

# NATIONAL EDUCATION POLICY 2020: CHALLENGES FOR CHEMISTRY TEACHERS AND CHEMICAL EDUCATION IN RURAL AREAS

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## Abstract:

*Education is important for the rural development. National Education Policy 2020 is big footstep of changes in rural educational System. The problems faced by rural India in achieving the education are less number of schools and resources, less availability of teachers, religious and societal norms, the large distance between the school and home, lack of awareness of education. The way to improve the present scenario of education in rural India is the construction of schools in every village, providing proper and adequate infrastructure and other resources, using modern technologies in education, creating awareness about the importance of education and rights. As far as chemistry is concerned, only theoretical knowledge is never going to be enough. Hands-on experiments are integral parts of chemistry, and this poses even more severe challenges. How efficiently and effectively National Education Policy 2020 gets implemented in rural areas with federal and state governments working together will determine the future of Chemical Education in rural development. If the quality along with number of chemistry teachers and, that too committed teacher can be improved in these schools and colleges, then aspiring rural children and India can fulfill their dreams of doing something great.*

**Keywords:** NEP 2020, Rural Areas, Chemistry Teacher, challenges

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## Introduction:

To fulfil the aspirations of the nation, education is one of the most important areas that need to be given priority. A good education is a foundation for a better future. The government aims to make education accessible to all children by 2022 and ensure that no child is left behind. For the large majority of the population living in rural areas, education is highly dependent on government-run or aided schools and non-governmental organizations. But rural areas still face various barriers that directly impact the country's literacy rate. The literacy rate in India is 77.7%. However, the literacy rate of urban region in India is 87.7% whereas in rural India it is only 73.5%. There are many reasons behind the difference between these two. India has one of the densest rural populations in the world, living in the 600,000 villages scattered throughout the country. The huge density of rural population exerts human pressure on the natural resources and adversely affects the quality of life. Though



India is considered an emerging economic power, in reality life remains largely rooted in villages.

A majority of the rural population in India lives on agriculture and related activities. Throughout India the rural population has lower education levels, higher poverty, higher mortality and higher fertility<sup>1</sup>. Nearly 65.53% population of India resides in a rural area. India is relatively young as a nation with around 28 million youth population being added every year. More than 50 per cent of its population is below the age of 25 and more than 65 per cent are aged below 35. In 2020, the average age of an Indian is expected to be 29 years, while it will be 37 for China and 48 for Japan. However, India's high youth population will not be of help to the economy if universal education is not achieved all over India<sup>2</sup>. The main problem India now faces is that all the pedagogical innovations are fit to improve the quality of urban education while the rural learners and their education remain largely neglected.

The Rural development generally refers to the process of improving the quality of life and economic welfare of people living in relatively isolated and sparsely populated areas. India is emerging as a major power economy and our cities and urban centers are beginning to display marks of affluence. Unfortunately our development is uneven. The rural vicinities are not able to march in tandem with urban India. The benefits of economic growth are not percolating to more than two-thirds of the people. The vital sectors such as agriculture, infrastructure development, and community and social services, and in rural development as a whole, our performance is not appreciable<sup>3</sup>. There is a wide gap between urban and rural education system.

Rural students have capacity to recognize and think out of the box. What they need is proper guidance. A teacher, together with a united set of books, is the knowledge base, which anchors the education process. The teacher is the active agent, communicating information to the rural students, who are the passive receptors of information. Learning by memorization is the method most preferred because the information transmitted is largely disjointed and the rural student is not really quite sure what the motivation behind knowing all those disparate facts. Teachers in all locations are one of the most important factors in students learning, rural teachers often have a more unique and powerful impact on student's lives. Rural teachers can facilitate close-knit connections that can enhance learning in the classroom and continue beyond the school day<sup>4</sup>.

Chemistry as one of the science subjects is basic for understanding the complexities of modern technology and essential for technological advancement of a nation. Chemistry is one of the pre-requisite subjects for the study of engineering technological, medical and other applied science courses, in the University. Chemistry provides training for a vast range of carriers where it is either employed directly or where the skills developed can be applied in innovative ways in other fields. Despite its importance, Chemistry remains the least favored science subject among rural students, generally only a few rural students choose to study Chemistry at higher degree. Chemistry as a course of study is perceived to be experimental; the understanding of practical aspect may help rural students to learn Chemistry concepts. The New Education Policy 2020 is a crucial milestone for the growth of teacher education in India. In this article, we have looked into the challenges for chemistry teacher in



rural region and role of Indian Education Policy 2020 for rural chemical education.

## **1. Teachers and Teacher Education in National Education Policy 2020:**

According to the National Education Policy 2020, teacher must be at the center of the fundamental reforms in the education system. Teacher education is vital in creating a pool of school teachers that will shape the next generation. The new education policy must help re-establish teachers, at all levels, as the most respected and essential members of our society, because they truly shape our next generation of citizens. It must do everything to empower teachers and help them to do their job as effectively as possible. The new education policy must help recruit the very best and brightest to enter the teaching profession at all levels, by ensuring livelihood, respect, dignity, and autonomy, while also instilling in the system basic methods of quality control and accountability. The motivation and empowerment of teachers is required to ensure the best possible future for our children and our nation. Following are the important recommendations of NEP 2020 regarding teachers and teacher education.

- (a) To ensure that outstanding students enter the teaching profession - especially from rural areas - a large number of merit-based scholarships shall be instituted across the country for studying quality 4- year integrated B.Ed. programmes.
- (b) In rural areas, special merit-based scholarships will be established that also include preferential employment in their local areas upon successful completion of their B.Ed. programmes.
- (c) Incentives will be provided for teachers to take up teaching jobs in rural areas, especially in areas that are currently facing acute shortage of quality teachers. A key incentive for teaching in rural schools will be the provision of local housing near or on the school premises or increased housing allowances.
- (d) 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.
- (e) Teachers at very small schools will not remain isolated any longer and may become part of and work with larger school complex communities, sharing best practices with each other and working collaboratively to ensure that all children are learning.
- (f) Teachers will be given more autonomy in choosing aspects of pedagogy, so that they may teach in the manner they find most effective for the students in their classrooms.
- (g) By 2030, only educationally sound, multidisciplinary, and integrated teacher education programmes shall be in force. As teacher education requires multidisciplinary inputs, and education in high-quality content as well as pedagogy, all teacher education programmes must be conducted within composite multidisciplinary institutions. To this end, all multidisciplinary universities and colleges - will aim to establish, education departments which, besides carrying out cutting-edge research in various aspects of education, will also run B.Ed. programmes, in collaboration with other departments such as psychology, philosophy, sociology, neuroscience, Indian languages, arts, music, history, literature, physical education, science and mathematics. Moreover, all stand-alone teacher education institutions will be required to convert to multidisciplinary institutions by



2030, since they will have to offer the 4-year integrated teacher preparation programme<sup>5</sup>.

## **2. Importance of Education in Rural Areas:**

It is important to understand the need for good quality education in rural areas, as it helps keep rural areas populated. Young people move to urban areas for better opportunities in education and employment, improved rural education is one possible strategy for keeping them in rural areas. Education of the rural youth directly leads to employment. Employed youth earn a decent living thus eliminating poverty. An education system in rural communities has the opportunity to build capacity and knowledge in the rural populace, helping them to make informed decisions about their farms and to innovate in agricultural affairs. Good education of the youth in rural, as well as urban areas decreases the possibility of picking up immoral values and habits. Educations develop skills, knowledge, values and moral habits. Education plays a critical role in rural development, as it is a key factor in developing the people of the rural area, the community, and the land itself. The foundation to turn India into a strong nation has to be laid down at primary and rural levels and so the quality of education right from the beginning should be excellent. Majority of people living in villages have understood the importance of education and know that it is the only way to get rid of poverty<sup>6</sup>.

## **3. Challenges for Chemistry Teachers and Chemical Education in Rural Areas:**

Even after taking several steps to anticipate educational losses, many technical and situational crises ascended that did not allow the provisions made to work effortlessly and proficiently in imparting chemical education in rural areas. Some of the major challenges for chemistry teachers in rural areas are as follows:

### **3.1. Lack of Availability of Resources:**

Teaching is faced with many challenges; the most concern is the teacher in rurally located communities where there are limited resources for both the student-teachers as well as schools and colleges. There is also a lack of infrastructure in the schools situated in rural areas—no availability of benches, playgrounds, Chemical laboratories, washrooms or if present they are in the worst condition. In India, the school or college in rural areas have only one or two chemistry teachers. Sometimes the chemistry textbooks are not available in proper quantity, or if available they are not in good condition. Also, the availability of stationery is also a challenge. Many rural Indians do not have enough money to bear stationary charges and other expenses. There is less transportation availability for teachers as there is poor connectivity from one place to another place. A large number of rural institutions lack the proper chemical laboratory equipment such as beaker, Erlenmeyer flask, volumetric flask, graduated cylinder, test tube, burette, pipette, funnel, Bunsen burner, dessicator etc., to carry out experimental research efficiently and safely. Sometimes, even chemistry teachers are not properly trained. These challenges need to be addressed by providing proper training for the educators and funding the colleges/universities to build well equipped laboratories<sup>7</sup>. A stress results when the chemistry teacher's experience is



unpleasant, given rise to tension, frustration, anger, anxiety, and depression, poor working conditions resulting from lack of practical equipment's for conducting effective Chemistry practical. Other problems encountered by students in conducting chemistry practical in school and college include lack of practical manuals, lack of motivation, poor laboratory condition and problems in setting apparatus.

### **3.2. Lack of Awareness of the Importance of Education:**

Many rural students are not achieving adequate levels of literacy, scientific temperament and academic achievement. Reason for the low literacy rate in rural regions in India is the lack of awareness of the importance of education. People in rural regions are mostly engaged in agricultural and allied sectors. Children from the beginning are engaged in these sectors and not give much importance to their studies. Many rural Indians believe that children, especially girls, should not study much and do not have to cover a long distance to go to school and college. Instead of getting the education, they should focus on some work which helps them in earning. Rural and people are not aware of the fact that, it is science and technology education alone that can solve the problems of hunger and poverty and all must have to work towards achieving this goal of harnessing science in all spheres of rural development, because ultimately the total national development would depend on the rapid progress of the rural areas only by the joint effort of scientists, administrators, and local people with the full support of the political structures and nongovernmental, voluntary organizations<sup>8</sup>.

### **3.3. Less Availability of School and Science College:**

There is also less availability of schools and science colleges in rural regions. Many students have to go from one village to another village by covering miles of distance for Science College<sup>9</sup>. Another challenge is the non-availability of transport. It takes long hours to reach school and to come back home. This challenge also aids in increasing drop-out student ratios in rural India. The government should set up more school and science colleges in rural India to boost up education. Most of the children have to leave their education due to the large distance between the home and the school or college. This is the case, especially for girls. Most of the girls drop out of school due to non-availability of transport.

### **3.4. Lack of Access to Modern Tools of Learning:**

Unlike urban areas, rural areas do not have access to modern tools of learning. For example, the latest tool in education is the introduction of digital platforms. Unfortunately, the rural areas do not have access to these modern tools of learning. The lack of access to the internet, digital devices and uninterrupted power supply are some of the problems of rural areas. National Education Policy 2020 emphasises digital learning as an alternative to the conventional classroom model but implementing this in rural India will face some challenges due to lack of proper ICT lab facilities in the rural college, inadequate equipment's of hardware and software facilities, Poor network of Wi-Fi connectivity in the institution, cell phones, projectors, interactive whiteboards, graphing calculators, laptop computers, tablets, and other evolving technologies in a chemistry classroom. Modern tools of learning and teaching materials are very important in the whole process of teaching and



learning to any subject. They make learning more pleasant to the students because they offer a reality of experiences, which stimulates self-activity and imagination on the part of the students. Students have difficulties in relating the chemistry phenomena they learned and the life around them. It is necessary to have teaching aids which can help them to relate between chemistry with the phenomena occurred in everyday life, which is chemistry's teaching aids based on local wisdom. There are three teaching aids which used in chemistry teaching and learning, i.e. clay molymod, electrolyte tester, electroplating tool<sup>10</sup>. A large number of rural institutions lack these three teaching aids due to which hurdles in teaching and learning process.

### **3.5. Lack of Finances:**

The general population in the rural areas are hired labourers on farmland or other manual work. The remuneration in these sectors is relatively low. As the finances are low, the rural population finds it burdensome to spend on the education of their children. As a result, a large portion of the youth in the rural sector stays away from school and Science College. School and college chemistry practical not only needs test tube, burette and pipette but also costly instruments like colorimeter, spectrophotometer, pH meter, Digital magnetic stirrer, oven, Hot plate, digital centrifuge machine, potentiometer, conductometer etc., as lack of finances is a major problem in developing countries like India, rural schools and colleges cannot afford to purchase these instruments easily.

### **3.6. Communication Gap:**

The rural sector mostly communicates with each other in the local language. The medium of instruction in most schools and colleges in the rural areas is the local language. There are many different languages spoken throughout India, which makes it difficult for teachers to find effective ways of communicating with their students. The major challenge is the use of teaching and learning language, English. Learners cannot grasp the content easily as English is not their mother tongue. Some learners do not even understand what teacher are teaching as they do not understand the language teacher are speaking. Most learners are not well exposed to the English language, which brings up the high level of misunderstanding amongst the learners, and it even stultifies the communication between the teacher and the learners. The ability to communicate effectively in both writing and speech is crucial for success in any field, and chemistry is no exception. "All efforts will be made early on to ensure that any gaps that exist between the language spoken by the child and the medium of teaching are bridged," the NEP says<sup>5</sup>.

### **3.7. Lack of Quality Teachers in Rural Areas:**

One of the major problems of education in rural areas is the lack of teachers. Moreover, even if there are teachers, the lack of quality chemistry teachers poses a big problem. Due to the lack of teachers in the rural areas, the Government in some states has exempted teachers from clearing the Teachers Eligibility Test. This has further deteriorated the quality of teachers in the rural sector. Due to the poor quality of teachers, students in the rural sector tend to suffer. This is one of the problems of education in rural areas. It leads to the poor quality of learning amongst students. Chemistry is complicated, but there is a way to



make it much simpler. The best chemistry teachers possess a strong combination of passion, skills, knowledge, and experience. There are many private teacher-training institutes in India, but the quality of the training they provide is unsatisfactory. Continuous professional development is a motivator for teachers, and enough attention is needed in this regard.

#### **4. Important Ways to Boost Rural Chemical Education**

If the schools and science colleges are set up at every village, it will aid in increasing the enrolment percentage and decrease the drop-out rate of rural children. Early schooling in a child's mother tongue, as recommended in the new National Education Policy, can improve learning, increase student participation and reduce the number of dropouts<sup>5</sup>. The Government of India and Private institutions and individuals must initiate several scholarships and grants to students from rural areas. These scholarships encourage education amongst students from the rural areas and other weaker sections of society. One of the most important ways to boost rural education is boosted up free education, as our constitution provides the right to education to all citizens of India. The government should focus on how they can increase the enrolment of children who reside in rural areas. Another way to boost up the education in rural India is by providing proper infrastructure and resources.

In recent rise of pandemics demands digital platforms on ICT based educational initiative. 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. Attuned to the government's Digital India initiative, a couple of projects have been introduced in the school education segment. For instance, E-basta aims to make digital education via tablets and computers accessible to learners in rural areas. Digital learning can help develop critical thinking skills. The project aims not only to benefit learners in learning concepts, but also to make them comfortable with technology. Steps are already being taken to introduce digital aids in preschools. Though digital aids can never really replace teachers, initiatives of these kinds can make quality content available to them<sup>11</sup>. According to NEP 2020 that educational software will be available for both the teachers and students at all levels including students in remote areas and Divyang students. Setting of e-content for teaching and learning developed by all states in their regional languages and by NCERT, CIET, CBSE, NIOS, etc., and will be uploaded in the DIKSHA platform. 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. Technology has transformed education and our society. Cell phones, projectors, wireless internet access, interactive whiteboards, graphing calculators, laptop computers, tablets, and other evolving technologies are among the devices available to use in a chemistry classroom. If used appropriately, these tools can enhance student-centred instruction. In order to train future chemists who are equipped to communicate their science, faculty must consider ways in which opportunities to



develop these skills can be incorporated into the chemistry curriculum. The impact of professional training of chemistry teachers is extremely important and inferred that the autonomy provided to them actually led to better learning for the students. Huge area of concern is the lack of properly trained teachers. To teach such a large pool of students all over India using experiential learning methodology, more teachers need to be hired and trained properly. The central government launched a program called Nishtha (National Initiative for School Heads' and Teachers' Holistic Advancement) for improving the quality of school education through integrated teacher training. Moreover, many institutes including the premium ones such as IISc, IITs, IISERs, and others are offering teacher education programs to bridge this gap. Talent Development Center (TDC) at Challakere IISc Campus trains the High School and Pre-University Course (PUC) teachers in science and mathematics through lectures and hands-on training. With generous support from the state government, over 6500 teachers have already participated in these programs. Most teachers are not familiar with experiential teaching methods either and they need to be trained. The policy aims to improve the quality of teacher training at universities by ensuring that all teachers are trained in the latest pedagogical practices and classroom technologies. The government also plans to establish a national teaching standards framework. This will ensure that all teachers are trained in the latest pedagogical practices and classroom technologies<sup>12</sup>. One of the biggest ways of how we can improve education in rural areas is through the donations and initiatives of large-hearted philanthropists in India and around the world.

## 5. Conclusion:

India Strive better to improve rural educational facilities. Despite the best efforts still have a few flows in it. The new National Education Policy 2020 will introduce measures such as increasing the number of teachers training institutions, providing incentives for teachers who are willing to work in rural areas, encouraging private investment in education and introducing new curricula at different levels. The policy will also focus on providing access to quality education in rural and remote areas. There are numerous challenges and hurdles for a chemistry teacher but it offers tremendous opportunities. As discussed before there are certain hurdles and challenges that need to be overcome to implement the recommendation by NEP 2020 in rural areas. Popularization of scientific ideas and activities among students, especially from rural school, is important as they can learn new methods and gets exposure to the modern world. The study concludes that rural schools and science colleges face challenges such as lack of resources, lack of finance, lack of adequate knowledge of the English language as a medium of instruction, and absenteeism and truancy on the part of rural learners, which affect the productivity and effectiveness of student-teachers. Government schools are unable to attract good quality teachers due to inadequate teaching facilities and low salaries. Without being dismissive of any of these, we would like to point out the effectiveness of digital aids in battling the challenges plaguing our education system. In addition to the lack of proper infrastructure or substantial funding, probably what is hurting the most is how chemistry is taught at the school and high school level, and the dearth of well-trained educators. Chemistry, due to its very nature, is understood best when accompanied by real-life examples and hands-on experiments. There are numerous





challenges and hurdles for chemistry teacher and Chemical Education in rural region, but it also offers a tremendous opportunity.

### References:

- Shekher, T.V. (2012). Rural Demography of India, International Handbook of Rural Demography, Springer Science+Business Media B.V. 2012; DOI: 10.1007/978-94-007-1842-5\_13
- Pradhan, S. (2020). Rural Education in India and its Problems, <https://pscnotes.in/rural-education-in-india-and-its-problems/>
- Yakanna, A. (2017). Issues and Challenges of Rural Development India, Indian Journal of Applied Research, 7(10), 560-562.
- Starrett, A., Yow, J., Lotter, C., Irvin, M.J., & Adams, P. (2021). Teachers connecting with rural students and places: A mixed methods analysis, Teaching and Teacher Education, 97, 1-12. <https://doi.org/10.1016/j.tate.2020.103231>
- Ministry of Human Resource Development Government of India. (2020). National Education Policy 2020. <https://www.education.gov.in/>
- Shridhar, S. (2020). Review study on importance of rural education in India, International Journal of Innovative Technology and Research (Proceeding of Cloud Based Technical Symposium), 17-20.
- Senapati, S., Nagaraja, H.S., & Guru Row, T.N. (2022) Chemical Education and Research in India: Challenges, Perspective, and Future Opportunities in Line with the National Education Policy 2020. Journal of Chemical Education, 99, 3678-3686. DOI: <https://doi.org/10.1021/acs.jchemed.2c00454>
- Balayogi, K. (2020). Science and technological education for rural transformation, International Journal of Creative Research Thoughts (IJCRT), 8(4), 2802-2806.
- Mahajan, A. (2021). Problems and challenges in secondary education in remote areas of India, Webology, 18(6), 1013-1018.
- Priyambodo, E., Wulaningrum, S. (2017). Using Chemistry Teaching Aids Based Local Wisdom as an Alternative Media for Chemistry Teaching and Learning, International Journal of Evaluation and Research in Education (IJERE), 6(4), 295-298.
- Srivathsani, S., & Vasantha, S. (2019). Influence of Digital Economy on School Education in India, International Journal of Recent Technology and Engineering (IJRTE), 7(6S5), 1132-1137.
- Bhatt, T. (2022). New Education policy 2020 Challenges and Opportunities for Teacher Education, Neuro Quantology, 20(13), 3414-3419. DOI Number: 10.14704/nq.2022.20.13.NQ88421

