infrastructure by learners. Total DIKSHA uses times has crossed 6100 Crore minutes. The application availability was made 100% in last three months. As many as 11,597 contributors have made 2,41,307 content contribution to DIKSHA. There are 9569 courses in DIKSHA, more than 16.70 Crore enrolments and more than 13.69 Crore total course completions.

4.4.2 NISHTHA: National Initiative for School Heads' and Teachers' Holistic Advancement

The National Education Policy (NEP) 2020 states that "teachers truly shape the future of our children and therefore, the future of our nation and the motivation and empowerment of teachers is required to ensure the best possible future of our children and nation". As per the recommendation of NEP 2020, every teacher and head teacher is expected to participate in at least 50 hours of Continuous Professional Development (CPD) opportunities every year for their own professional development, driven by their own interests. CPD opportunities will, in particular, systematically cover the latest pedagogies regarding foundational literacy and numeracy, formative and adaptive assessment of learning outcomes, competency-based learning, and related pedagogies, such as experiential learning, arts-integrated, sports-integrated, and storytelling-based approaches, and so on. To realize the vision of NEP-2020, NCERT in collaboration with States / UTs and autonomous bodies have initiated the NISHTHA integrated training

programme 1.0, 2.0, and 3.0 online for different stages of school education - teachers, head-teachers/ principals and other stakeholders in educational management and administration. During the pandemic, the massive teacher's professional development programme NISHTHA 1.0 for elementary grades was launched online through DIKSHA targeting 25 lakh teachers. In a short period, more than 5 crore course enrolments with an average of 89% course completions were witnessed with more than 4.5 crore certificates issued so far. Owing to the success, NISHTHA 2.0 for Secondary grades and NISHTHA 3.0 were also launched targeting 10 lakhs and 25 lakhs teachers respectively.

4.4.3 Swayam Prabha DTH TV Channels

12 Swayam Prabha Channels are earmarked for school education under the one class, one TV channel initiative and about 6, 800 video programs (both in English and Hindi for class one to twelve) have been produced. To ensure coherent access through multimodal delivery, the broadcasted content is organised by chapter and topics on DIKSHA to ensure asynchronous usage by anyone, anytime, anywhere and are meant to support and reach those who do not have access to the internet. It supports distance and remote learning, supports learning without teacher's presence, also aids as a support for teachers and complementary learning to schooling, and provides the most dependable (disadvantaged) with education during the crisis, also supports parental /caregiver support with learning especially in early childhood education. There are more than 4,200 ISL (Indian Sign Language) programs and more than 5,400 live shows available on these channels. A robust feedback mechanism is also available wherein students can interact through e-mails and IVRS system.

4.4.4 SWAYAM (Study Waves of Active Learning for Young Aspiring Minds)

SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

This is done through a platform that facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation to be accessed by anyone, anywhere at any time. All the courses are interactive, prepared by the best teachers in the country and are available, free of cost to any learner. More than 1,000 specially chosen faculty and teachers from across the country have participated in preparing these courses.

As per the latest statistics (which includes Higher Education also), the number of total courses ever listed on SWAYAM are 9306, unique users are 1.03 Cr and total enrollments are 3.32 Cr.

4.4.5 Radio/Community Radio/Podcasts

Radio broadcasting/Podcasts is used for children in remote areas with no means of internet. More than 3500 pieces of curriculum-based radio programs have been produced for dissemination on 398 radio stations and also through iRadio 1600+ programs have been disseminated. A Podcast called *Shiksha Vani* of the CBSE is also being effectively used for almost all topics for all subjects of secondary and senior secondary level.

4.4.6 e-Content for CwSN (Children with Special Needs)

For Children with Special Needs, as mentioned in Para 4.4.3 above, more than 4000 Indian Sign language (ISL) based content, a one-hour live program in ISL on PM e-*Vidya* TV Channel, *Mukta Vidya Vani*, an audio streaming podcast and *Radio Vahini*, with 24x7 broadcast and talking books for learners with blindness and low vision has been prepared and also a total of 3522 audio books have been developed.

For the purpose of teaching hearing-impaired pupils sign language, NIOS (National Institute of Open Schooling) uses one DTH channel. Study materials have been created for visually and audibly impaired students and are accessible on the NIOS website and YouTube in both sign language and the Digitally Accessible Information System (DAISY).

For States/UTs to use as a reference when creating electronic material for children with disabilities, NCERT has created a very thorough set of guidelines. The NCERT textbooks have naturally and seamlessly incorporated the problems and concerns regarding inclusion and various aspects of accessibility for Children with Special Needs (CwSN) into the regular chapters. In order to promote inclusive education, NCERT has also created curricula and resource materials for students, instructors, and other stakeholders.

4.4.7 National Digital Education Architecture (NDEAR)

In accordance with the vision in National Education Policy 2020, Para 24.4 (b), that, 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,

DoSE&L, Ministry of Education has come up with concept of NDEAR. 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. It is a set of standards and core applications which will make all applications interoperable in the country.

The design and architecture principles of NDEAR lay the foundation for developing solutions that address scale, diversity, and complexity. NDEAR aims to energise and catalyze the digital education ecosystem to create and deliver diverse, relevant, contextual, innovative solutions that benefit students, teachers, parents, communities, administrators resulting in timely implementation of policy goals.

Architecture Principles:



Figure 1: Architecture principles of NDEAR

Building blocks of NDEAR:

An initial set of 36 building blocks across 12 categories have been identified to kickstart the digital infrastructure for education. The idea is not for NDEAR to build these blocks or to use these blocks for solutions exclusively. Some building blocks may exist, some may need to be developed, others repurposed in/for the education ecosystem. As long as they are compliant and compatible with NDEAR, they may be used by governments, civil society and private organizations to develop relevant platforms, solutions and programmes for students, teachers, parents, administrators and the community.



Figure 2: Building blocks of NDEAR

Expected outcomes/deliverables of NDEAR:

- 1) Real time picture of availability of teachers, schools, and students.

- 2) A highly unified and interoperable environment for different websites, portals, LMS, databases etc. hosted by different entities.
- 3) Digital content and LMS for schools, students, and teachers.
- 4) It will bridge the gap between different stakeholder's ecosystems through digital highways.
- 5) A sandbox environment for boosting digital innovation in the education sector.
- 6) Bring innovation by providing a network environment which will allow ecosystem players to access and build on the solutions and programmes of other stakeholders.
- 7) The availability of basic buildings blocks of future which will allow current environment to work in a more efficient way and will be used by Government, civil societies, private organizations, and others to develop platforms solutions for students, teacher, parents, administrators, and community.
- 8) The availability of easily accessible multi layered eco-system of information (school-wise, block-wise, district-wise, constituency-wise, state-wise, and region-wise).
- 9) This will catalyse and energize all the stakeholders to build, create, contribute, and cooperate in the education sector.

4.4.8 Olabs (Virtual Labs on DIKSHA)

The OLabs is built on the premise that teaching lab activities online can be done more effectively and inexpensively. Students without access to physical laboratories or in

situations where equipment is unavailable due to scarcity or high cost can also be given access to the labs. As well as bridging the digital gap and geographic distances, this enables them to compete with students in schools with better resources. The experiments are accessible at any time and from any location, eliminating the time restrictions associated with having limited access to a real lab. Through OLabs, "learning-enabled assessment" makes it easier to evaluate an experiment's procedural and manipulative skills, concepts and comprehension, and a student's reporting and interpreting abilities.

The study and application of mathematical methods to illustrate the various complex functions in various branches of science are part of the growth of OLabs. Modern simulation technology is used in the laboratories to simulate real-world lab environments. Live experiment demonstrations capture actual lab situations, allowing students to learn about the processes and tools used in the lab. The growth of the graphical symbols is visualized using realistic scenarios, and it is then compared to the relevant real equipment. Using different authoring tools, simulations are interactively made, simulating and recreating an actual lab setting. The OLabs are hosted at www.olabs.edu.in. As per the website, more than 3.97 lakhs users are registered; training is done for more than 27,000 teachers across more than 8,000 schools.

4.4.9 Vidya Sameeksha Kendra

The *Vidya Sameeksha Kendra* (VSK) seeks to improve learning results by utilizing data and technology. Big data analysis, artificial intelligence, and machine learning will be used to analyze meaningfully the data of more than 15 lakh schools, 96 lakh teachers, and 26 crore students in order to better learning outcomes and the overall monitoring of the educational system.

4.4.10 e-Pathshala

The *e-Pathshala*, a joint initiative of the Ministry of Education, Govt. of India and the National Council of Educational Research and Training (NCERT), has been developed for showcasing and disseminating all educational e-resources including textbooks, audio, video, periodicals, policy documents and a variety of other print and non-print materials.

The platform addresses the dual challenges of addressing a diverse clientele and bridging the digital gap (geographic, socio-cultural, and linguistic), by offering comparable quality of e-contents in multiple languages and ensuring its unrestricted availability everywhere. E-books are accessible to students, instructors, educators, and parents via a variety of technological devices, including tablets and mobile phones (as epub), as well as laptops and desktops connected to the internet (as flipbooks). These books have features that enable mobile reading, selection, zooming, bookmarking, underlining, navigation, searching, reading in day or night mode, and digital note-taking. According to the analytics available on the website <https://epathshala.nic.in/>, there are 504 total e-text books and 3886 e-resources available on *e-pathshala*. The app of *e-pathshala* has been downloaded 4.5 million times as per the website.

4.4.11 Action taken/ initiated with reference to implementation of Union Budget 2022-23:

With reference to announcement in Budget 2022-23, Department of School Education and Literacy, Ministry of Education has taken various steps. The launch of 200 DTH TV channels is in advanced stage with coordination of various other stakeholders. With

reference to virtual labs and skilling e-labs, the gap analysis of OLABs by classes, subjects and selection of OLABs has been initiated by the Ministry.

The development of content by SME (Subject Matter Expert) for each Lab such as theory, procedure, animation, video simulation, assessment questions, and resources and so on has been undertaken. Storyboarding for animations and design of simulations in multiple modes is also initiated.

Regarding High-quality e-content in all spoken languages for delivery via the internet, mobile phones, TV and radio through digital teachers, training workshops have been taken in a phased manner for skilling the teachers. Action is also initiated by the Ministry for Standardization of Indian Sign Language (ISL).

To conclude, Government of India has taken numerous initiatives to implement digital technology in education in line with NEP, 2020 and also in the advanced stage regarding implementation of related Budget 2022-23 announcements.

4.5 Research Question: What are the main challenges faced by Indian school students while using online education methods?

To address the above research question, questionnaires were prepared for various stakeholders viz students, parents, teachers and school administration. Accordingly, primary data was collected from these stakeholders and responses received are separately being analyzed.

4.5.1 Analysis of responses related to the Students:

4.5.1.1 Descriptive statistics analysis

Table-4 Descriptive Statistics of Students

| Demographic Characteristics | No of responses | Representation |
|------------------------------------|------------------------|-----------------------|
| Gender | | |
| Male | 90 | 52% |
| Female | 83 | 48% |
| Age | | |
| < 8 Years | 34 | 19.7% |
| 8-12 Years | 31 | 17.9% |
| 12-16 Years | 47 | 27.2% |
| >16 Years | 61 | 35.3% |
| Medium of School | | |
| English | 122 | 70.5% |
| Hindi | 48 | 27.7% |
| Others | 3 | 1.7% |
| Type of School | | |
| Govt | 57 | 32.9% |
| Private | 106 | 61.3% |
| Others | 10 | 5.8% |

Descriptive analysis of students' respondent profile was tabulated and same is annexed at Table- 4 above. Descriptive analysis of respondent profile indicates that 52% of the respondents are male while 48% are female. 19.7% are of age < 8 years, 17.9 % are between 8-12 years, 27.2% are between 12-16 years and remaining 35.3 % are more than 16 years. It shows that respondents were distributed across various age groups. Most of them i.e. 70.5% respondents are studying in English medium schools where as 27.7% respondents are from Hindi medium. Statistics showed that 32.9 % respondents are studying in Gov schools, whereas most of them i.e. 61.3 % are studying in private

schools. Hence this can be inferred that this demography mainly represents students from English medium and private schools.

4.5.1.2 Analysis of responses

For analyzing the responses, graphs from Google form were used. Below mentioned are the graphs and analysis thereon with respect to the students.

1. Do you have access to a device while learning online?

173 responses

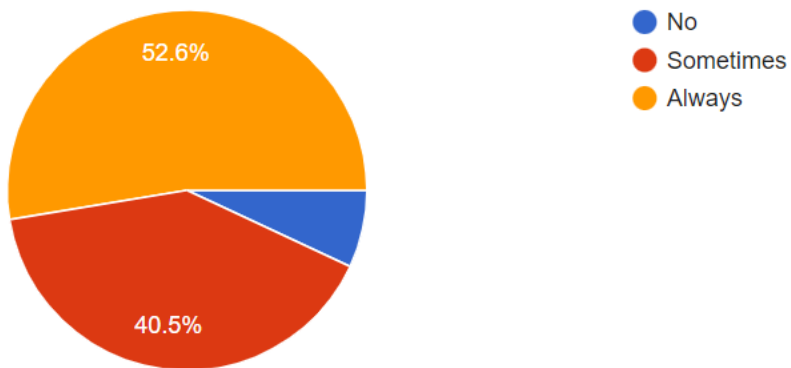


Figure 3 : Response of students to question no 1

On the face of it, majority of the students (52.6%) always have access to a device, however, almost an equal percentage (40.5%) claim that they have this access ‘sometimes’ only. This is not a very reassuring learning as the respondents primarily belong to English speaking, private schools of urban areas (Table-4) . Therefore, this learning for the ‘majority having access to a device’ should be not generalised for the entire population.

2. Were there any challenges faced while using online education mode of learning?

173 responses

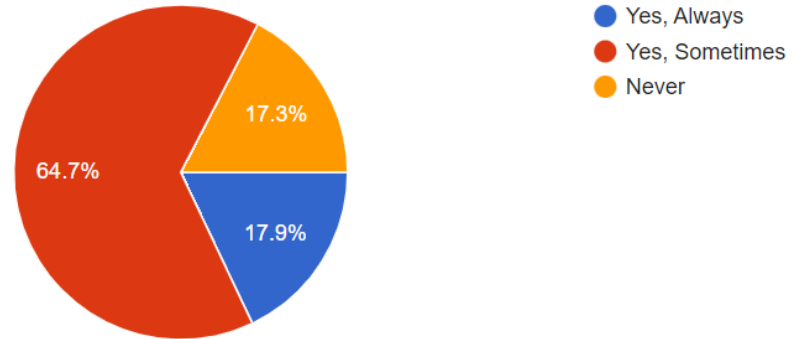


Figure 4 : Response of students to question no 2

17.9 % students mentioned that they always faced challenges, whereas 64.7% students 'sometimes faced these challenges. 17.3% students never faced any challenge during online classes. This is again not a very reassuring finding, especially since the majority of the schools, as already stated above are English speaking, private schools in urban areas. This also conveys that students face dual constraints viz. having limited access to the digital devices (finding 1 above) as well as challenges in accessing online education.

3. How many hours do you spend each day on average to learn online?

173 responses

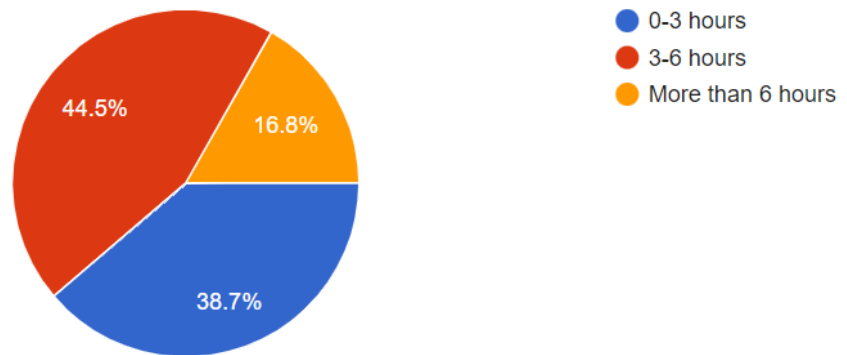


Figure 5 : Response of students to question no 3

63.3% students mentioned that they spent more than 3 hours on average to learn online.

This infers that online learning has become a new normal and implementation of proper digital technologies has become very important aspect of learning.

4. How effective has online learning been for you?

173 responses

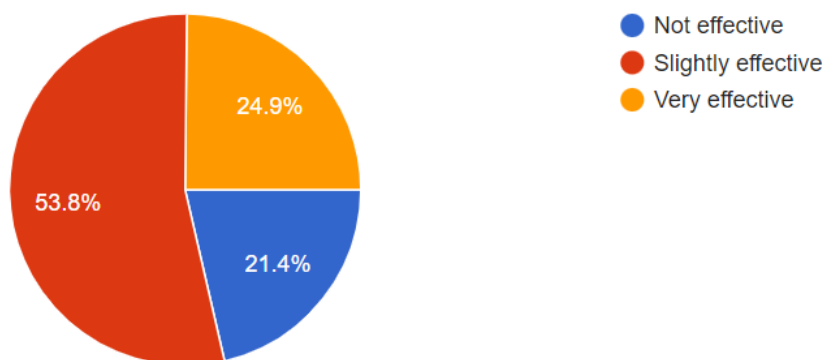


Figure 6 : Response of students to question no 4

21.4% students mentioned that online learning is not effective for them, 53.8% mentioned that it is slightly effective, whereas for remaining 24.9%, it is very effective. Majority of the respondents (75.2%), therefore, are not finding this mode of education to be effective. This emphasises the need for better means of online education for example training of teachers for online pedagogy, gamification, interactive learning etc. to enhance the effectiveness of teaching.

5. How helpful is your school in offering you the resources to learn from home?

173 responses

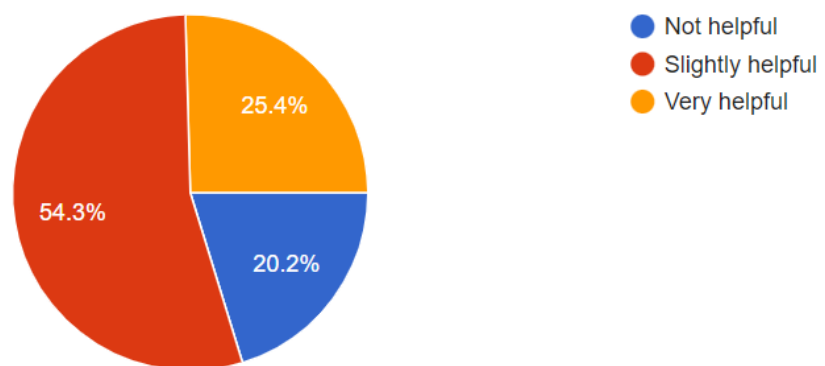


Figure 7 : Response of students to question no 5

54.3 % students mentioned that their school was slightly helpful in offering the resources, whereas 25.4% mentioned that the school is very helpful. Remaining 20.2% mentioned that the school is not at all helpful in this regard. This means that schools should use better tools and platforms, internet connectivity etc. to make this mode of learning more effective.

6. How helpful are your teachers while studying online?

173 responses

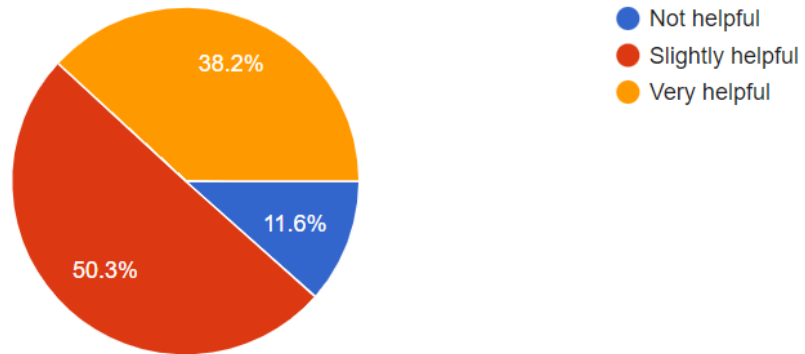


Figure 8 : Response of students to question no 6

Majority of the students (61.9%) felt that their teachers are ‘slightly helpful’ or ‘not helpful’ while studying online. This again requires emphasis on training of teachers for better online pedagogy as also mentioned while analysing the question no 4 above.

7. Do you use the DIKSHA (Digital Infrastructure for Knowledge Sharing) platform of Ministry of Education for learning?

173 responses

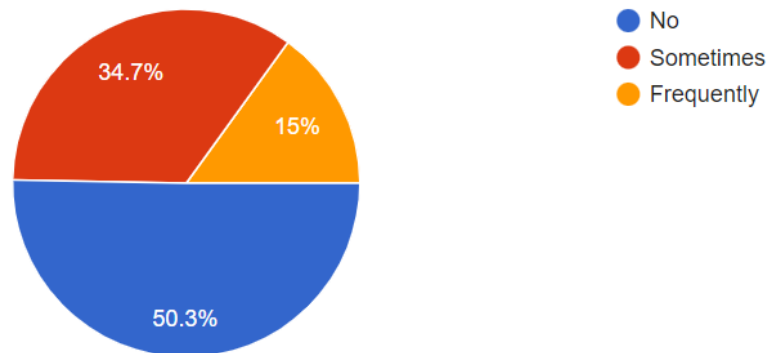


Figure 9 : Response of students to question no 7

50.3% students mentioned that they are not using DIKSHA for learning. 15% students mentioned that they are frequently using this platform, whereas 34.7% students use it sometimes. This reveals that there is a need for further awareness sensitization and advocacy for DIKSHA. Mass campaigns may be organized by schools for this purpose.

8. Do you have access to seamless internet connectivity for learning?

173 responses

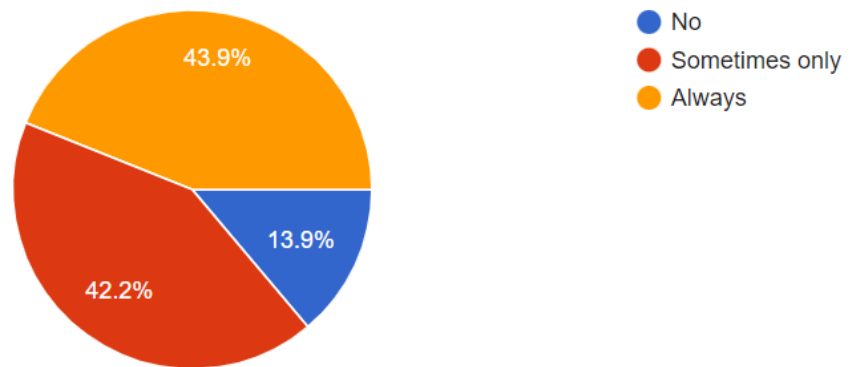


Figure 10 : Response of students to question no 8

43.9% students mentioned that they always have access to seamless internet connectivity whereas 42.2.% have sometimes. Only 13.9% mentioned that they don't have seamless internet connectivity. This emphasizes on requirement of better internet connection throughout the country through Bharatnet.

9. Do you follow peer-learning for online classes?

173 responses

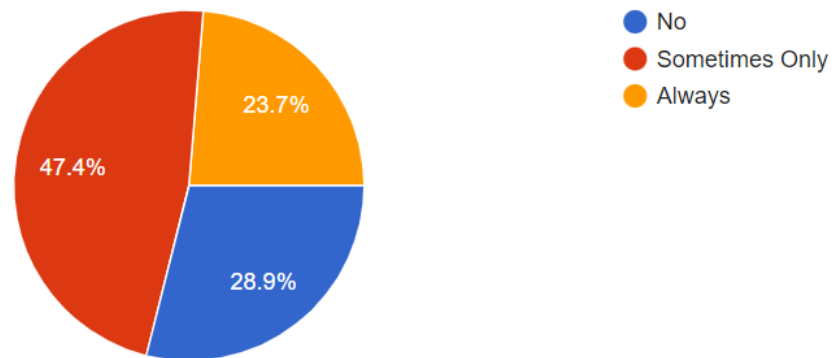


Figure 11 : Response of students to question no 9

47.4% students mentioned that they sometimes follow peer learning for online classes, whereas 28.9% said no in this regard. With education moving online, embedding peer-to-peer learning technologies in the framework is essential for the students as literature revealed (refer para 2.2 of chapter 2) that there are numerous benefits of peer learning in online education.

10. Are you being taught about sex-trafficking, online gambling, cyber-safety etc

173 responses

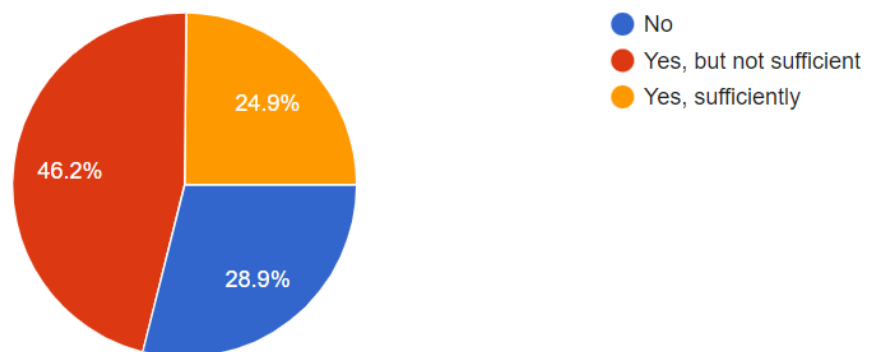


Figure 12 : Response of students to question no 10

As many as 75.1% students mentioned that either they are not being taught about cyber crimes or is not sufficient. This is not an encouraging statistics as majority of them are not aware of cyber crimes and ways to safeguard them against the same. Standing Committee on Education, Women, Children, Youth, and Sports in its report on the Reforms in Content and Design of School Text Books submitted on November 30, 2021, also recommended that textbooks should contain separate elements spreading awareness against internet addiction and other aspects harmful to the society (refer para 2.3.2 of chapter 2).

11. What's the most preferred mode of online classes provided in your school?

173 responses

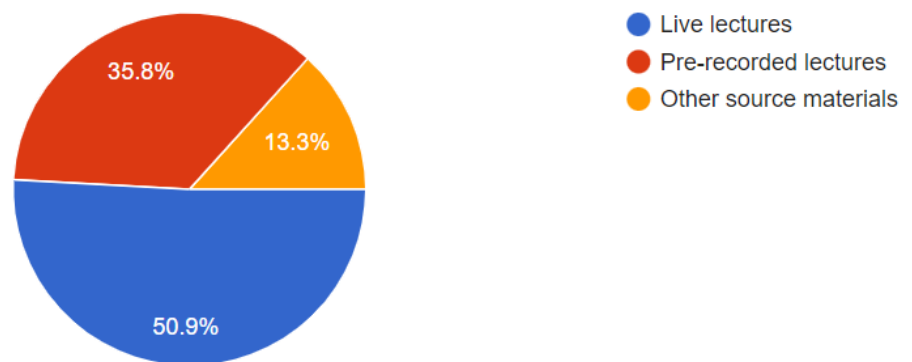


Figure 13 : Response of students to question no 11

Above data shows that 50.9% students preferred live lectures whereas 35.8% preferred pre-recorded lectured and remaining 13.3% preferred other source material. This is a good learning for various online platforms available like DIKSHA, SWAYAM and so on to have separate slot for live sessions where problem resolutions and discussions could be carried out contextualized to the concerns of students.

12. Do you lose your time of play due to online learning?

173 responses

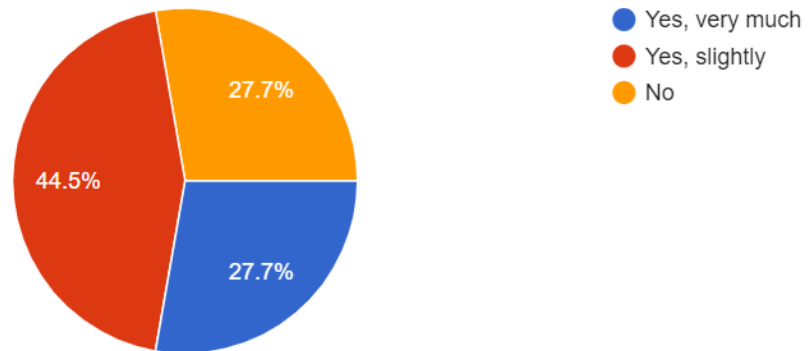


Figure 14 : Response of students to question no 12

Majority of the students (72.2%) mentioned that they either don't lose or slightly lose the time of play due to online learning. This reveals that proportion of online teaching is in accordance with routine time table of the students and they do not find any compromise in the time devoted for their physical activities including playing etc.

13. Have you experienced any stress/health concerns during online learning?

173 responses

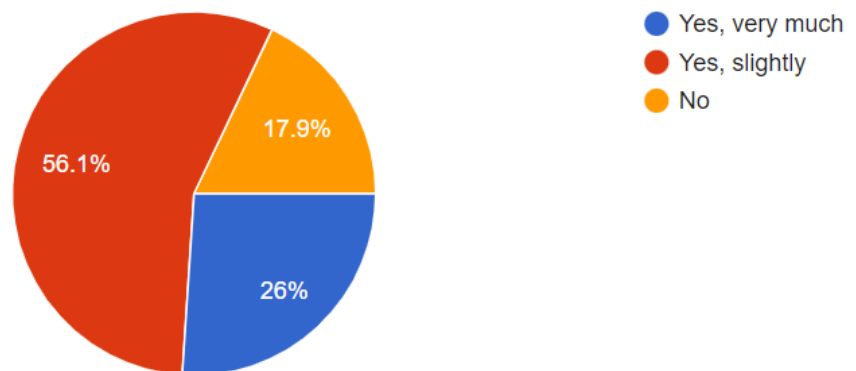


Figure 15 : Response of students to question no 13

Majority of students (74%) mentioned that they experienced no stress/ health concern or slight concerns during online learning. This may be due to that these repercussions may not be perceived immediately and may occur in the future. However, it is the responsibility of the schools and parents to ensure that adequate safeguards are inbuilt in the process of online education such as provision of screen guards on desktops, comfortable ergonomics like correct posture of sitting, adequate light etc.

14. Could you cope up with the concepts during online learning?

173 responses

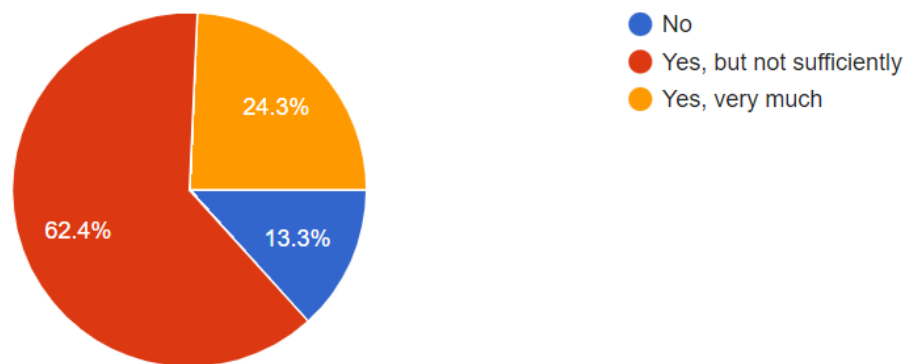


Figure 16 : Response of students to question no 14

62.4% students mentioned that they could cop-up with concepts during online classes but not sufficiently. Whereas 24.3% students mentioned that they could cop up with concepts very much but 13.3% students stated that they couldn't cop up with concepts in online classes. This shows that there should be emphasis on training of teachers for better pedagogy, gamification, peer learning etc.

15. Mark your response for the most appropriate category according to you?

173 responses

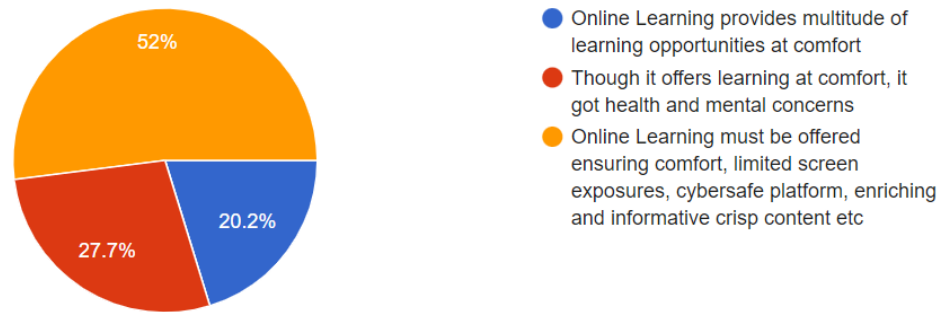


Figure 17 : Response of students to question no 15

52% students mentioned that online learning must be offered ensuring comfort, limited screen exposure, cyber safe platform, enriching and informative crisp content and so on. This echo the findings as observed while analysing the question no 10,11,13 and 14 above.

16. How can online learning be improved?

173 responses

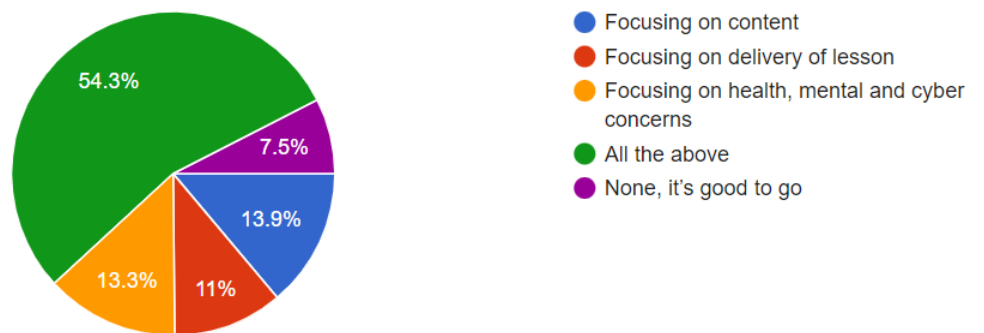


Figure 18 : Response of students to question no 16

54.3% students felt that focus on content, delivery of lesson and health, mental and cyber concerns are the area, where improvement is required. This is again in sync with findings as mentioned above in analysing the other responses.

17. Do you prefer online assessments/online lab etc over regular?

173 responses

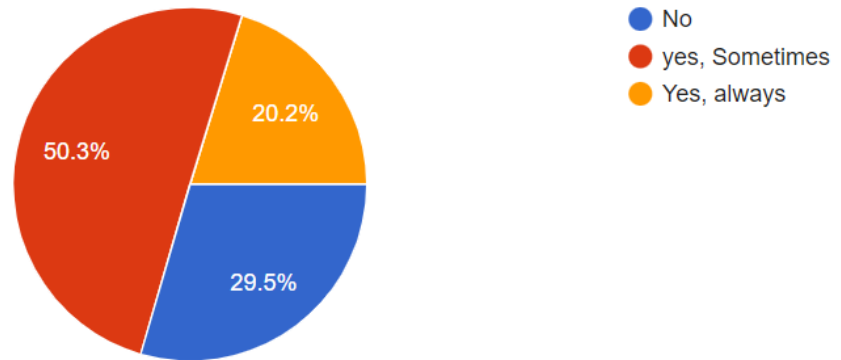


Figure 19 : Response of students to question no 17

79.8% students either don't prefer or only sometimes prefer the online assessments/online labs over regular. The reason may be that they do not like the online assessments as the techniques are not very up to the date and probably not following the principles of gamification.

18. On a scale of 1 to 10 rate your overall remote learning experience? (1 being worst and 10 being best)

173 responses

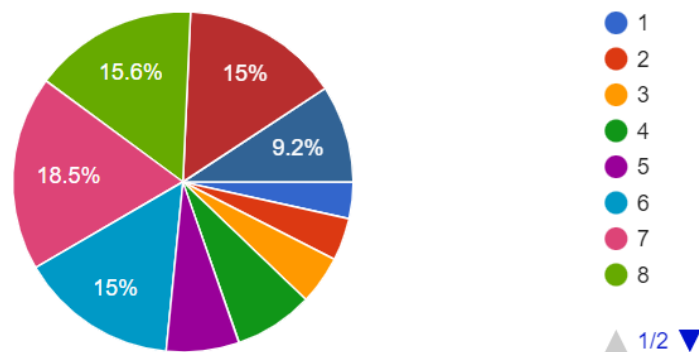


Figure 20 : Response of students to question no 18 (1)

18. On a scale of 1 to 10 rate your overall remote learning experience? (1 being worst and 10 being best)

173 responses

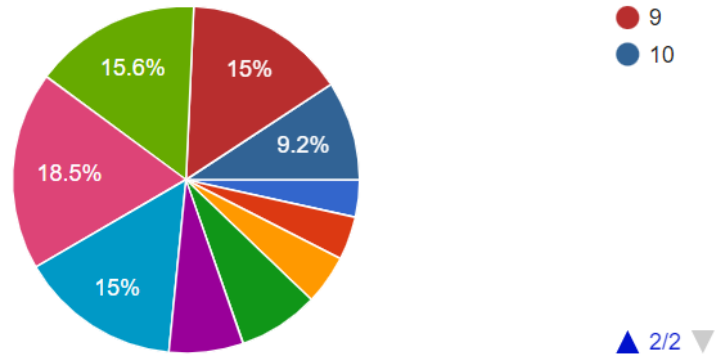


Figure 21 : Response of students to question no 18 (2)

19. Rate online vs regular learning on a scale of 10 in achieving the learning outcomes. (1 being worst and 10 being best)

173 responses

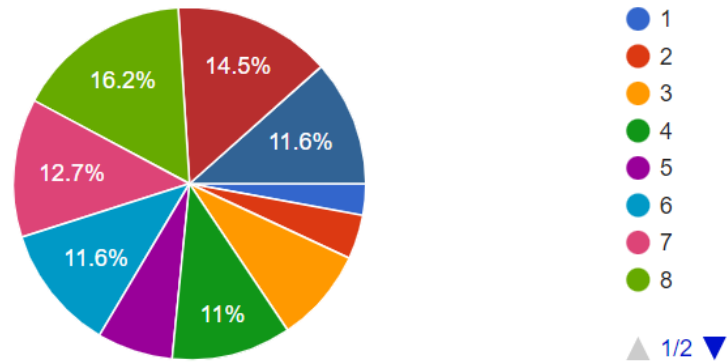


Figure 22 : Response of students to question no 19 (1)

19. Rate online vs regular learning on a scale of 10 in achieving the learning outcomes. (1 being worst and 10 being best)

173 responses

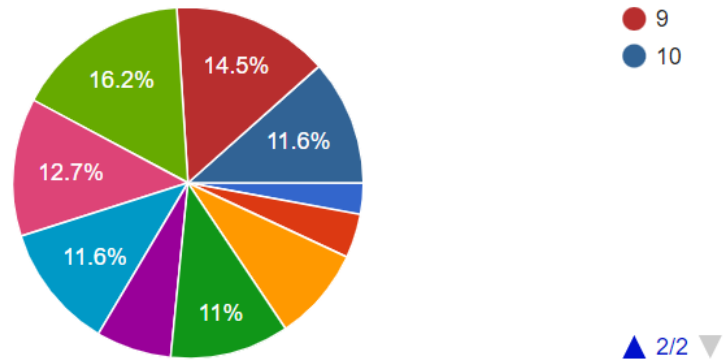


Figure 23 : Response of students to question no 19 (2)

Findings from response no 18 and 19 above are that there is a need to focus on the strategies mentioned before in analysing the previous responses so that the majority is able to enjoy the remote learning experience and have better outcome of learning.

20. Rate your teacher's lesson delivery Online? (on a scale of 10, 1 being worst and 10 being best)

173 responses

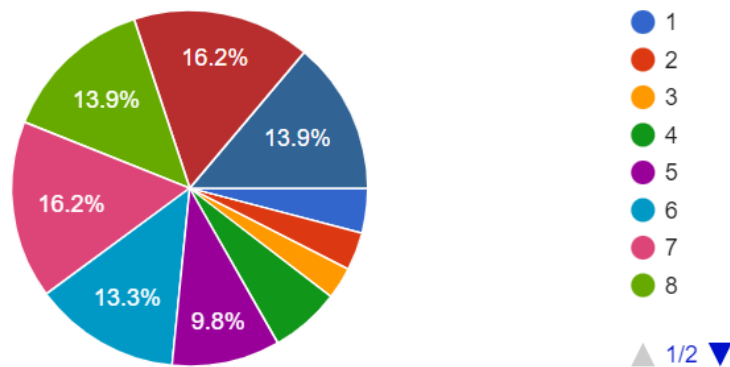


Figure 24 : Response of students to question no 20 (1)

20. Rate your teacher's lesson delivery Online? (on a scale of 10, 1 being worst and 10 being best)

173 responses

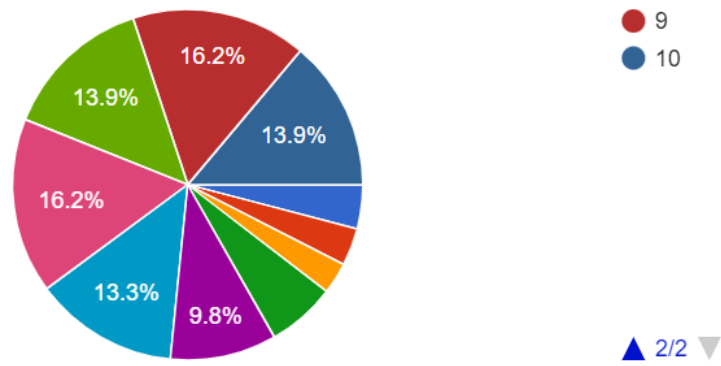


Figure 25 : Response of students to question no 20 (2)

As of now the respondents are almost equally divided on the efficacy of their teachers, therefore there is more need to strengthen the teachers through training of teachers.

4.5.2 Analysis of responses related to the parents:

4.5.2.1 Descriptive statistics analysis

Table 5: Descriptive statistics of Parents

| Demographic Characteristics | No of responses | Representation |
|-----------------------------|-----------------|----------------|
| Gender | | |
| Male | 81 | 62.8% |
| Female | 47 | 36.4% |
| Others | 1 | 0.8% |
| Age | | |
| < 25 Years | 2 | 1.6% |
| 25-35 Years | 13 | 10.1% |
| 35-50 Years | 90 | 69.8% |
| >50 Years | 24 | 18.6% |
| Qualification | | |
| Less than Graduate | 2 | 1.6% |
| Graduate | 35 | 27.1% |
| Post Graduate | 62 | 48.1% |
| Above post graduate | 30 | 23.3% |
| Location | | |
| Urban | 121 | 93.8% |
| Rural | 8 | 6.2% |
| Type of Employment | | |
| Govt | 63 | 48.8% |
| Private | 56 | 43.4% |
| Business | 10 | 7.8% |
| Annual Income (In lakhs) | | |
| <3 | 7 | 5.4% |
| 3-6 | 2 | 17.1% |
| 6-8 | 11 | 8.5% |
| >8 | 89 | 69% |
| Child in Private School | | |
| Yes | 109 | 84.5% |
| No | 20 | 15.5% |

Descriptive analysis of parents' respondent profile was tabulated and same is annexed at Table- 5 above. The profile indicates that 62.8% of the respondents are male while 36.4% are female. 1.6% are of age < 25years, 10.1% are between 25-35 years, 69.8% are between 35-50 years and remaining 18.6 % are more than 50 years. 1.6% respondents

were below graduate, 27% are graduate, 48.1% are post graduate and 23.3% are above post graduate. The location indicated that 93.8% respondents are from urban area and rest are from rural area. 48.8% respondents are in govt job, 43.4 % are in private job and remaining 7.8% are in business. The annual income profile suggested that 5.4% respondents are earning < 3 Lakhs per annum, 17.1% are earning between 3-6 Lakhs, 8.5 % are between 6-8 Lakhs whereas remaining 69% are in bracket of more than 8 lakhs. 84.5% respondents mentioned that their child is going in private school. Since majority of respondents are postgraduate or above, staying in urban areas, working in Govt & Private sector, annual income more than Rs 8 lakhs and their wards goes to private school, this demography represents affluent parents.

4.5.2.2 Analysis of responses

For analyzing the responses, graphs from Google form were used. Below mentioned are the graphs and analysis thereon with respect to the parents.

1. Are there any actions taken to control concerns around increased device usage/ screen time?

129 responses

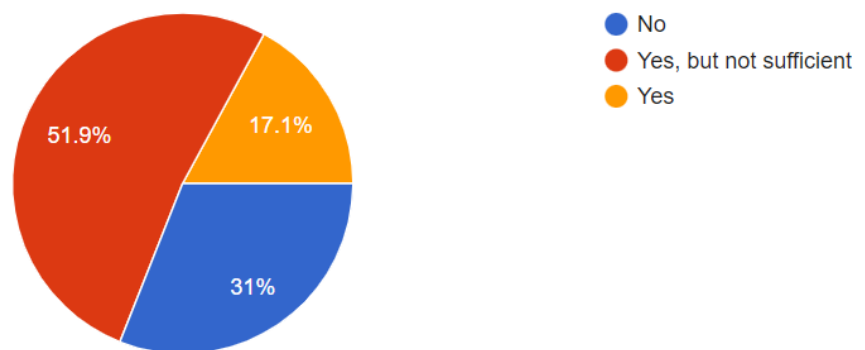


Figure 26 : Response of parents to question no 1

As many as 82.9% parents mentioned that either there is no action taken or insufficient action taken to control concerns around increased device usage/ screen time. It indicates that parents are not able to supervise screen/ device uses, may be due to lack of time. Parents need to be trained to use parental control and adequate utilities to monitor internet uses.

2. Does your child have their own laptop, tablet, computer etc for online learning?

129 responses

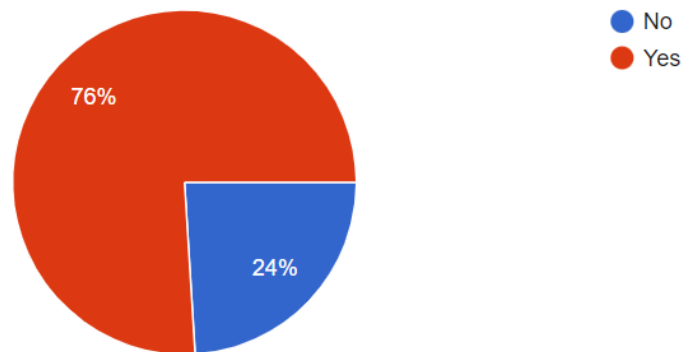


Figure 27 : Response of parents to question no 2

76% parents informed that their child has own laptop/computer/tablet. Since majority of the parents are from affluent background, this seems to be justified.

3. Do you have access to seamless internet connectivity ideal for learning?

129 responses

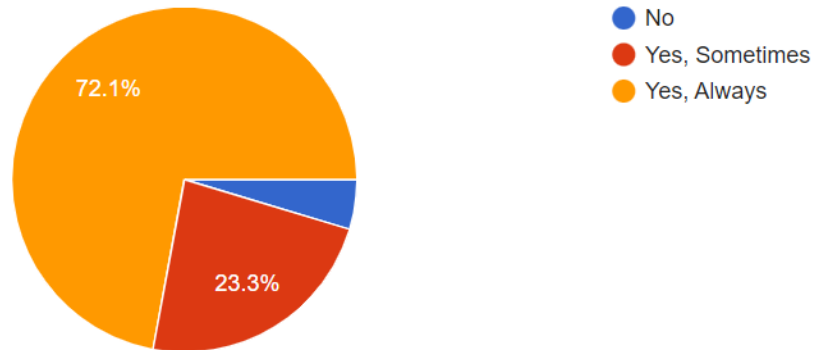


Figure 28 : Response of parents to question no 3

72.1% parents stated that they always have seamless internet connectivity, which is ideal for learning. This again echoes the demography of parents that they represents affluent category.

4. How can technology and learning be improved?



129 responses

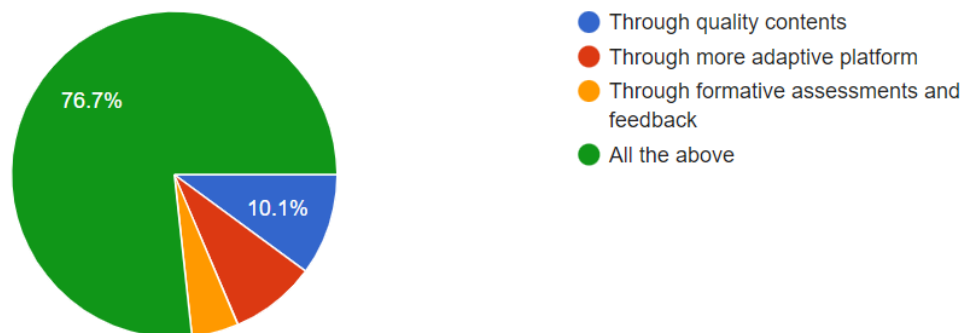


Figure 29 : Response of parents to question no 4

76.7% parents felt that that all above mentioned measures to be taken to improve technology and learning.

5. Has your child's school helped you in providing adequate digital resources?

129 responses

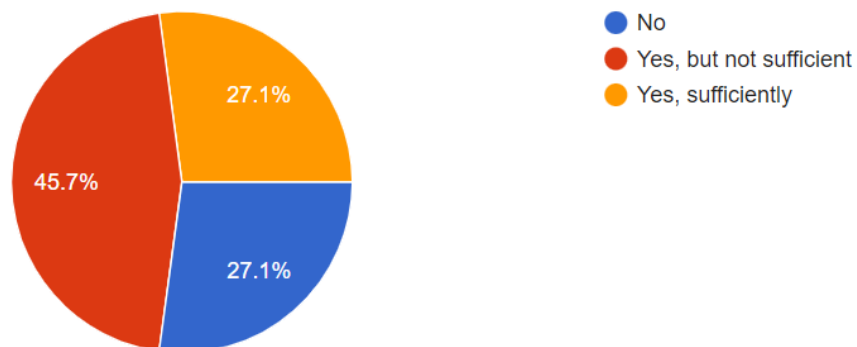


Figure 30 : Response of parents to question no 5

Majority of parents felt that schools are either not helpful or not sufficiently helpful to their child in providing adequate digital resources. It reveals that majority of parents are not happy with the action taken by schools in this regard. Schools may be encouraged to have latest resources, better platforms, and better facilities and so on.

6. Do you keep a proper check on your child's activity on the internet?

129 responses

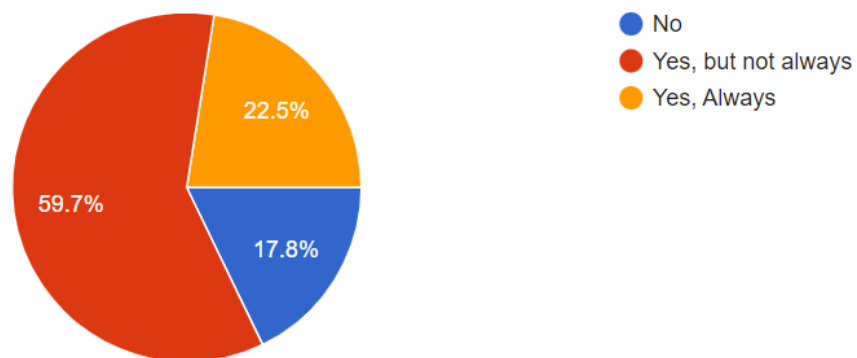


Figure 31 : Response of parents to question no 6

As many as 77.5% parents either don't check or only sometimes check the child activity on internet. This again echoes the need for training for parents also.

7. What is the suitable mode of learning according to you?

129 responses

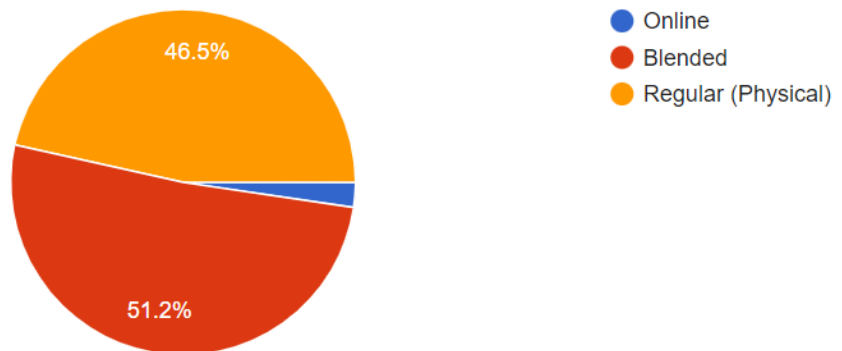


Figure 32 : Response of parents to question no 7

51.2% parents felt that blended mode is suitable mode of learning. Since online education has become a new normal, use of better technology, latest resources and so on may be required so that to have a positive shift towards blended mode of learning.

8. Has your child's school worked on bridging the digital divide in education?

129 responses

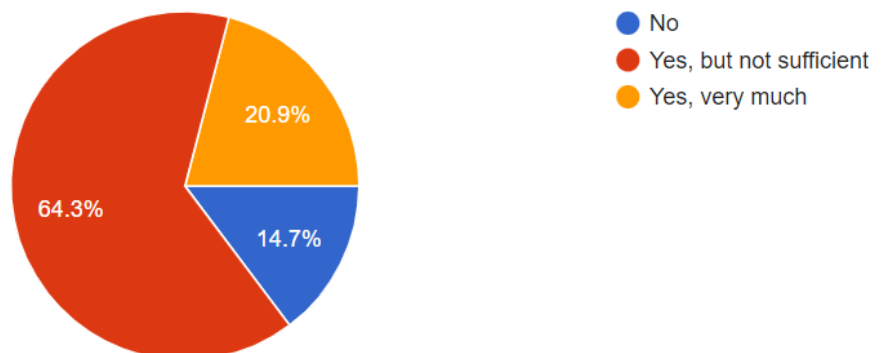


Figure 33 : Response of parents to question no 8

This again echoes the findings as mentioned in response to question no 5 above. Even affluent parents want schools to have better resources and better mechanism in this regard.

9. Do you guide your child on appropriate usage of the internet and technology?

129 responses

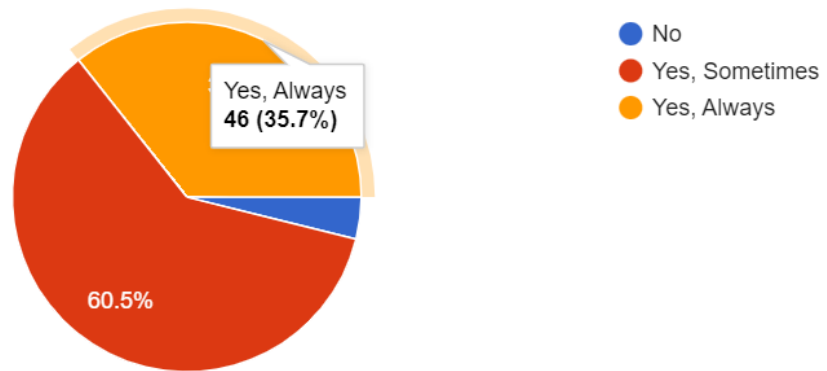


Figure 34 : Response of parents to question no 9

Majority of parents only 'sometimes' or 'never' guide their child on appropriate use of internet and technology. This again reveals a need for training of parents in this field.

11. How frequently do you assist your child with their schoolwork?

129 responses

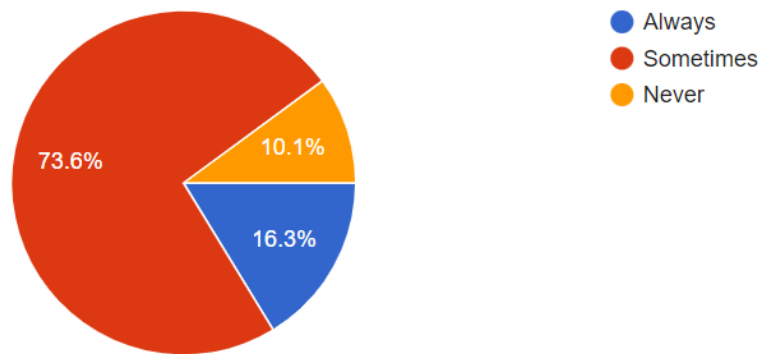


Figure 35 : Response of parents to question no 11

12. How happy are you with the apps/platforms used for distance learning?

129 responses

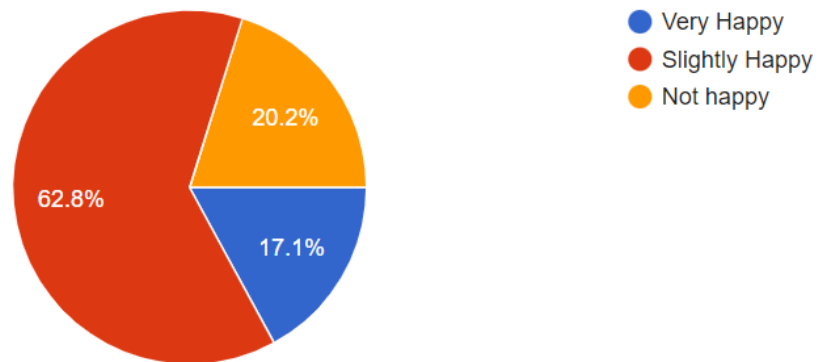


Figure 36 : Response of parents to question no 12

This shows that as many as 83% parents mentioned that either they are not happy or slightly happy with the apps/ platforms used for distance learning. This again echoes the need for better pedagogy mechanisms and latest use of resources for distance learning.

13. Do you feel communication is smooth between students and teachers during online learning?

129 responses

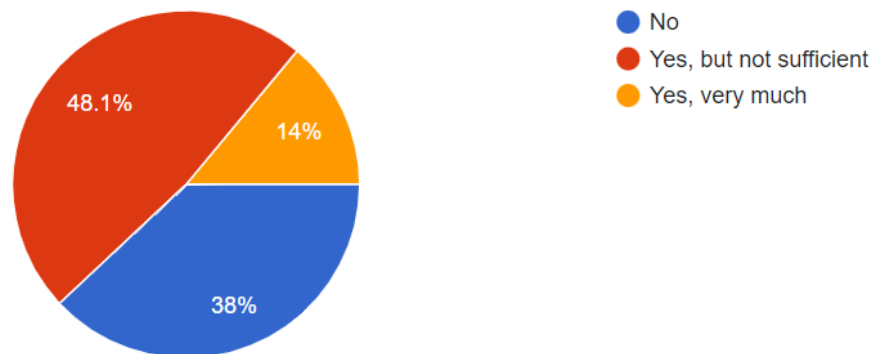


Figure 37 : Response of parents to question no 13

Majority of parents felt that the communication is not sufficiently smooth between students and teachers during online learning. This reveals the need for training of teachers for better pedagogy.

14. Are you confident your child will make adequate academic progress through remote learning?

129 responses

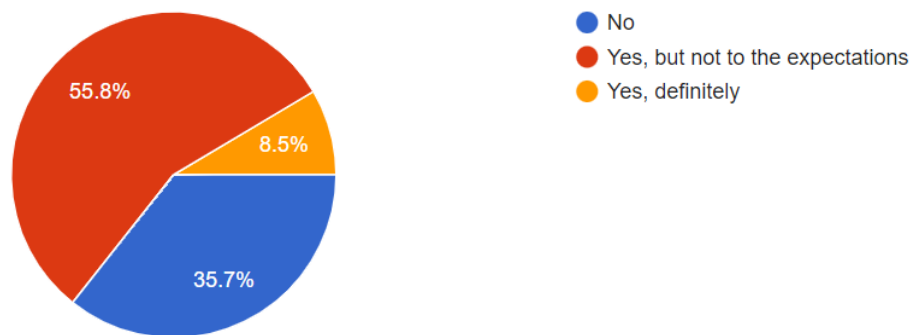


Figure 38 : Response of parents to question no 14

Majority of parents are not confident that their child will make adequate academic progress through remote learning. This again emphasizes on training of teachers for better pedagogy, gamification, and peer learning and so on in remote learning.

15. What advice would you give the teachers to improve student engagement (Please select most appropriate option according to you)?

129 responses

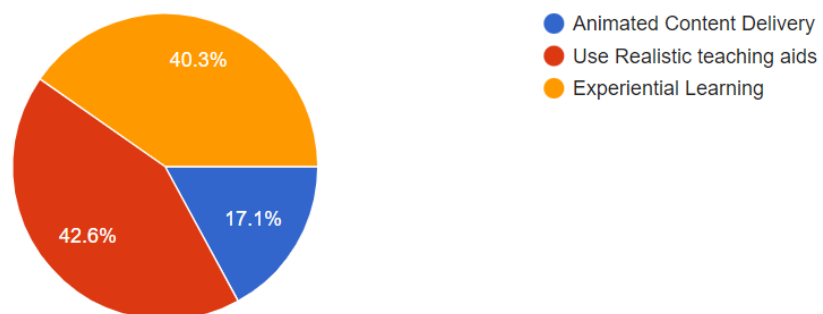


Figure 39 : Response of parents to question no 15

42.6% parents suggested using realistic teaching aids whereas 40.3% advised to use experiential learning to improve student engagement. This also emphasizes to have better mechanisms to stimulate peer learning.

16. Do you think that your child's physical activity has reduced due to increased use of technology in education?

129 responses

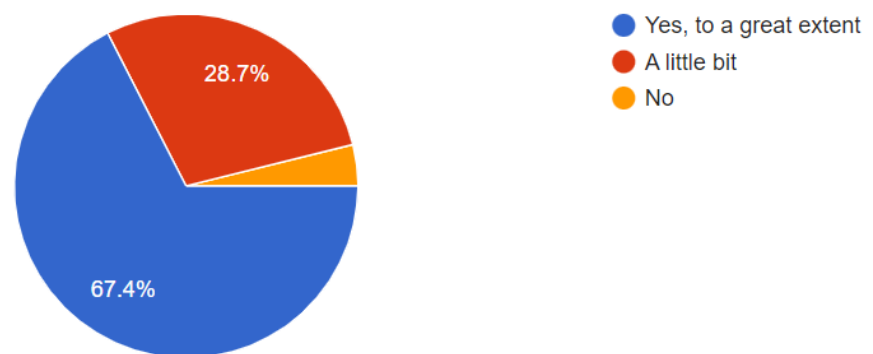


Figure 40 : Response of parents to question no 16

As many as 67.4% parents mentioned that their child physical activity is reduced due to increased use of technology in education. 28.7% mentioned that it is little bit reduced whereas rest *i.e.* only 3.9% felt that it is not reduced. This means that parents are aware of the physical, social damages and mental repercussions of the technologies and hence there is a need to inculcate better broad based mechanisms.

17. Does your child's school keep you updated about your child's progress?

129 responses

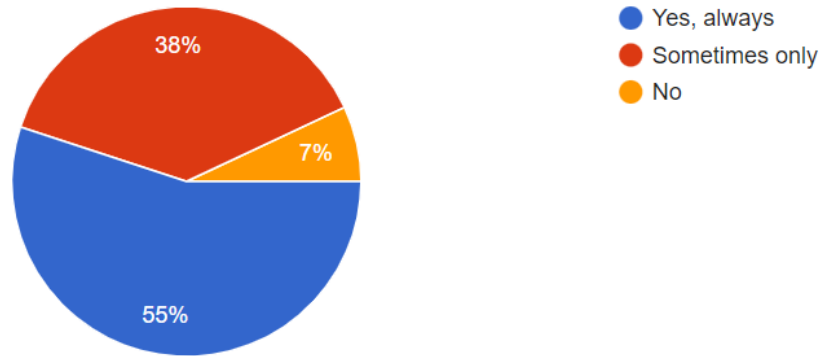


Figure 41 : Response of parents to question no 17

55% parents mentioned that the school keeps them updated about their child's progress. It means that majority of the parents reveals that there are such mechanisms exists which should be replicated in all kind of schools.

18. Does the school have sufficient channels, such as Parents' Day, the school website, school post box, etc., for you to express your views to the school?

129 responses

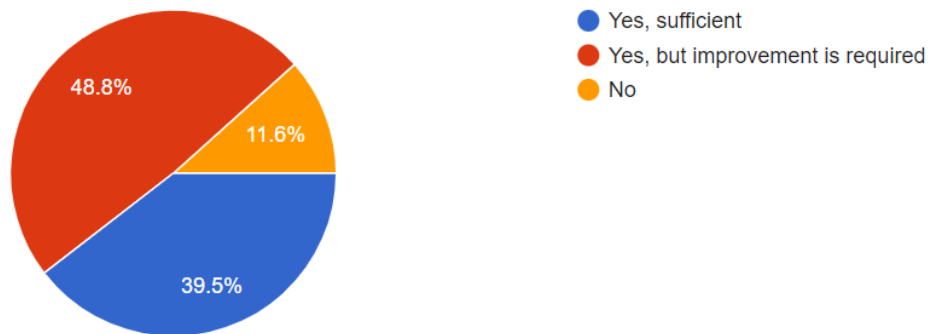


Figure 42 : Response of parents to question no 18

The details are self explanatory from above graph.

19. When working on school activities using the internet and technology, does your child get distracted?

129 responses

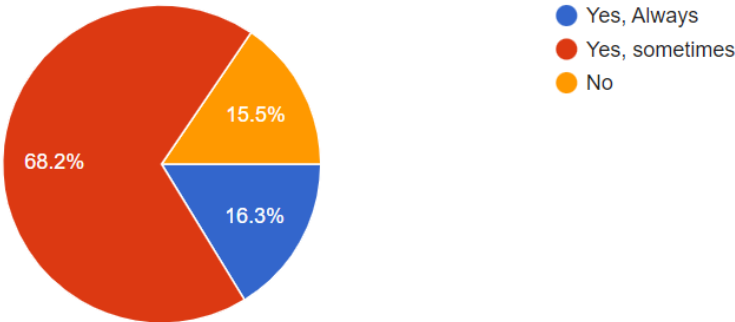


Figure 43 : Response of parents to question no 19

84.5% parents felt that their child get distracted either always or sometimes while working on school activities using internet and technology. This again emphasizes on need of cyber education for children as well as parents.

20. Do you have knowledge about sex-trafficking, online gambling, cyber-safety etc?

129 responses

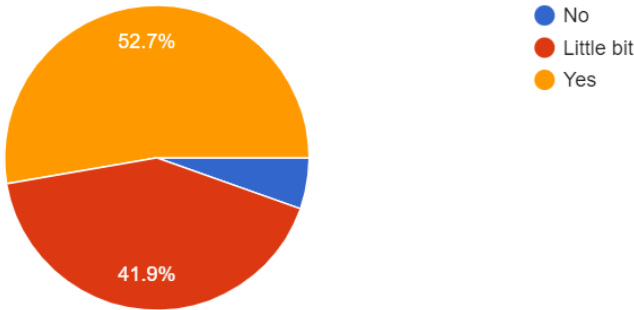


Figure 44 : Response of parents to question no 20

As many as 47.3% parents informed that either they don't have knowledge or only a little bit knowledge about cyber security. This means that parents also needs to be taught about this subject to have awareness.

4.5.3 Analysis of responses related to the teachers:

4.5.3.1 Descriptive statistics analysis

Table – 6 Descriptive Statistics of Teachers

| Demographic Characteristics | No of responses | Representation |
|------------------------------------|------------------------|-----------------------|
| Gender | | |
| Male | 50 | 50.5% |
| Female | 49 | 49.5% |
| Age | | |
| < 25 Years | 20 | 20.2% |
| 25-35 Years | 27 | 27.3% |
| 35-50 Years | 33 | 33.3% |
| >50 Years | 19 | 19.2% |
| Type of School | | |
| Govt | 28 | 28.3% |
| Private | 59 | 59.6% |
| Others | 12 | 12.1% |

Descriptive analysis of teachers' respondent profile was tabulated and same is annexed at Table- 6 above. Descriptive analysis of respondent profile indicates that 50.5% of the respondents are male while 49.5% are female. 20.2% are of age < 25 years, 27.3% are between 25-35 years, 33.3% are between 35-50 years and remaining 19.2 % are more than 50 years. Statistics showed that 28.3 % respondents are teaching in govt schools, whereas 59.6% are teaching in private schools.

4.5.3.2 Analysis of responses:

1. Do you have access to a device while teaching online?

99 responses

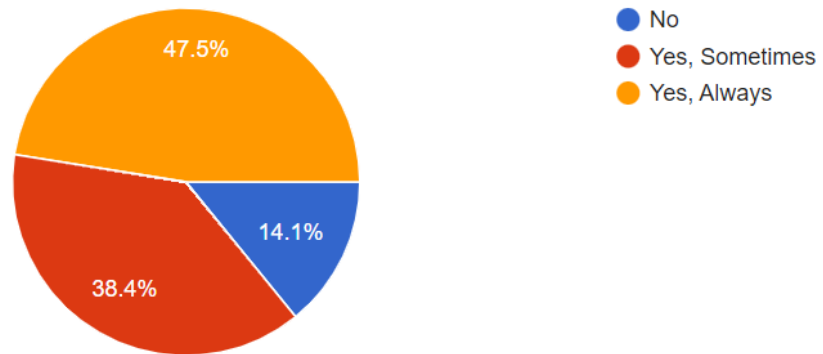


Figure 45 : Response of teachers to question no 1

85.9% teacher informed that they either sometimes or always have access to a device while teaching online. It's reassuring that majority of teachers have access to a device. However, this is to mention here that the respondents are primarily from private schools.

2. Were there any challenges faced while using online education mode of teaching?

99 responses

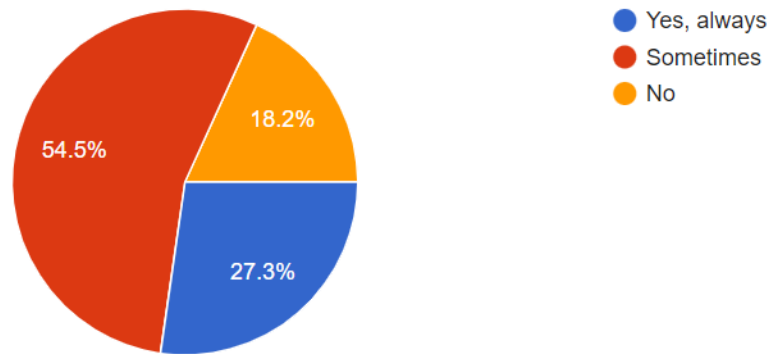


Figure 46 : Response of teachers to question no 2

81.8% teachers felt that they have sometimes or always faced challenges while using online mode of education for teaching. This reveals the need of training of teachers. Also the infrastructure needs to be strengthened and use of latest technology be encouraged to minimize these problems.

3. How helpful is your school in offering you the resources to learn from home?

99 responses

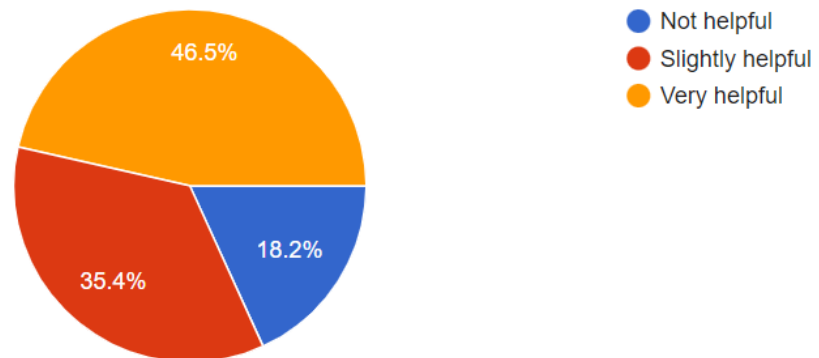


Figure 47 : Response of teachers to question no 3

Majority (52.6%) of teachers mentioned that their school is either not helpful or slightly helpful in offering them the resources to learn from home. This again emphasises on need of better internet connectivity, use of latest technology and so on by schools.

4. How helpful have parents been while supporting their children’s remote learning?

99 responses

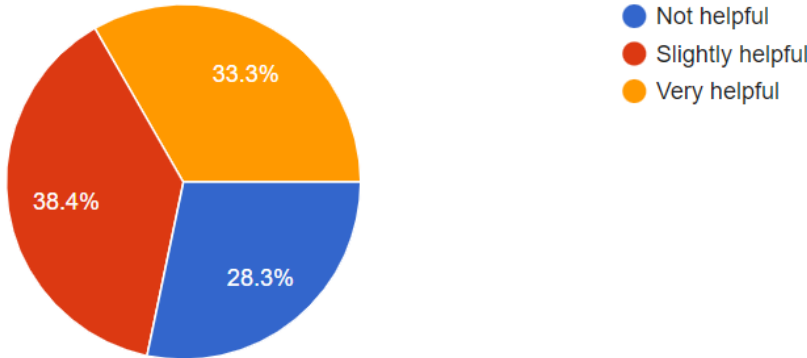


Figure 48 : Response of teachers to question no 4

As many as 66.7% teachers mentioned that, either parents are not helpful or only slightly helpful while supporting their children’s remote learning. Since online learning is a new normal, use of better technology, resources and so on may be embedded to have shift towards online mode of learning.

5. Is there any provision of training for using online education mode of teaching?

99 responses

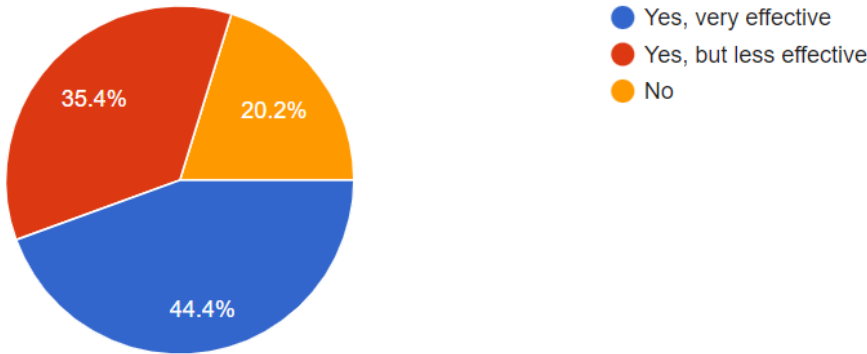


Figure 49 : Response of teachers to question no 5

As many as 54.6% teachers mentioned that there is either no provision or very less effective provision of training for online mode of teaching. This strongly emphasizes on the need of training of teachers in this area. Schools need to be sensitized their teachers about the GoI's initiative such as NISHTHA.

6. How much percentage of children are actively engaged in online classes daily?

99 responses

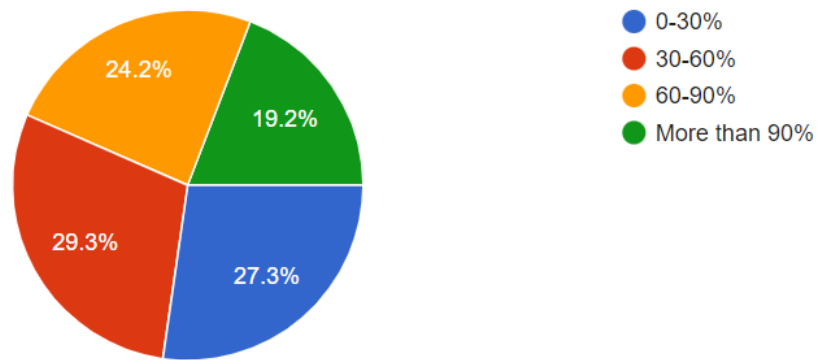


Figure 50 : Response of teachers to question no 6

This again reveals that there is a need to have better mechanisms, gamification, peer learning approach and so on to engage them more actively in online education.

7. How many hours do you spend each day on average to teach online?

99 responses

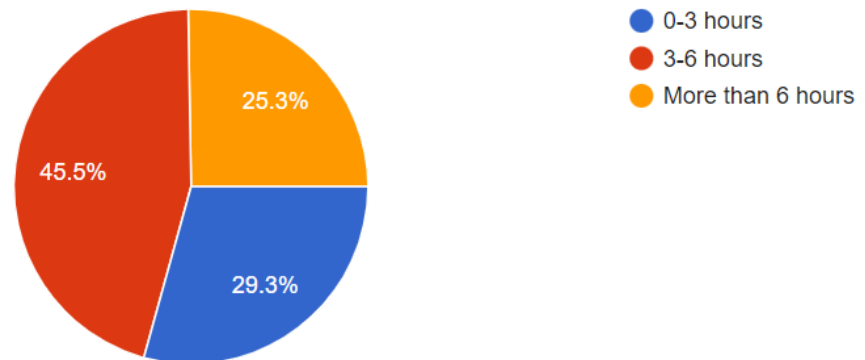


Figure 51 : Response of teachers to question no 7

Above graph is self explanatory on the issue.

8. Are there any courses provided by school to upgrade teaching skills?

99 responses

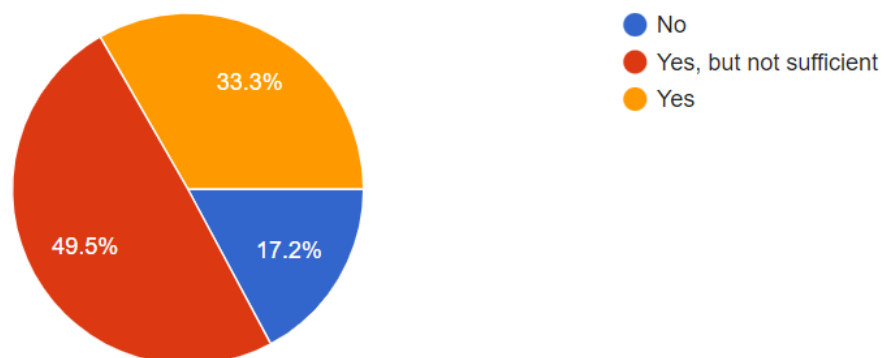


Figure 52 : Response of teachers to question no 8

Majority (66.7%) of the teachers mentioned that either nil or insufficient courses are provided by their schools to upgrade teaching skills. This again emphasizes on the need of training of teachers.

9. Are you using the DIKSHA platform for teaching?

99 responses

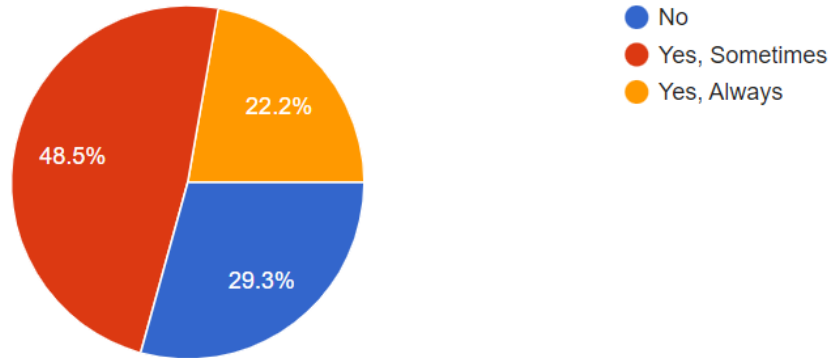


Figure 53 : Response of teachers to question no 9

Majority (77.8%) of teachers mentioned that either they don't use or sometimes uses the DIKSHA platform. This emphasizes on awareness sensitization and advocacy for DIKSHA platform.

10. Whether the NISHTHA (National Initiative for School Heads and Teachers Holistic Advancement) training modules are helpful professionally?

99 responses

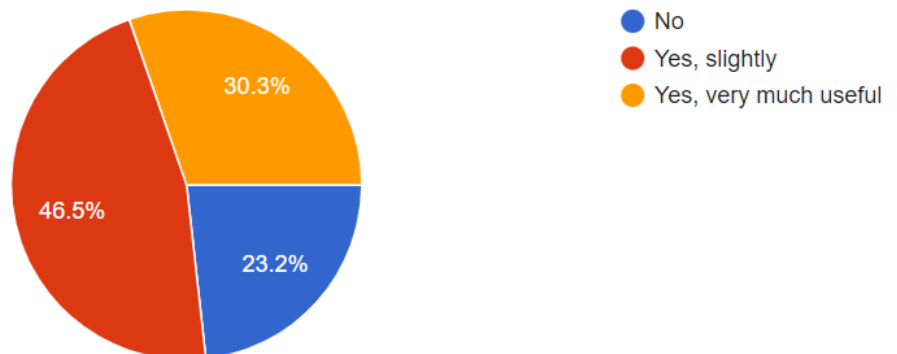


Figure 54 : Response of teachers to question no 10

The above graph emphasizes on further awareness sensitization and advocacy for NISHTHA platform.

11. Is there any improvement required in online training modules?

99 responses

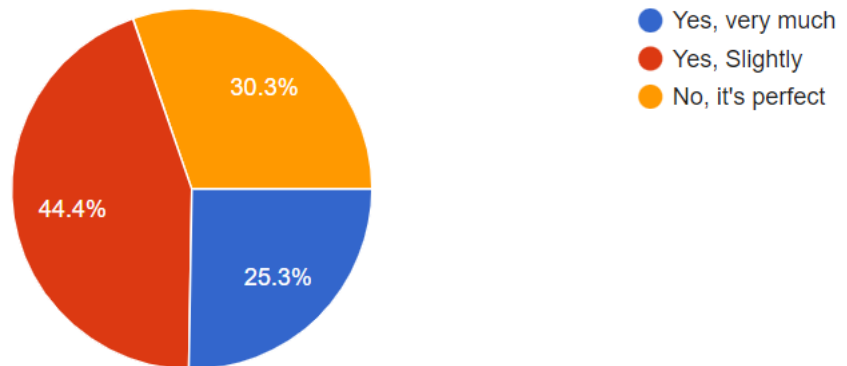


Figure 55 : Response of teachers to question no 11

25.3% teachers felt that there is strong need to improve online training modules whereas 44.4% mentioned that slight improvement is required. Hence there is a need to improve the existing modules in terms of use of latest technology, better pedagogy techniques etc.

12. Have you attended trainings on sex-trafficking, online gambling, cyber-safety etc

99 responses

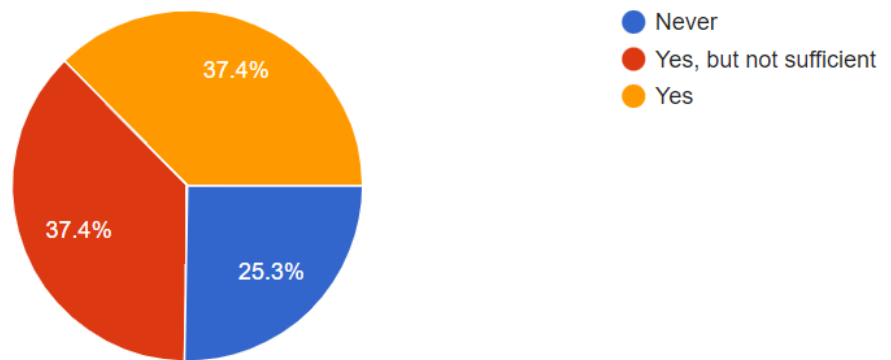


Figure 56 : Response of teachers to question no 12

25.3% teachers mentioned that they never attended training on sex-trafficking, online gambling, cyber safety and so on. This reveals a strong need to have training of teachers on these subjects so that they can educate the students also.

13. What's the suitable mode of teaching according to you?

99 responses

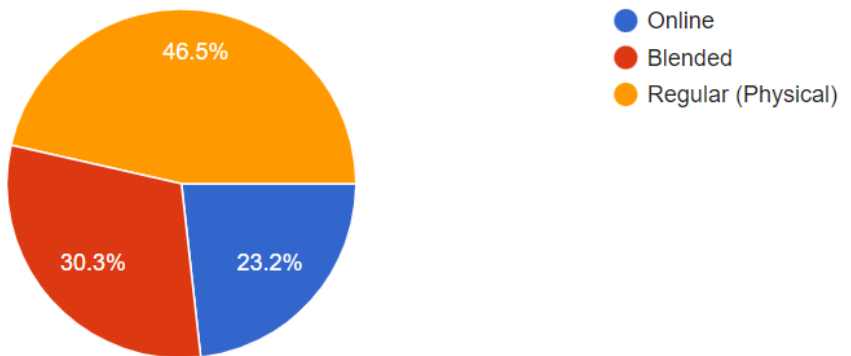


Figure 57 : Response of teachers to question no 13

46.5% teachers felt that regular (physical) mode of learning is most suitable whereas 30.3% teachers felt the blended mode.

14. Do you know about digital libraries?

99 responses

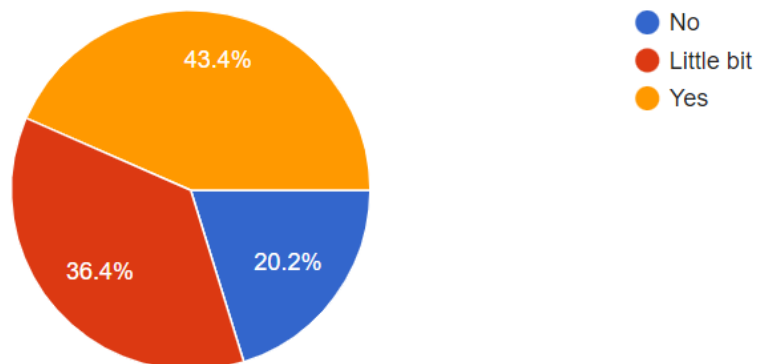


Figure 58 : Response of teachers to question no 14

There is a need to sensitize the teachers about use of digital libraries.

15. Whether the personal concerns of children are addressed and guided by you?

99 responses

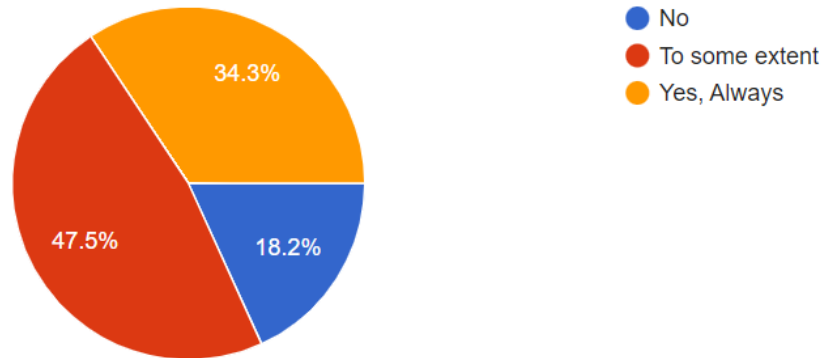


Figure 59 : Response of teachers to question no 15

81.8% teachers mentioned that they could address the personal concerns of child and guided them either always or to some extent.

16. How can tech learning and training be improved?



99 responses

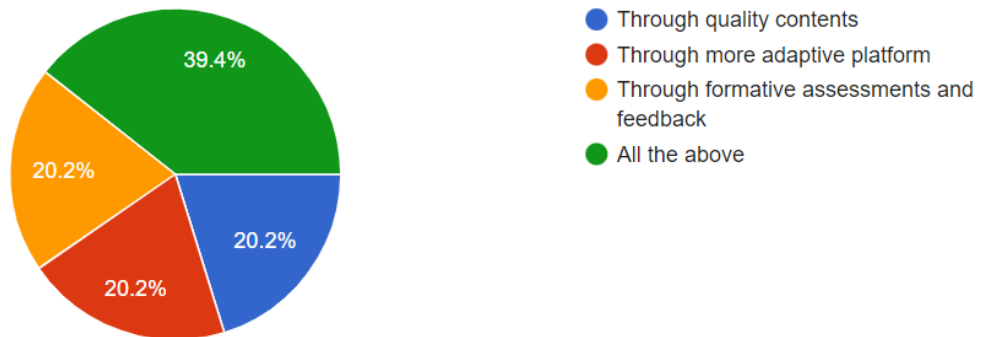


Figure 60 : Response of teachers to question no 16

Above graph is self-explanatory , wherein teaching and learning may be improved by using all the above mentioned techniques.

17. How many students are able to achieve the learning outcomes via digital mode?

99 responses

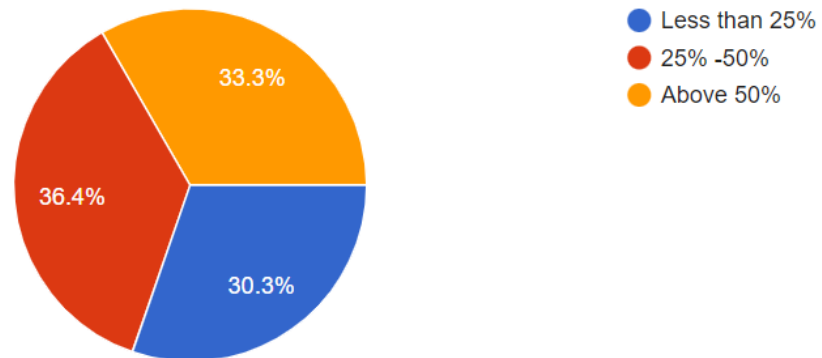


Figure 61 : Response of teachers to question no 17

66.7% teachers felt that below 50 % students are able to achieve the learning outcomes via digital mode. This again emphasizes on need to have better platforms, better way of pedagogy etc to achieve the learning outcomes.

18. How do you guide children who misbehave/make nuisance in online classes?

99 responses

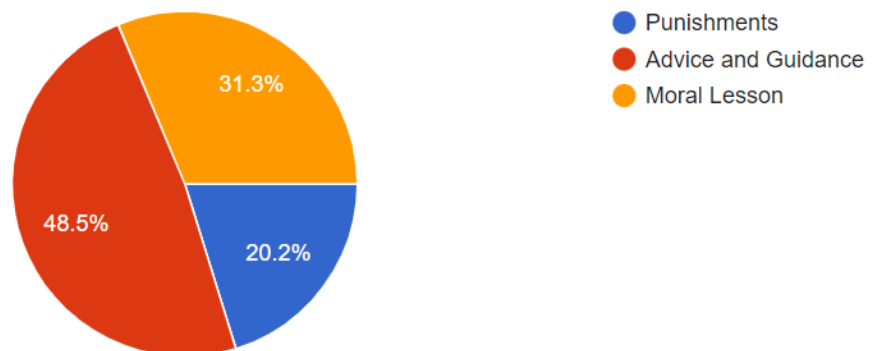


Figure 62 : Response of teachers to question no 18

19. On a scale of 1 to 10 (1 being worst and 10 being best) rate your overall remote/online teaching experience?

99 responses

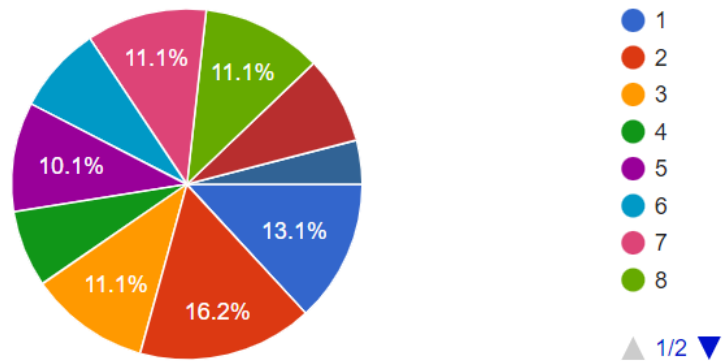


Figure 63 : Response of teachers to question no 19 (1)

19. On a scale of 1 to 10 (1 being worst and 10 being best) rate your overall remote/online teaching experience?

99 responses

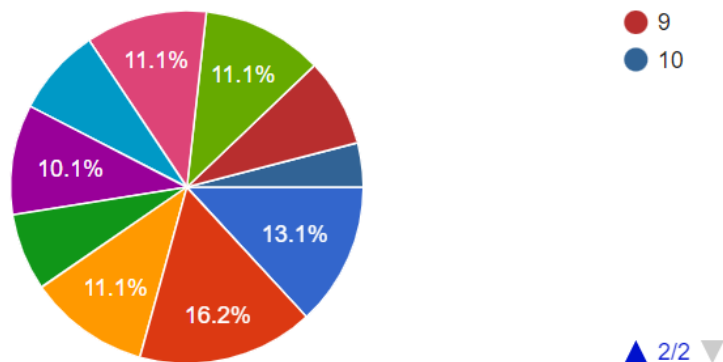


Figure 64 : Response of teachers to question no 19 (2)

There is again need to have better training for teachers apart from having latest technology and so on for making online experience the better one. Schools also needs to be sensitized their teachers about the GoI's initiative such as NISHTHA.

20. Online assessments/Online Laboratory - How trained are you (on scale of 10, 1 being worst and 10 being best)

99 responses

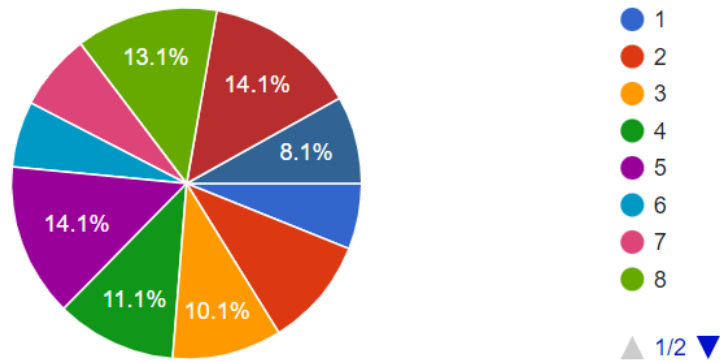


Figure 65 : Response of teachers to question no 20 (1)

20. Online assessments/Online Laboratory - How trained are you (on scale of 10, 1 being worst and 10 being best)

99 responses

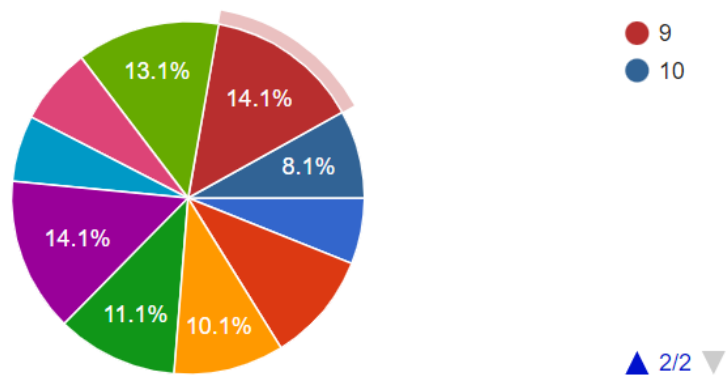


Figure 66 : Response of teachers to question no 20 (2)

This emphasizes on strengthening of online assessment and online laboratory.

4.5.4 Analysis of responses related to the School Administration:

4.5.4.1 Descriptive statistics analysis related to the School Administration

Table- 7 Descriptive Statistics of School Administration

| Demographic Characteristics | No of responses | Representation |
|------------------------------------|------------------------|-----------------------|
| Gender | | |
| Male | 24 | 68.6% |
| Female | 11 | 31.4% |
| Age | | |
| < 25 Years | 1 | 2.9% |
| 25-35 Years | 1 | 2.9% |
| 35-50 Years | 19 | 54.3% |
| >50 Years | 14 | 40% |
| Type of School | | |
| Govt | 22 | 62.9% |
| Private | 11 | 31.4% |
| Others | 2 | 5.7% |

Descriptive analysis of school administration respondent profile was tabulated and same is annexed at Table- 7 above. Descriptive Respondent profiles' indicates that 68.6% of the respondents are male while 31.4% are female. 2.9% are of age < 25 years, 2.9% are between 25-35 years, 54.3% are between 35-50 years and remaining 40% are more than 50 years. Statistics showed that 62.9 % respondents are from Govt schools, whereas 31.4% are from private schools.

4.5.4.2 Analysis of responses

1. Do all your students have access to a digital device while learning online?

35 responses

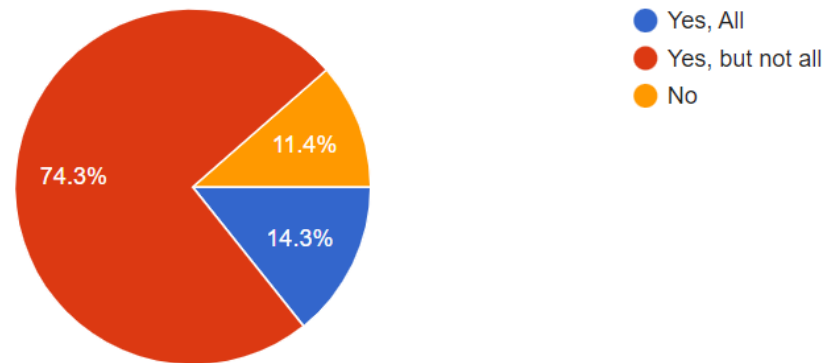


Figure 67 : Response of school administration to question no 1

As many as 85.7% schools mentioned that their all students don't have access to a digital device. This clearly indicates regarding digital divide as an area of concern for implementing digital technology in education.

2. Were there any challenges faced while using online education mode of learning?

35 responses

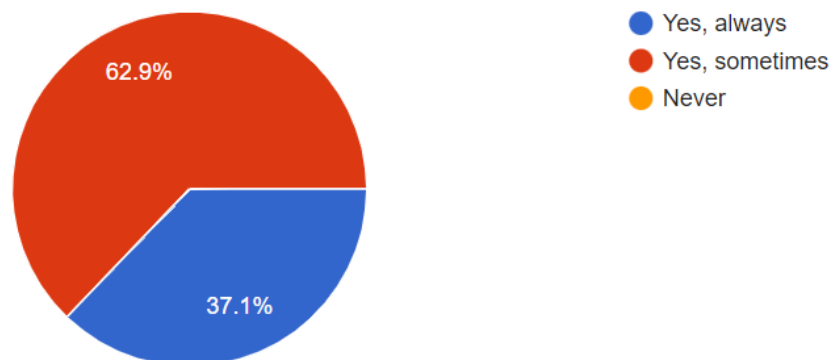


Figure 68 : Response of school administration to question no 2

100% schools felt that there are sometimes or always challenges faced while using online education mode of learning. This clearly indicates that there is a need to revamp the

online education mode of learning in terms of training of teachers, use of latest technologies, better infrastructure etc.

3. Does your school offer resources to students to learn from home?

35 responses

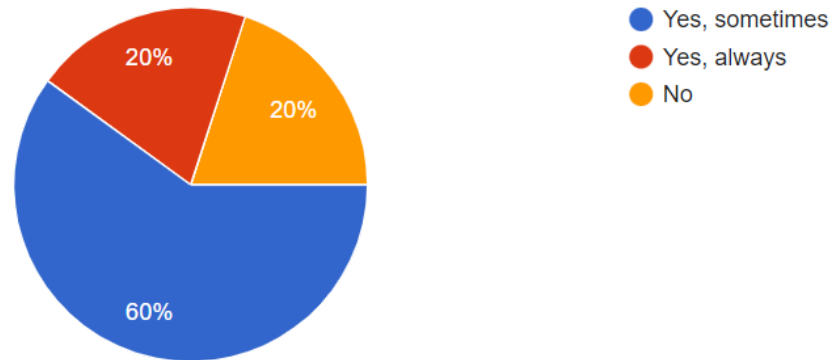


Figure 69 : Response of school administration to question no 3

80 % of the schools are able to offer resources to students to learn from home either sometimes or always.

4. Does your school educate the students about sex-trafficking, online gambling, cyber-safety etc

35 responses

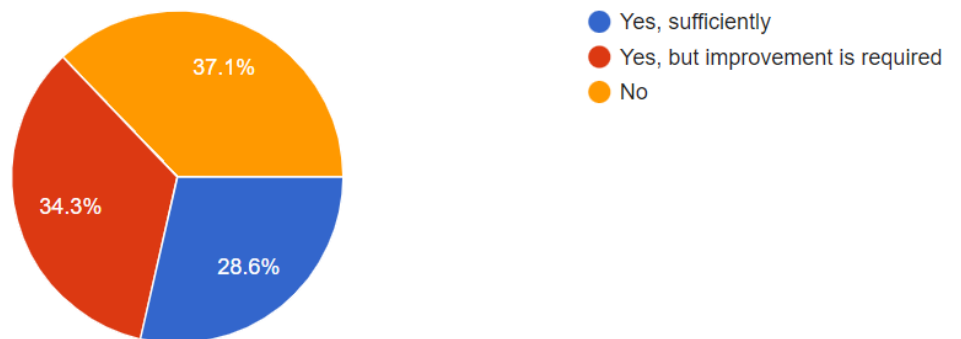


Figure 70 : Response of school administration to question no 4

37.1% schools informed that their school does not educate the students on these subjects whereas 34.3% schools felt that improvement is required. This shows that training of teachers is required in this area so that school can educate their students.

5. Has the school taken any steps to bridge the digital divide?

35 responses

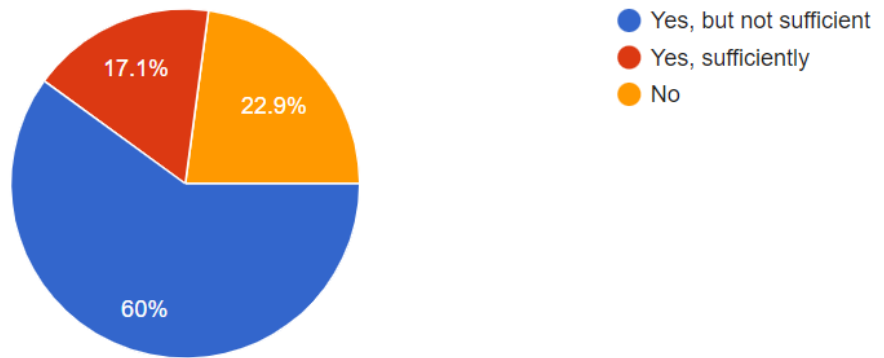


Figure 71 : Response of school administration to question no 5

60% schools informed that school has taken steps to bridge the digital divide but not sufficiently. 22.9% schools informed that no steps are taken in this regard. To promote digital education, digital divide needs to be addressed.

6. What's the most preferred mode of online classes in your school?

35 responses

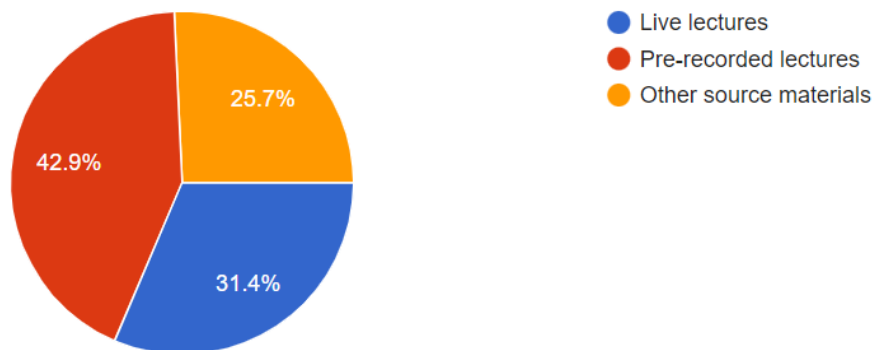


Figure 72 : Response of school administration to question no 6

In 42.9% schools, most preferred mode of online classes is pre-recorded lectures. However, analysis of responses from students showed that they prefer live lectures. This needs to be embedded more by schools in their online mode of teaching.



7. Are there any steps that have been taken to improve the online learning experience for students and parents?

35 responses

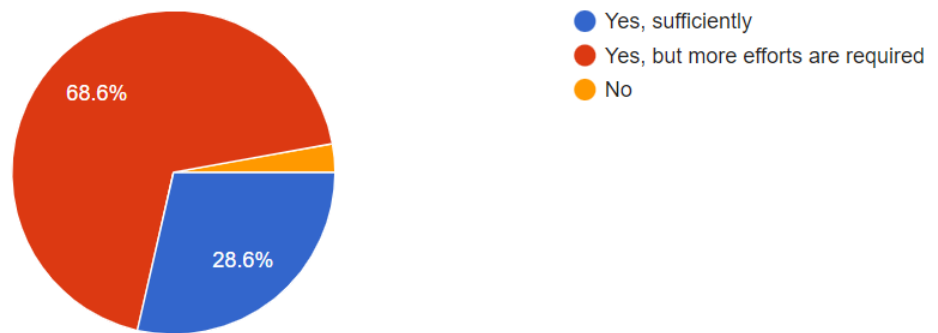


Figure 73 : Response of school administration to question no 7

68.6% schools informed that more efforts are required towards steps taken to improve the online learning experience for students and parents.



8. Do you provide any training to teachers for using online education mode of teaching?

35 responses

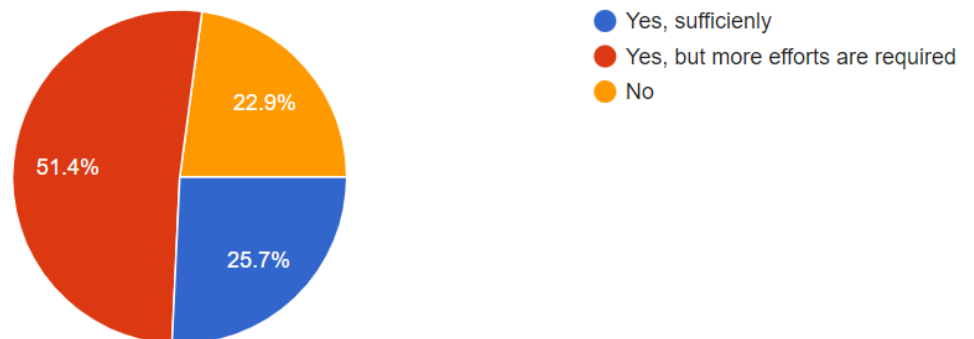


Figure 74 : Response of school administration to question no 8

74.3% schools informed that either there is no training to teachers or improvement is required in training for using online education mode of teaching. This again emphasizes strongly on the need of training of teachers.

9. Does your school provide any courses to teachers for upgrading their teaching skills?

35 responses

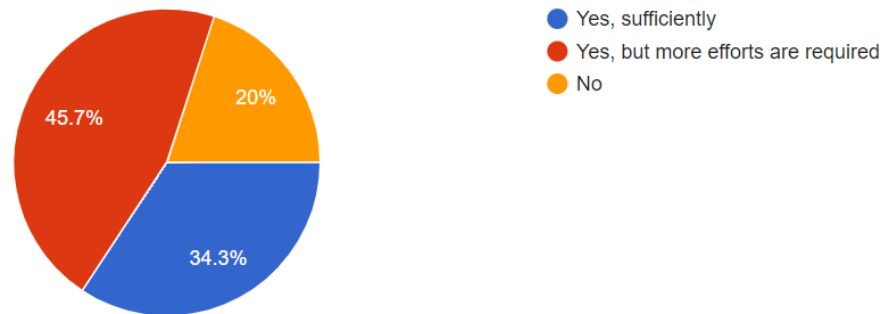


Figure 75 : Response of school administration to question no 9

65.7% schools mentioned that either there are no efforts or more efforts are required in providing courses to teachers for upgrading their teaching skills. There is a strong need to provide such courses and arrange training for teachers.

10. Does your school keep the parents updated about their child's progress?

35 responses

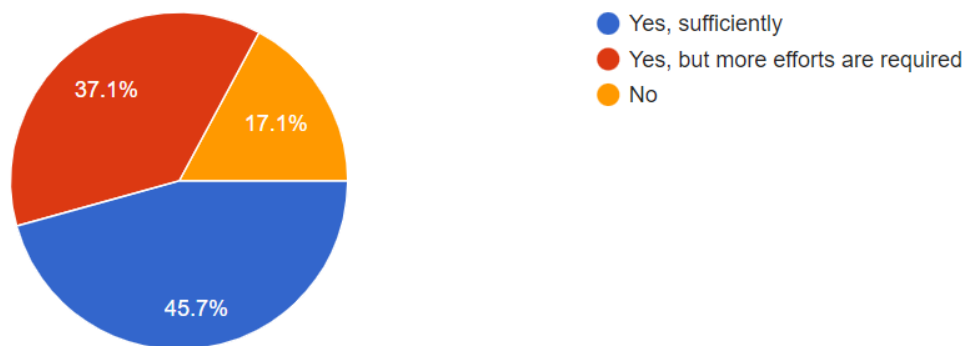


Figure 76 : Response of school administration to question no 10

Above graph is self explanatory in this regard.

11. Does the school have sufficient channels, such as Parents' Day, the school website, school post box, etc., for parents to express their views to the school?



35 responses

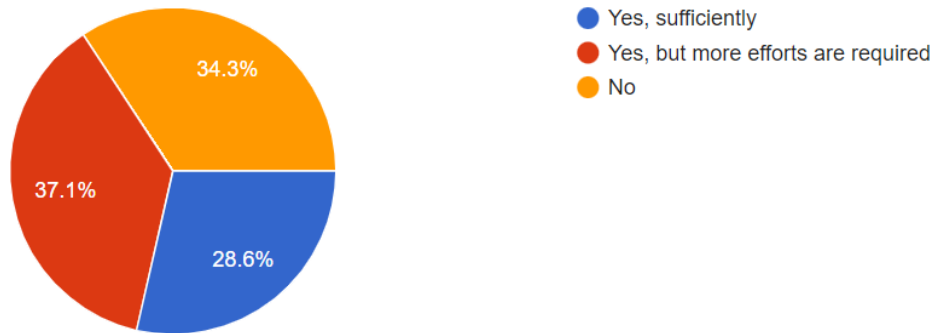


Figure 77 : Response of school administration to question no 11

Statistics shows that most of the schools have sufficient channels in this regard.

12. Does your school provide adequate extracurricular activities for overall growth and development of children?



35 responses

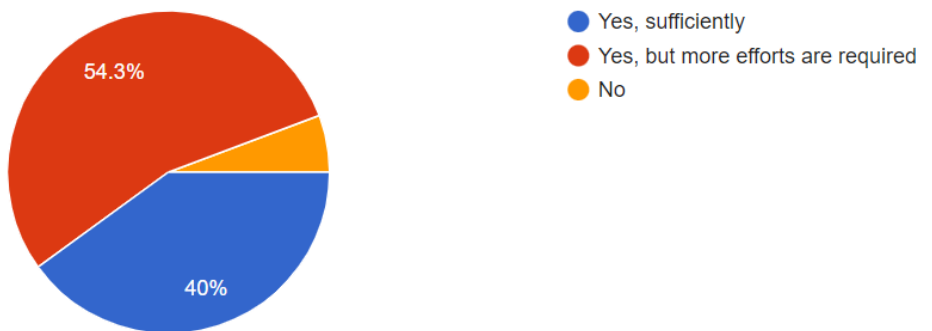


Figure 78 : Response of school administration to question no 12

Above statistics shows that more efforts are required by the schools in providing extra-curricular activities for overall growth and development of the children.

13. How much percentage of classrooms are equipped with smart boards?

35 responses

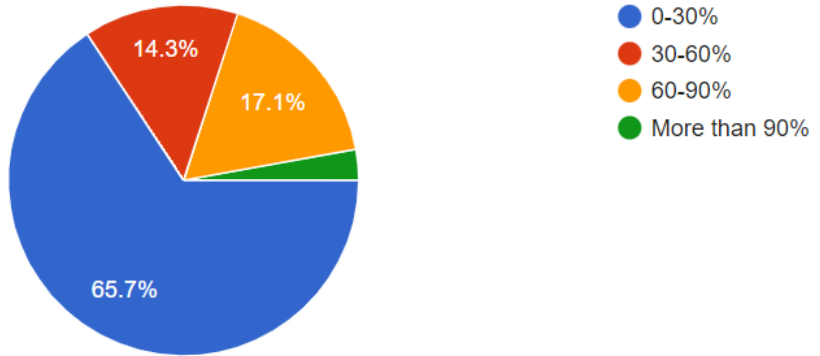


Figure 79 : Response of school administration to question no 13

65.7% schools informed that only 0-30% classrooms are equipped with smart boards. This reveals that there is a need to upgrade the infrastructure facilities by schools to promote digital learning.

14. Any support extended to EWS/CwSN through school funds?

35 responses

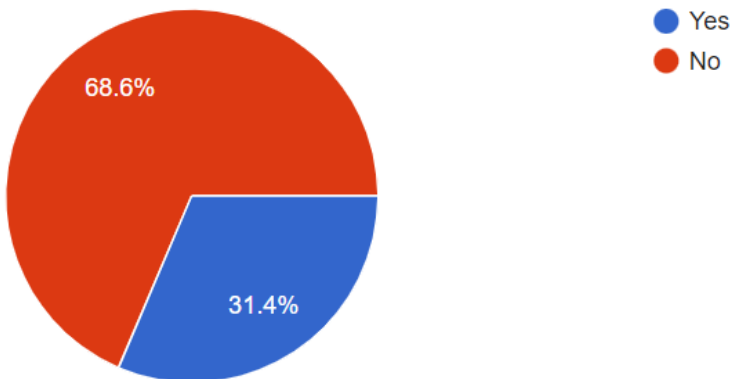


Figure 80 : Response of school administration to question no 14

68.6% schools have extended support o EWS/ CwSN through school funds. However, more needs to done in this direction to have all the schools onboard.



15. Are the government's teacher training modules effective?

35 responses

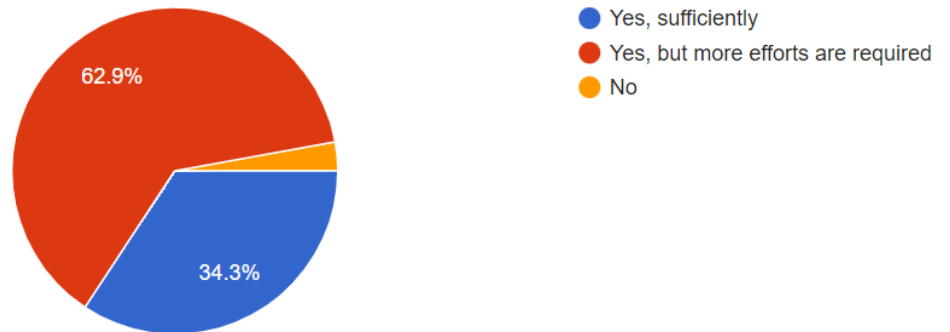


Figure 81 : Response of school administration to question no 15

97.2% schools felt that government's teacher training modules are effective however 62.9% out of them feels that more efforts are required. This again emphasizes strongly on training of teachers.

16. Whether the school has Atal tinkering Lab facility?

35 responses

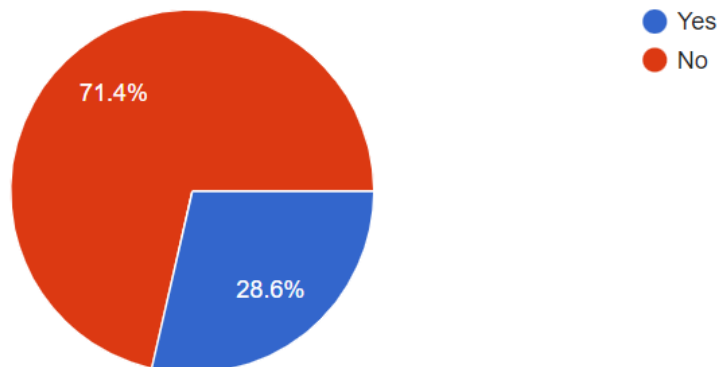


Figure 82 : Response of school administration to question no 16

As many as 71.4% schools doesn't have Atal Tinkering Lab facility in their school.

17. How good are the infrastructure and the essential facilities of school?

35 responses

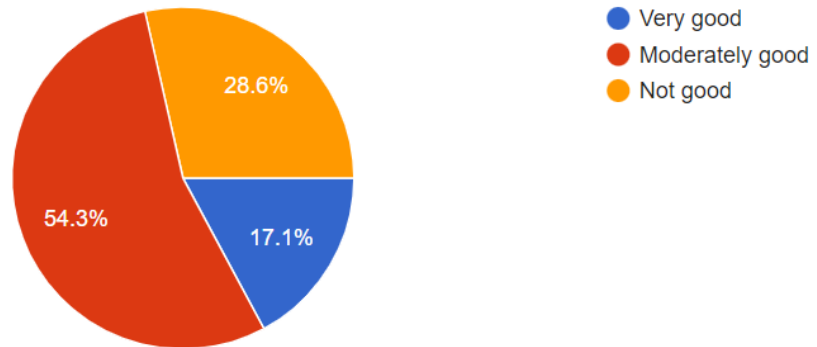


Figure 83 : Response of school administration to question no 17

Above statistics revealed that infrastructure facilities in most of the schools need to be revamped.

18. Do you support the matters/decisions concerning curriculum/infra/online learning etc taken by policy makers?



35 responses

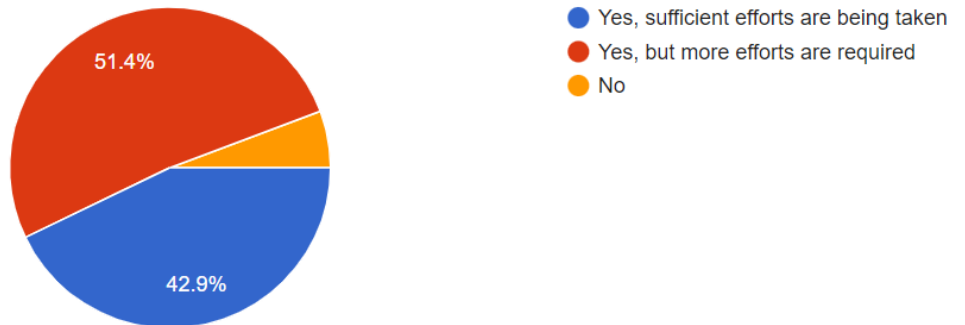


Figure 84 : Response of school administration to question no 18

42.9% schools supports the decisions taken by policymakers regarding curriculum/infra/online learning and so on. 51.4% mentioned that it is there but more efforts are required.

19. Rate online learning (on a scale of 10, 1 being worst and 10 being best) in achieving the learning outcomes

35 responses

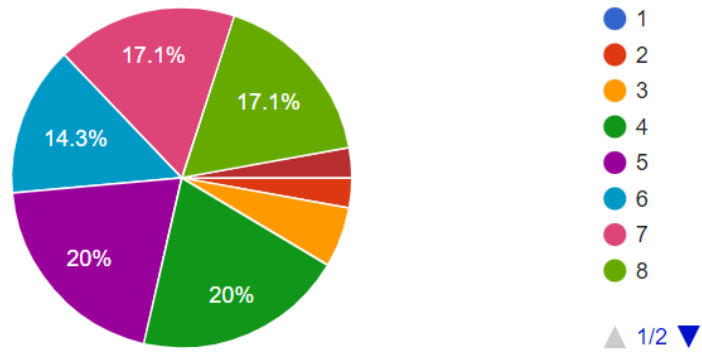


Figure 85 : Response of school administration to question no 19 (1)

19. Rate online learning (on a scale of 10, 1 being worst and 10 being best) in achieving the learning outcomes

35 responses

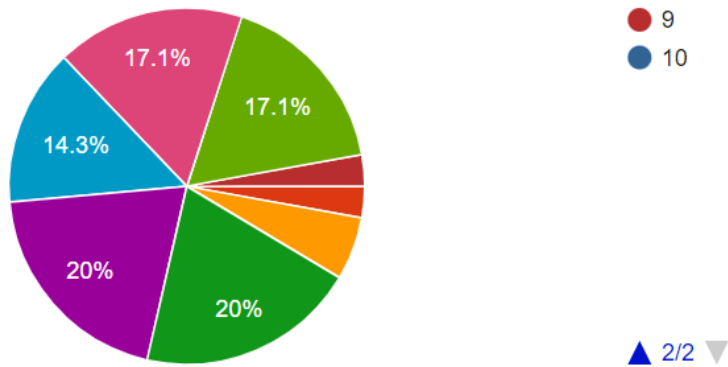


Figure 86 : Response of school administration to question no 19 (2)

Above statistics shows that more efforts are required in digital education to achieve the learning outcomes.

20. Rate the efficiency of teachers in your school in view of knowledge/skill/class management (on 10, 1 being worst and 10 being best)

35 responses

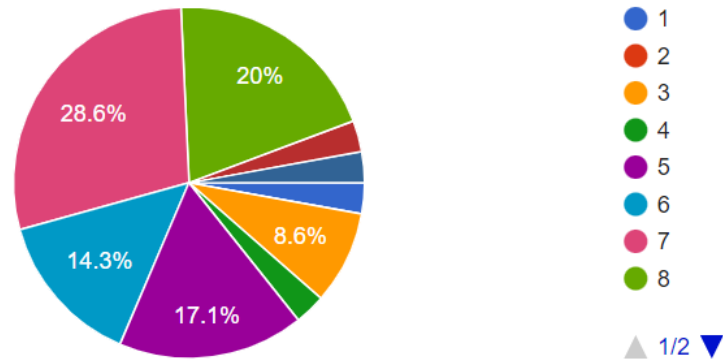


Figure 87 : Response of school administration to question no 20 (1)

20. Rate the efficiency of teachers in your school in view of knowledge/skill/class management (on 10, 1 being worst and 10 being best)

35 responses

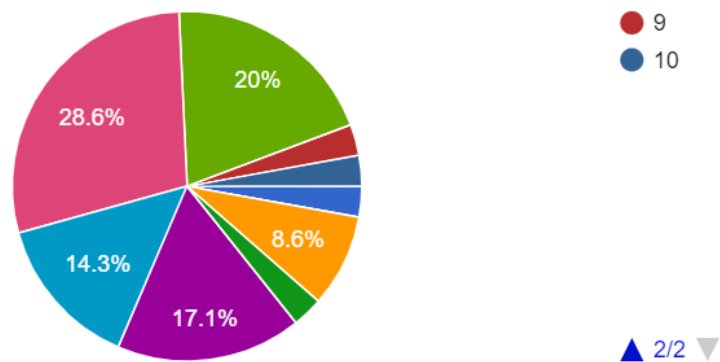


Figure 88 : Response of school administration to question no 20 (2)

This clearly emphasizes on the need for training of teachers.

4.5.5 Broad summary of analysis:

The summary of above analysis with respect to students, parents, teachers and school administration highlighted the following:

- 1) Access to digital device is limited and challenges are also being faced while using online mode of learning.
- 2) Schools are lacking in infrastructure facilities required for online education such as latest platforms, better internet connectivity, smart boards etc.
- 3) All stakeholders *i.e.* students, teachers, parents and school administration are need to be trained/ taught about cyber hygiene/ cyber security.
- 4) Peer learning/ collaborative learning, gamification etc are needs to be embedded in online learning.
- 5) There need to focus on better mode of online assessments and online labs.
- 6) There is a strong need for training of teachers for better pedagogy in digital education and also in the field of cyber hygiene/ cyber security.
- 7) Schools and parents need to ensure that adequate safeguards are inbuilt in the process of online education such as screen guard on desktop/ laptop, comfortable ergonomics etc.
- 8) Parents need to be taught about parental control and adequate utilities to monitor internet uses by their ward.

- 9) To avoid any physical, social damages and mental repercussion of the online learning, there is a need to inculcate better broad based mechanisms.
- 10) There is a need to sensitize the schools, teachers, parents and students regarding the schemes of Government of India such as DIKSHA, NISHTHA, SWAYAM-Prabha, SWAYAM, Radio / community radio and so on.

Chapter -5

Recommendations

In previous chapters, the role of digital education in school education in India, with reference to the National Education Policy (NEP) 2020 and the budget document for 2022-23 has been discussed. The NEP 2020 recognizes the importance of digital technology in education and budget document for 2022-23 also highlights the government's commitment to providing digital infrastructure and content to support the implementation of the same. Digital education has a lot of potential and India has done a remarkable progress in last few years. However, there are some challenges that must be addressed before it can become widespread across all levels of society. While digital education is already prevalent in urban regions, it still has a ways to go in rural areas due to existing obstacles that need to be overcome. Technology evolves fast, and without vision and strategy, the application of technology to deliver productivity would be short-lived. Regular maintenance and up-gradation, improvements need to be in place to even keep the solutions relevant in every changing technology scenario.

5.1 Recommendations

Based on the findings on analysis of questionnaire in Chapter-4, following are the recommendations with reference to employing digital technologies in school education of India:

5.1.1 To address the 'Digital divide': Urban v/s Rural

India has made substantial progress in implementing digital technology in school education. However, there is a significant digital divide between urban and rural areas,

which needs to be addressed to ensure equitable access to digital education. The challenges in rural areas are numerous. Firstly, the lack of digital infrastructure, including high-speed internet connectivity, digital devices, and digital classrooms, makes it difficult to implement digital education in rural schools. Secondly, there is a shortage of trained teachers who can effectively use technology in teaching. Thirdly, many students in rural areas come from economically weaker sections of society and do not have access to digital devices, which further exacerbates the digital divide.

To address these challenges, there is a need for a multi-pronged approach. The first step is to provide digital infrastructure in rural schools. The government may use innovative approaches such as satellite-based internet connectivity and solar-powered digital classrooms to provide access to digital education in remote areas. Additionally, the government may provide digital devices to students from economically weaker sections of society. The second step is to train teachers in rural areas on the effective use of technology in teaching. The government may set up training programs, either online or offline, to equip teachers with the necessary technical and pedagogical skills. The third step is to design digital content and resources that are relevant to the rural context. This includes creating content in regional languages, which is culturally relevant and takes into account the local context.

Finally, there is a need to continuously monitor and evaluate the impact of digital education in rural areas. The government can use data analytics and other tools to monitor the effectiveness of digital education programs and identify areas for improvement.

5.1.2 To address the ‘Digital divide’- access and availability of devices

There is a lack of access and availability to functional ICT infrastructure across stakeholders (teachers, students and school administrators). The availability of devices might have improved during the pandemic with the distribution of tablets/other targeted schemes; however, there is a sizable population of teachers, parents and students who don't have access to devices. With evolving technology, devices often become obsolete if regular maintenance/up-gradation is not taken care of.

To mitigate this digital divide and ensure that all students have access to digital learning tools, there should be a greater focus on manufacturing hardware such as laptops, desktops, and network connections in India. One of the major benefits of manufacturing hardware in India is that it would support the government's 'Make in India' program (*Aatmnirbhar Bharat*), which aims to promote domestic manufacturing and attract foreign investment. This would not only create jobs and boost the economy, but also reduce dependence on imports and make digital devices more affordable and accessible to the masses. Moreover, make in India would also lead to the development of a strong technology ecosystem, with greater collaboration between hardware manufacturers, software developers, and education providers. This would result in the development of more innovative and customized digital learning solutions that are tailored to the needs of Indian students and educators. In addition, that would also ensure that devices are compatible with local languages and regional requirements, which would make them more user-friendly for students and educators.

5.1.3 Shortage of infrastructure at schools

Many schools in India lack the infrastructure facilities required for online education, which can be a significant challenge, particularly in rural and underprivileged areas. However, there are solutions that can be implemented to address this issue. Here are some possible solutions:

1. **Government support:** The government may provide financial assistance to schools to help them upgrade their infrastructure facilities. This can include funding for the purchase of required desktops, laptops, smart boards, and other technology required for online education.
2. **Public-private partnerships:** Public-private partnerships may be formed to provide infrastructure support to schools. Private companies can help schools with the latest platforms, internet connectivity, and other facilities required for online education.
3. **Philanthropy/ Donations from individuals and organizations:** Donations from individuals and organizations can be used to provide schools with the necessary infrastructure facilities for online education. This can be a particularly effective solution for schools in underprivileged areas.
4. **Innovative solutions:** Innovative solutions can also be implemented to address the lack of infrastructure facilities in schools. For example, low-cost tablets or smart phones can be provided to students, which can be used for online learning.

5.1.4 Cyber hygiene/ cyber-security education for all stakeholders

This is also one of the most crucial learning from the analysis of responses done in chapter 4. Cyber-security training is essential for all stakeholders, including students,

teachers, and parents in the context of digital education. In addition to protecting personal data and preventing cyber-bullying, it is also important to educate stakeholders on other online threats such as sex-trafficking, online gambling, and other forms of cybercrime. Here are some reasons why training in cyber-security including sex-trafficking, online gambling, etc. is necessary:

1. Protecting vulnerable individuals: Online sex-trafficking is a growing problem in India. Cyber-security training can help students, teachers, and parents recognize the signs of sex-trafficking and take steps to prevent it. This training can also help vulnerable individuals protect themselves online.
2. Avoiding online gambling: Online gambling is becoming more prevalent in India, particularly among young people. Cyber-security training can help students, teachers, and parents recognize the risks associated with online gambling and take steps to avoid it.
3. Preventing financial fraud: Financial fraud is a significant problem in India, with many scams taking place online. Cyber-security training can help these stakeholders to recognize the signs of financial fraud and take steps to avoid it.
4. Ensuring online safety: In addition to protecting personal data, it is important to ensure that students, teachers, and parents are safe online. Cybersecurity training can teach them how to stay safe online, avoid risky behavior, and report any suspicious activity.
5. Creating a culture of digital responsibility: Cyber-security training can help create a culture of digital responsibility, where all stakeholders are aware of the risks associated with technology and take steps to protect themselves and others.

5.1.5 One Nation One Learning Platform

To ensure successful implementation of digital education in the Indian schooling system, a single platform of ‘One Nation One Learning Platform’ may be designed. A comprehensive platform that integrates all educational activities can be a game changer for Indian education.

1. The platform should be compatible with all available devices and support all major regional languages.
2. Additionally, the platform should be designed with interesting gamification strategies to maximize its usage and must inculcate a user-centric approach and accessibility in mind for CwSN (children with special need) too.
3. Personalization, contextualization, and multilingualism are essential components of such a system. Personalization of content means that every student should be able to learn according to their own pace and learning style. This can be achieved through the use of adaptive learning technology, which uses data analytics to create personalized learning pathways for individual students. The contextualization of learning materials means that students should be able to relate what they are learning to real-world scenarios, thereby promoting greater understanding and application of knowledge. Multilingualism is crucial for a country like India, with its diverse linguistic landscape. The use of technology can enable learning to take place in regional languages, which can be more effective for students who may not be fluent in English or Hindi. A comprehensive platform that integrates all educational

activities can help to ensure that learning can take place anytime and anywhere.

5.1.6 Use of ‘Peer learning’ and ‘Business games for learning’

To defeat digital fatigue, ‘Peer learning’ and ‘Business-games for learning’ are two powerful strategies that must be embedded in online education. Peer learning would help to create an engaging and interactive learning environment, as well as motivate the students to stay engaged with online education and help in knowledge retention. Business games for learning is to provide students with a safe environment to practice their decision-making skills, test their business acumen, and learn from their mistakes without real-world consequences.

5.1.7 Online assessment

Online assessment is a critical component of digital technology implementation in school education. It is essential to have better modes of online assessment that can ensure accurate, reliable, and fair evaluation of students' learning outcomes. Here are some ways to improve online assessment in school education in India:

1. Use a variety of assessment modes: Schools can use a variety of assessment modes such as objective tests, subjective tests, quizzes, assignments, projects, and online discussions. This can help evaluate different aspects of students' learning outcomes and ensure a fair and comprehensive assessment.
2. Develop standardized tests: Standardized tests can help ensure that students are evaluated fairly and consistently. Schools can develop standardized tests that are aligned with the learning objectives and curriculum standards.

3. Use assessment tools: There are several assessment tools available that can help automate the process of evaluation and provide immediate feedback to students. These tools can also help reduce the workload of teachers and improve the efficiency of assessment.
4. Provide clear instructions: It is essential to provide clear instructions to students before the assessment. The instructions should include the format of the assessment, the time limit, the mode of submission, and the evaluation criteria.
5. Ensure security: Online assessment raises concerns about security and cheating. Schools can ensure the security of online assessment by using proctoring tools, plagiarism detection tools, and monitoring tools.
6. Provide feedback: Providing feedback is an essential aspect of the assessment process. Schools can provide timely and constructive feedback to students to help them understand their strengths and weaknesses and improve their learning outcomes.
7. A flexible regime of assessments that allows the learner to earn credits through various activities, not necessarily undertaken in the school, should be in place. Learners should be able to attain a certain level of understanding/cognition early in multiple areas based on their multiple experiences in and outside schools and the school education system should be able to undertake scientific/flexible assessment to certify these learning's.

5.1.8 Online labs

Online labs can be an effective way to provide students with hands-on learning experiences in a virtual environment. However, for online labs to be successful in India,

they need to be interesting and engaging for students. Here are some ways to make online labs more interesting:

1. **Interactive simulations:** Interactive simulations can be used to provide students with virtual lab experiences that are engaging and interactive. Simulations can allow students to explore concepts and theories in a safe and controlled environment, making learning more interesting and fun.
2. **Augmented reality:** Augmented reality technology can be used to provide students with a more immersive lab experience. Students can use their smartphones or tablets to scan images in their textbooks, which will then show them 3D models of the concepts they are learning about.
3. **Gamification:** Online labs can be gamified to make them more interesting for students. For example, students can earn points, badges, or rewards for completing lab activities. This can help motivate students and make learning more engaging.
4. **Real-time data:** Real-time data can be used to provide students with up-to-date information about the experiments they are conducting. This can help students see the immediate impact of their actions, making the lab experience more interesting and meaningful.
5. **Peer/ collaborative learning:** Online labs can be designed to promote collaborative learning, which can make the experience more interesting and engaging for students. For example, students can work in teams to conduct experiments, share their results, and discuss their findings.

6. Personalized learning: Online labs can be personalized to meet the needs and interests of individual students. For example, students can be given the option to choose the lab activities they want to complete, or they can be provided with additional resources based on their learning style and preferences.

5.1.9 Strong need for training for teachers:

India has a massive workforce of over 95 lakh teachers in the school education system, and training them is a critical aspect of implementing digital education effectively. The full potential of digital technology can only be realized if teachers have the necessary skills to use it effectively. Teachers need to be trained on how to incorporate digital technology into their lesson plans, how to use online tools and resources, and how to assess students' digital skills. However, many teachers lack the necessary skills and knowledge to effectively incorporate digital technology into their teaching practices.

Therefore, it is essential to prioritize the training of teachers to ensure the successful implementation of digital technology in school education. This can lead to a more engaging and effective learning experience for students and teachers can leverage the full potential of digital technology to enhance their teaching practices.

To ensure that all teachers, regardless of demography, are properly trained, there is a need for an innovative training model that leverages technology. Online courses for teachers can play a significant role in training teachers effectively. These courses can be designed to cover various topics, such as digital pedagogy, using technology in the classroom, and cyber security. These courses should be available in all major regional languages to ensure that they are accessible to teachers from all regions.

To ensure that the training has a network effect and reaches as many teachers as possible, there is a need for a platform that can connect teachers with trainers and mentors. This platform can be designed as a social learning platform, where teachers can collaborate with each other, share resources, and learn from each other's experiences. The platform can also feature gamification elements to make the learning experience more engaging and fun. To ensure that the training is effective, it is essential to provide teachers with access to high-quality content and resources. This content should be designed by experts and should be regularly updated to ensure that it is relevant and up-to-date. The training should also be designed to provide teachers with hands-on experience, with opportunities to practice using technology in the classroom.

Another critical aspect of training teachers is ensuring that they have access to the necessary technology and infrastructure. This includes providing them with devices such as laptops or tablets and ensuring that they have access to high-speed internet connectivity.

5.1.10 Necessary safeguards to protect students' physical and mental health

It is essential to ensure that adequate safeguards are in place to protect students' physical and mental health during long hours of online learning. Both schools and parents have a responsibility to ensure that the necessary measures are taken to prevent any physical or psychological harm to students. Here are some measures that schools and parents can take to ensure that online education is safe and comfortable for students:

1. Screen guard on desktop/laptop: Prolonged exposure to the glare of computer screens can cause eye strain, headaches, and other health problems. Using a

screen guard can help reduce the glare and protect students' eyes from harmful blue light.

2. **Comfortable ergonomics:** Sitting in front of a computer for long hours can lead to poor posture, back pain, and other musculoskeletal disorders. It is essential to ensure that students have comfortable ergonomics, such as proper desk height, chair support, and footrest. They should take breaks in between and move around.
3. **Limit screen time:** Limiting screen time can help reduce the risk of digital eye strain, improve sleep quality, and promote overall health and wellbeing. Schools and parents should encourage students to take regular breaks and engage in physical activities or relaxation techniques to reduce stress.
4. **Monitor online activity:** Parents should monitor their children's online activity to ensure that they are not accessing inappropriate content or engaging in risky online behavior. Schools should also have monitoring systems in place to prevent cyberbullying, harassment, or other forms of online abuse.
5. **Provide emotional support:** Online education can be stressful for students, particularly those who may be struggling with the transition to online learning. Schools and parents should provide emotional support to students by creating a supportive environment, encouraging communication, and providing access to counseling or mental health services.

5.1.11 Sensitization regarding various schemes of Government of India

The Government of India has launched several schemes to promote digital education in the country, such as DIKSHA, NISHTHA, SWAYAM-Prabha, SWAYAM, Radio/Community Radio, e-Pathshala, and many more. Sensitizing schools, teachers,

parents, and students about these schemes is crucial to ensuring their successful implementation. Here are some ways to do this:

1. Awareness campaigns: Schools, teachers, parents, and students can be sensitized about the government schemes through awareness campaigns. These campaigns can be conducted through social media, email, messaging apps, and other digital channels. Schools can also organize seminars, webinars, and workshops to educate their staff and students about the government schemes.
2. Training programs: Training programs can be conducted for teachers to help them understand how to use the various digital tools provided by the government schemes. These training programs can be conducted online or offline and can be organized by the schools or by the government.
3. Collaborations: Schools can collaborate with the government, NGOs, and other organizations to promote the use of government schemes in education. For example, schools can partner with NGOs to organize digital literacy programs for parents and students.
4. Information dissemination: Schools can disseminate information about the government schemes to parents and students through their websites, newsletters, and other communication channels. They can also provide access to digital resources such as e-books, videos, and interactive learning tools.

5.2 Education @ 2047

We are celebrating '*Azadi ka Amrit Mahotsav*' to commemorate 75 years of independence and next 25 years are marked as '*Amrit Kaal*', which represents a significant milestone in India's journey towards progress and development. One of the

main objectives of the *Amrit Kaal* is to accelerate India's progress towards becoming a developed nation. This includes improving the country's infrastructure, boosting economic growth, and promoting social and cultural development. As such, the future education system in India also needs to be designed to meet the needs of a rapidly changing world. There should be a real equity across all socio- economic divides; all children above three years of age should be in schools, availability and accessibility of quality education resources for all to be ensured and so on. All efforts are to be taken to make our education system amongst the best in the world. In the year 2047, India will celebrate its 100 years of independence and all the sectors, particularly education should strive to make India a global knowledge superpower and to restore India's glory as a great centre of learning.

References

1. 345th report of the Standing Committee on Education, Women, Children, Youth, and Sports available at https://rajyasabha.nic.in/rsnew/Committee_site/Committee_File/ReportFile/16/167/345_2022_12_15.pdf accessed on 05.03.2023
2. COL (2020). Keeping the Doors of Learning Open COVID19. Available at <https://www.col.org/resources/keeping-doors-learningopen-covid-19>. Accessed on 09.09.2022.
3. DIKSHA platform of Ministry of Education, Government of India available at <https://diksha.gov.in/about/>. Accessed on 15.02.2023
4. Damarin, Suzanne K. (2000). The 'Digital Divide' Versus Digital Differences: Principles for Equitable Use of Technology in education. Available at <https://www.jstor.org/stable/44428620>. Accessed on 08.09.2022.
5. Damon, W. (1984). Peer education: The untapped potential. *Journal of applied developmental psychology*, 5(4), 331-343.
6. Devi, S., Rizwaan, M., & Chander, S. (2012). ICT for Quality of Education in India. *International Journal of Physical and Social Sciences*, 2(6), 542-554.
7. *E-Pathshala* initiative of Ministry of Education, Government of India available on <https://epathshala.nic.in/>. Accessed on 20.02.2023
8. Gond, R., & Gupta, R. (2017). A study on digital education in India: scope and challenges of an indian society. *Anveshana's international journal of research in regional studies, law. Soc Sc J Manag Prac*, 2(3), 12-18.

9. Henriksen, D., Mishra, P., and Fisser, P. (2016). Infusing creativity and technology in 21st century education: A systemic view for change. *Journal of Educational Technology and Society*, 19(3), 27-37. Available at <https://www.jstor.org/stable/10.2307/jeductechsoci.19.3.27> Accessed on 08.09.2022
10. Ketels, Christian & Porter, Michael. (2022). *Competitiveness Roadmap for India@100*.
11. Key aspects of Union Budget, 2022-23 available at <https://www.india.gov.in/spotlight/union-budget-fy-2022-2023#:~:text=The%20Union%20Budget%20for%20FY,Energy%20Transition%2C%20and%20Climate%20Action>. Accessed on 06.09.2022
12. Kirkwood, A., and Price, L. (2014). Technology-enhanced learning and teaching in higher education: what is ‘enhanced ‘and how do we know? A critical literature review. *Learning, media and technology*, 39(1), 6-36. Accessed on 10.09.2022
13. Kulkarni, S. (2019). Future Perspective of Digital Education in India. Available at <https://www.asmaindia.in/blog/future-perspective-of-digital-education-in-india/> Accessed on 08.09.2022
14. Kumar, S. (2020). Digital Education - The Future of Education in India. Available at <https://www.coherentmarketinsights.com/blog/the-future-of-education-in-india-digital-education-118> Accessed on 08.09.2022
15. Kundu, A. (2018). Blended learning in Indian elementary education: Problems and prospects. *Journal of Online Learning Research*, 4(2), 199-227.

16. Laal, M., & Ghodsi, S. M. (2012). Benefits of collaborative learning. *Procedia-social and behavioral sciences*, 31, 486-490.
17. Lim, C. P., Zhao, Y., Tondeur, J., Chai, C. S., and Tsai, C. C. (2013). Bridging the gap: Technology trends and use of technology in schools. *Journal of Educational Technology and Society*, 16(2), 59-68. Available at <https://www.jstor.org/stable/10.2307/jeductechsoci.16.2.59>. Accessed on 08.09.2022
18. Misra, P. K. (2021). Multilingualism aspect of National Education Policy 2020: Implementation challenges in schools and way forward to post National Education Policy (Doctoral dissertation, IIPA, New Delhi).
19. Mulhayatiah Diah, Purwanti, Setya Winda, Suhendi Herni Yuniarti, Kariadinata Rahayu , Hartini Sri (2019). Available at <https://pdfs.semanticscholar.org/79ea/12e819b9065ae266e93818009f8359457787> .pdf accessed on 16.09.2022
20. National Education Policy, 2020. Ministry of Education (erstwhile Ministry of Human Resource Management), Government of India. Available at https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf Accessed on 04.09.2022
21. NDEAR initiative of Ministry of Education, Govt of India, available on <https://www.ndear.gov.in/about-ndear.html>. Accessed on 20.02.2023.
22. Nicholas, Mark (2003). A theory for eLearning Available at <https://www.jstor.org/stable/10.2307/jeductechsoci.6.2.1>. Accessed on 08.09.2022

23. NISHTHA initiative of Ministry of Education, Govt of India, available on <https://itpd.ncert.gov.in/>. Accessed on 20.02.2023
24. Ozerbas and Erdogan (2016) .The Effect of the Digital Classroom on Academic Success and Online Technologies Self Efficacy. Available at <https://www.jstor.org/stable/10.2307/jeductechsoci.19.4.203>. Accessed on 08.09.2022
25. Patra, J. N., & Mete, J. (2014). The Role of ICT in improving the Quality of School Education in India. International Educational E-Journal, 3(2), 2277-2456.
26. Pendor, S. M. (2022). NEP 2020 Use of Technology in Education. Sumedha Journal of Management, 11(3), 75-79.
27. Rajput Diksha (2020). Using ICT to Cope With the Impact of COVID-19: Response of the Educational Sector. University News,A weekly Journal of Higher Education. Vol. 58, No.51, December, 21-27, 2020.
28. Raymond, A., Jacob, E., Jacob, D., & Lyons, J. (2016). Peer learning a pedagogical approach to enhance online learning: A qualitative exploration. Nurse education today, 44, 165-169.
29. Reimers, F.M., and Schleicher, A. (2020). Schooling disrupted, schooling rethought, How the COVID-19 pandemic is changing education OECD. https://read.oecd-ilibrary.org/view/?ref=133_133390-1rtuknc0hiandtitle=Schoolingdisruptedschooling-rethought-How-the-Covid-19-pandemic-is-changing-education. Accessed on 09.09.2022

30. Report of Unified District Information System for Education (UDISE) for year 2018-19, 2019-20 and 2021-22 available on website <https://udiseplus.gov.in/#/page/publications>. Accessed on 07.03.2023.
31. Speedtest global index by Ookla available at <https://www.thehindu.com/sci-tech/technology/indias-mobile-downloading-speed-increases-while-broadband-dips/article66423558.ece>. Accessed on 05.03.2023
32. SWAYAM initiative of Ministry of Education, Govt of India available on <https://swayam.gov.in/>. Accessed on 20.02.2023
33. SWAYAM-Prabha initiative of Ministry of Education, Govt of India available on <https://www.swayamprabha.gov.in/>. Accessed on 20.02.2023
34. The Standing Committee on Education, Women, Children, Youth, and Sports report on 'Plans for Bridging the Learning Gap caused due to School Lockdown as well as Review of online and offline Instructions and Examinations and Plans for re-opening of Schools' submitted on August 6, 2021: https://prsindia.org/files/policy/policy_committee_reports/Report%20summary_COVID%20Education.pdf accessed on 06.03.2023
35. The Standing Committee on Education, Women, Children, Youth, and Sports report on the Reforms in Content and Design of School Text Books submitted on November 30, 2021: https://prsindia.org/files/policy/policy_committee_reports/Reforms%20in%20Content%20and%20Design%20of%20School%20Text%20Books_SCR_Summary_Final.pdf accessed on 04.03.2023

36. *Vidya Sameeksha Kendra* initiative of Ministry of Education, Govt of India, available on <https://www.ndear.gov.in/vidya-sameeksha-kendra.html>. Accessed on 25.02.2023
37. Yadav, R. N. (2022). The Impact of on Well-being of Students During COVID-19 Pandemic (Doctoral dissertation, Indian Institute of Public Administration, New Delhi).
38. World Economic Forum (2020). The COVID-19 pandemic has changed education forever. This is how. Available at <https://www.weforum.org/agenda/2020/04/coronavirus-educationglobal-covid19-online-digital-learning> Accessed on 09.09.2022.

Dear Student,

Greetings of New Year 2023!

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I, therefore, request your cooperation and participation in responding questionnaire. The questionnaire will take about 10 minutes to respond.

Yours Sincerely

Prashant Agarwal

Roll NO: 4801

Email: prashant.ag@gov.in

Mob: 9971791451

Part- I (Information about student)

Q.1 Name:

Q.2 Gender: Male Female Transgender

Q.3 Age (in years): Less than 8 8-12 12-16 above 16

Q.4 In which class you are studying:

Q.5 Medium of school: English/ Hindi/ Other (Please specify)

Q.6 Any other information, you would like to add.

Part- II

1. Do you have access to a device while learning online?
 - a) No
 - b) Sometimes
 - c) Always
2. Were there any challenges faced while using online education mode of learning?
 - a) Yes, always
 - b) Yes, Sometimes
 - c) No
3. How many hours do you spend each day on average to learn online?
 - a) 0-3 hours
 - b) 3-6 hours
 - c) More than 6 hours

4. How effective has online learning been for you?
 - a) Not effective
 - b) Slightly effective
 - c) Very effective
5. How helpful is your school in offering you the resources to learn from home?
 - a) Not helpful
 - b) Slightly helpful
 - c) Very helpful
6. How helpful are your teachers while studying online?
 - a) Not helpful
 - b) Slightly helpful
 - c) Very helpful
7. Do you use the DIKSHA (Digital Infrastructure for Knowledge Sharing) platform of Ministry of Education for learning?
 - a) No
 - b) Sometimes
 - c) Frequently
8. Do you have access to seamless internet connectivity for learning?
 - a) No
 - b) Sometimes only
 - c) Always
9. Do you follow peer-learning for online classes?
 - a) No
 - b) Sometimes only
 - c) Always
10. Are you being taught about sex-trafficking, online gambling, cyber-safety etc
 - a) No
 - b) Yes, but not sufficient

- c) Yes, sufficiently
11. What's the most preferred mode of online classes provided in your school?
- a) Live lectures
 - b) Pre-recorded lectures
 - c) Other source materials
12. Do you lose your time of play due to online learning?
- a) Yes, very much
 - b) Yes, slightly
 - c) No
13. Have you experienced any stress/health concerns during online learning?
- a) Yes, very much
 - b) Yes, slightly
 - c) No
14. Could you cope up with the concepts during online learning?
- a) No
 - b) Yes, but not sufficiently
 - c) Yes, very much
15. Mark your response for the most appropriate category according to you:
- a) Online Learning provides multitude of learning opportunities at comfort
 - b) Though it offers learning at comfort, it got health and mental concerns
 - c) Online Learning must be offered ensuring comfort, limited screen exposures, cybersafe platform, enriching and informative crisp content etc
16. How can online learning be improved?
- a) Focusing on content
 - b) Focusing on delivery of lesson
 - c) Focusing on health, mental and cyber concerns
 - d) All the above
 - e) None, it's good to go

17. Do you prefer online assessments/online lab etc over regular?
 - a) No
 - b) Yes, sometimes
 - c) Yes, Always
18. On a scale of 1 to 10 rate your overall remote learning experience? (1 being worst and 10 being best)
19. Rate online vs regular learning on a scale of 10 in achieving the learning outcomes. (1 being worst and 10 being best)
20. Rate your teacher's lesson delivery Online. (on a scale of 10, 1 being worst and 10 being best)
21. Any other comment that you would like to add?

Ma'am/ Sir,

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Yours Sincerely

Prashant Agarwal
Roll NO: 4801
Email: prashant.ag@gov.in
Mob: 9971791451

Part- I (Information about parents)

Q.1 Name:

Q.2 Gender: Male Female Transgender

Q.3 Age (in years): Less than 25 25-35 35-50 above 50

Q.4 Qualification: Less than Graduate Graduate Post Graduate Above Post Graduate

Q.5 Email:

Q.6: Location of residence: Rural Urban

Q.7: Type of Employment: Govt. Private Business

Q.8: Annual Income (In Lakhs): Less than 2 2-4 4-8 More

Q.9: Grade in which your child is studying:

Q.10: Does/ did your child study in private school: Yes/ No

Q.11: Any other detail, you would like to add

Part- II

1. Are there any actions taken to control concerns around increased device usage/ screen time?

- a) No
- b) Yes, but not sufficient

- c) Yes
2. Does your child have their own laptop, tablet, computer etc for online learning?
- a) No
 - b) Yes
3. Do you have access to seamless internet connectivity ideal for learning?
- a) No
 - b) Yes, Sometimes
 - c) Yes, Always
4. How can technology and learning be improved?
- a) Through quality contents
 - b) Through more adaptive platform
 - c) Through formative assessments and feedback
 - d) All the above
5. Has your child's school helped you in providing adequate digital resources?
- a) No
 - b) Yes, but not sufficient
 - c) Yes, sufficiently
6. Do you keep a proper check on your child's activity on the internet?
- a) No
 - b) Yes, but not always
 - c) Yes, always
7. What is the suitable mode of learning according to you?
- a) Online
 - b) Blended
 - c) Regular (Physical)
8. Has your child's school worked on bridging the digital divide in education?
- a) No

- b) Yes, but not sufficient
 - c) Yes, very much
9. Do you guide your child on appropriate usage of the internet and technology?
- a) No
 - b) Yes, Sometimes
 - c) Yes, always
10. Has your child experienced any stress/ health concerns during online learning?
- a) Yes
 - b) Yes, sometimes
 - c) Yes, always
11. How frequently do you assist your child with their schoolwork?
- a) Always
 - b) Sometimes
 - c) Never
12. How happy are you with the apps/platforms used for distance learning?
- a) Very happy
 - b) Slightly Happy
 - c) Not happy
13. Do you feel communication is smooth between students and teachers during online learning?
- a) No
 - b) Yes, but not sufficient
 - c) Yes, very much
14. Are you confident your child will make adequate academic progress through remote learning?
- a) No
 - b) Yes, but not to the expectations
 - c) Yes, definitely

15. What advice would you give the teachers to improve student engagement?
 - a) Animated Content Delivery
 - b) Use Realistic teaching aids
 - c) Experiential Learning
16. Do you think that your child's physical activity has reduced due to increased use of technology in education?
 - a) Yes, to a great extent
 - b) A little bit
 - c) No
17. Does your child's school keep you updated about your child's progress?
 - a) Yes, always
 - b) Sometimes only
 - c) No
18. Does the school have sufficient channels, such as Parents' Day, the school website, school post box, etc., for you to express your views to the school?
 - a) Yes, sufficient
 - b) Yes, but improvement is required
 - c) No
19. When working on school activities using the internet and technology, does your child get distracted?
 - a) Yes, always
 - b) Yes, sometimes
 - c) No
20. Do you have knowledge about sex-trafficking, online gambling, cyber-safety etc?
 - a) No
 - b) A little bit
 - c) Yes
21. Any other comment that you would like to add?

Ma'am/ Sir,

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Yours Sincerely

Prashant Agarwal
Roll NO: 4801
Email: prashant.ag@gov.in
Mob: 9971791451

Part- I (Information about teacher)

Q.1 Name:

Q.2 Gender: Male Female Transgender

Q.3 Age (in years): Less than 25 25-35 35-50 above 50

Q.4 Designation:

Q.5 Email:

Q.6 Type of school you are teaching in: Government/ Private/ Others

Q.7: Your experience in field of Education as a teacher (In years):

Q.8: Any other information you would like to give:

Part- II

1. Do you have access to a device while teaching online?

- a) No
- b) Yes, sometimes
- c) Yes, always

2. Were there any challenges faced while using online education mode of teaching?

- a) Yes, always
- b) Sometimes
- c) No

3. How helpful is your school in offering you the resources to learn from home?
 - a) Not helpful
 - b) Slightly helpful
 - c) Very helpful
4. How helpful have parents been while supporting their children's remote learning?
 - a) Not helpful
 - b) Slightly helpful
 - c) Very helpful
5. Is there any provision of training for using online education mode of teaching?
 - a) Yes, very effective
 - b) Yes, but less effective
 - c) No
6. How much percentage of children are actively engaged in online classes daily?
 - a) 0-30%
 - b) 30-60%
 - c) 60-90%
 - d) More than 90%
7. How many hours do you spend each day on average to teach online?
 - a) 0-3 hours
 - b) 3-6 hours
 - c) More than 6 hours
8. Are there any courses provided by school to upgrade teaching skills?
 - a) No
 - b) Yes, but not sufficient
 - c) Yes
9. Are you using the DIKSHA platform for teaching?
 - a) No

- b) Yes, sometimes
 - c) Yes, always
10. Whether the NISHTHA (National Initiative for School Heads and Teachers Holistic Advancement) training modules are helpful professionally?
- a) No
 - b) Yes, slightly
 - c) Yes, very much useful
11. Is there any improvement required in online training modules?
- a) Yes, very much
 - b) Yes, Slightly
 - c) No, it's perfect
12. Have you attended trainings on sex-trafficking, online gambling, cyber-safety etc
- a) Never
 - b) Yes, but not sufficient
 - c) Yes
13. What's the suitable mode of teaching according to you?
- a) Online
 - b) Blended
 - c) Regular (Physical)
14. Do you know about digital libraries?
- a) No
 - b) A little bit
 - c) Yes
15. Whether the personal concerns of children are addressed and guided by you?
- a) No
 - b) To some extent
 - c) Yes, always
16. How can tech learning and training be improved?

- a) Through quality contents
 - b) Through more adaptive platform
 - c) Through formative assessments and feedback
 - d) All the above
17. How much are students coping in achieving the learning outcomes via digital mode?
- a) Less than 25%
 - b) 25% -50%
 - c) Above 50%
18. How do you guide children who misbehave/make nuisance in online classes?
- a) Punishments
 - b) Advice and Guidance
 - c) Moral Lesson
19. On a scale of 1 to 10 (1 being worst and 10 being best) rate your overall remote/online teaching experience?
20. Online assessments/Online Laboratory - How trained are you (on scale of 10, 1 being worst and 10 being best)
21. Any other comment that you would like to add?

Annexure- IV: Questionnaire for school administration

Ma'am/ Sir,

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Yours Sincerely

Prashant Agarwal
Roll NO: 4801
Email: prashant.ag@gov.in
Mob: 9971791451

Part- I (About respondent)

Q.1 Name:

Q.2 Gender: Male Female Transgender

Q.3 Age (in years): Less than 25 25-35 35-50 above 50

Q.4 Designation:

Q.5 Email:

Q.6 Type of school: Govt/ Private/ others

Q.7: Your experience in field of Education as a teacher/ Principal (In years):

Q.8: Any other detail, you would like to add

Part-II

1. Do all your students have access to a digital device while learning online?

- a) Yes, all
- b) Yes, but not all
- c) No

2. Were there any challenges faced while using online education mode of learning?

- a) Yes, always
- b) Yes, sometimes

- c) Never
3. Does your school offer resources to students to learn from home?
- a) Yes, sometimes
 - b) Yes, always
 - c) No
4. Does your school educate the students about sex-trafficking, online gambling, cyber-safety etc
- a) Yes, sufficiently
 - b) Yes, but improvement is required
 - c) No
5. Has the school taken any steps to bridge the digital divide?
- a) Yes, but not sufficient
 - b) Yes, sufficiently
 - c) No
6. What's the mode of online classes?
- a) Live lectures
 - b) Pre-recorded lectures
 - c) Other source materials
7. Are there any steps that have been taken to improve the online learning experience for students and parents?
- a) Yes, sufficiently
 - b) Yes, but more efforts are required
 - c) No
8. Do you provide any training to teachers for using online education mode of teaching?
- a) Yes, sufficiently
 - b) Yes, but more efforts are required
 - c) No
9. Does your school provide any courses to teachers for upgrading their teaching skills?

- a) Yes, sufficiently
 - b) Yes, but more efforts are required
 - c) No
10. Does your school keep the parents updated about their child's progress?
- a) Yes, sufficiently
 - b) Yes, but more efforts are required
 - c) No
11. Does the school have sufficient channels, such as Parents' Day, the school website, school post box, etc., for parents to express their views to the school?
- a) Yes, sufficiently
 - b) Yes, but more efforts are required
 - c) No
12. Does your school provide adequate extracurricular activities for overall growth and development of children?
- a) Yes, sufficiently
 - b) Yes, but more efforts are required
 - c) No
13. How much percentage of classrooms are equipped with smart boards?
- a) 0-30%
 - b) 30-60%
 - c) 60-90%
 - d) More than 90%
14. Any support extended to EWS/CwSN through school funds?
- a) Yes
 - b) No
15. Are the government's teacher training modules effective?
- a) Yes, sufficiently
 - b) Yes, but more efforts are required

- c) No
16. Whether the school has Atal tinkering Lab facility?
- a) Yes
 - b) No
17. How good are the infrastructure and the essential facilities of school?
- a) Very good
 - b) Moderately good
 - c) Not good
18. Do you support the matters/decisions concerning curriculum/infra/online learning etc taken by policy makers?
- a) Yes, sufficient efforts are being taken
 - b) Yes, but more efforts are required
 - c) No
19. Rate online vs regular learning (on a scale of 10, 1 being worst and 10 being best) in achieving the learning outcomes
20. Rate the efficiency of teachers in your school in view of knowledge/skill/class management (on 10, 1 being worst and 10 being best)
21. Any other comment that you would like to add?