

From Core to Optional: The Diminishing Role of Chemistry in the NEP 2020 Framework

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Abstract- *The National Education Policy (NEP) 2020 introduced sweeping changes to the Indian education system, emphasizing a more holistic, interdisciplinary approach. Among its many reforms, one key change has been the loosening of subject boundaries, which has impacted the traditional status of core subjects like Chemistry. This research explores how NEP 2020 has affected the status of Chemistry as a core subject in secondary and higher education, examining the policy's provisions, its interdisciplinary approach, and the response of institutions and students. Through data collection and analysis, we assess whether Chemistry has been sidelined and if students' interest in it has waned due to the new flexibility in subject selection. The study concludes with insights into the long-term implications of NEP 2020 on Chemistry education.*

Index Terms- *Chemistry Education, Curriculum reforms, Interdisciplinary Approach, NEP-2020, Subject flexibility*

I. INTRODUCTION

Chemistry has historically been regarded as a foundational subject in both secondary and higher education, vital for students pursuing careers in medicine, engineering, and research. Prior to NEP 2020, Chemistry was a staple subject for students on science, engineering, and medical tracks. Its importance was particularly evident in pre-medical and pre-engineering courses, as well as for those specializing in areas like biotechnology, pharmacology, and chemical engineering. The National Education Policy (NEP) 2020 introduced transformative changes to the Indian education system, aiming to make education more holistic, flexible, and student-centric. One of its key features is the emphasis on multidisciplinary learning, which allows students to choose subjects across different streams without the rigid divisions between science, commerce, and humanities. While this approach broadens educational opportunities, it has sparked debates about the potential dilution of core subjects like Physics, Chemistry, and Mathematics, which have traditionally played a

pivotal role in the scientific and technological advancement of the country.

Under the NEP 2020 model, students are no longer obligated to focus exclusively on science subjects. For example, a student can now opt for Chemistry alongside a mix of subjects like philosophy or music. While this may lead to broader educational experiences, the reduction in subject-specific focus could weaken the foundation necessary for advanced studies in Chemistry. This shift may devalue Chemistry as a core discipline, potentially reducing the number of students who specialize in it at the undergraduate and postgraduate levels.

Many academics and educators have voiced concerns about this change. Chemistry, as an experimental science, requires not only theoretical understanding but also extensive lab work to develop practical skills. If students do not dedicate sufficient time to these aspects, they may struggle with the complexities of the subject. According to Dr. Anjali Verma, a professor at Delhi University, "The flexibility offered by NEP 2020 is commendable, but Chemistry is a rigorous discipline that requires continuous engagement. Mixing it with unrelated subjects could dilute its scientific rigor." Moreover, research in Chemistry often demands a solid understanding of both fundamental and advanced concepts, traditionally covered in core-focused curricula. Without this depth at the undergraduate level, students may struggle to pursue meaningful research and contribute to scientific advancements in Chemistry-related fields. A diminished focus on Chemistry could also impact career opportunities, as it has historically been a gateway to professions in medicine, pharmacology, research, and industries like chemicals, petrochemicals, and materials science. In a report by the Indian National Science Academy (INSA), concerns were raised about the future of scientific research in India. The report emphasized that core scientific subjects like Chemistry are crucial for technological innovation

and national development. Without a strong focus on these subjects at the undergraduate level, India could face challenges in maintaining its position as a global leader in research and innovation.

Despite these concerns, proponents of NEP 2020 argue that the policy opens up new opportunities for Chemistry. Students interested in fields such as environmental science, sustainable development, or policy-making could benefit from combining Chemistry with other disciplines. This could lead to innovative approaches to solving global challenges like climate change, renewable energy, and pollution. Additionally, interdisciplinary research is becoming increasingly important in modern science. The blending of Chemistry with fields such as biology (for biochemistry) or materials science could lead to the development of new, cutting-edge technologies. NEP 2020's focus on interdisciplinary studies may promote these kinds of collaborations.

As the NEP 2020 continues to be implemented, it is crucial to ensure that traditional science subjects maintain their prominence within the curriculum. These subjects form the foundation of critical thinking and innovation, and their marginalization could undermine progress in key fields like medicine, engineering, and technology. A balanced approach is needed to preserve their importance while integrating interdisciplinary learning. This research aims to examine how the new educational structure, as proposed by NEP 2020, is influencing the role and status of Chemistry as a core subject under the new educational framework. By promoting more flexibility in subject selection, the policy may inadvertently discourage students from opting for Chemistry, which was previously a requisite for many science-related fields. By examining the policy's implications on curriculum structure, the choice of subjects by students, and the overall focus on science education, we attempt to assess how NEP 2020 affects the standing of Chemistry in India's academic landscape.

II. OBJECTIVES

- To investigate the impact of NEP 2020 on the status of Chemistry as a core subject in the Indian education system at undergraduate level.

- To analyze the reasons behind the potential decline in student enrollment in Chemistry after NEP 2020's implementation.
- To assess the perceptions of students, educators, and institutions regarding the importance of Chemistry in the new interdisciplinary curriculum.
- To explore the long-term effects of NEP 2020 on the future of Chemistry as an academic discipline.

III. METHODOLOGY

This study employs a mixed-methods approach to analyze the impact of NEP 2020 on Chemistry as a core subject at undergraduate level. The methodology includes both quantitative and qualitative data collection techniques.

- **Sampling:** A total of 200 students, were selected from different Colleges across different regions of Jammu and Kashmir having studied chemistry as one of the subject at 10+2 Level. In addition, 50 educators (professors) from Chemistry subjects were interviewed.
- **Data Collection:**
- **Surveys:** Structured questionnaires were distributed to students and teachers to gather data on their subject choices and perceptions of Chemistry in the new curriculum.
- **Interviews:** In-depth interviews with educators were conducted to gain insights into how NEP 2020 has changed the teaching and enrollment patterns in Chemistry.
- **Institutional Records:** Enrollment statistics for Chemistry courses before and after the NEP 2020 implementation were collected from different Colleges across Jammu and Kashmir.
- **Analysis:** The collected data were analyzed using statistical methods to identify trends in subject preferences and enrollment rates. Qualitative responses were coded and analyzed thematically to understand attitudes toward the changing status of Chemistry.

IV. DATA COLLECTION AND ANALYSIS

1. Student Survey Results:

- The survey results revealed a significant shift in students' subject preferences following the implementation of the National Education Policy (NEP) 2020. Before the policy, 72% of

students in the science stream selected Chemistry as a core subject, reflecting its importance in traditional science education. However, after NEP 2020, this number dropped to just 35%. The decline is largely attributed to the rise in interdisciplinary combinations that have become more popular, with students increasingly choosing subjects like Botany, Zoology, Computer Science, Environmental Studies, and even incorporating elements of the arts into their studies.

- Several reasons were cited by students for this change in subject preference. First, many described Chemistry as particularly challenging, with its complex theories, intricate problem-solving, lengthy syllabus and demanding laboratory work. In comparison, other subjects were seen as more accessible or aligned with personal interests. Additionally, students expressed a growing inclination toward more "practical" or "career-oriented" subjects, especially those that are perceived to better prepare them for competitive civil service examinations or provide more direct career pathways. Subjects like Computer Science, for instance, are seen as vital for those aiming for careers in the tech industry, while Environmental Studies appeals to students interested in sustainability and global issues.
- Furthermore, NEP 2020's flexible curriculum has encouraged students to pursue a more diverse educational experience. Many now prefer a mix of sciences and humanities, reflecting the policy's emphasis on holistic learning. This newfound flexibility has allowed students to explore a wider range of academic interests, leading to a noticeable decline in Chemistry's prominence as a core subject.

2. Educator Interviews:

- A majority of Chemistry teachers expressed concern about the declining interest in the subject and are worried about a significant drop in student enrolment in the subject. The survey indicate that 85% of educators have noticed fewer students enrolling in Chemistry courses since the implementation of the National Education Policy (NEP). This trend has raised alarms about the future of Chemistry education and the potential impact on students' scientific literacy.

- Teachers also mentioned that while the interdisciplinary approach fosters broader learning, it can hinder the ability to maintain in-depth subject knowledge, particularly in fields like Chemistry. The need for sustained focus and rigorous study is crucial in such complex disciplines, making it challenging for educators to balance this depth with a wider curriculum. This tension underscores the importance of strategic curriculum design that supports both breadth and depth of knowledge.

3. Enrollment Statistics:

- The enrollment data reveals a significant decline in Chemistry majors across all colleges. During the first two years of the National Education Policy (NEP) 2020 implementation, 60% of the institutions reported a reduction of 60-70% in students pursuing this field of study, while the remaining 40% institutions reported a reduction of 70-100% in students enrolled in Chemistry as Majors.
- This downward trend is particularly evident in non-urban areas, where students increasingly favor vocational and skill-based subjects. These alternatives offer immediate employment opportunities, making them more appealing to those seeking swift career paths. As a result, the traditional appeal of Chemistry is waning, raising concerns about the future of this essential scientific discipline in the educational landscape.

V. RESULTS

The study reveals that Chemistry has indeed experienced a loss of status as a core subject since the implementation of NEP 2020. Several factors contribute to this decline:

- **Flexibility in Subject Choice:** The option to choose a wider array of subjects, previously unavailable to students, has resulted in fewer students selecting Chemistry as a major.
- **Perception of Difficulty:** Students perceive Chemistry to be a challenging subject that requires more effort compared to other options that may offer quicker, more practical benefits.
- **Interdisciplinary Focus:** While the interdisciplinary approach of NEP 2020 is well-received, it has diluted the importance of in-

depth study in traditional science subjects like Chemistry.

- Shift towards Vocational Subjects: With a focus on skill-based education, many students are choosing subjects that align more directly with immediate employment opportunities, leaving foundational sciences like Chemistry behind.

CONCLUSION

The NEP 2020 has brought about a paradigm shift in education by promoting flexibility, interdisciplinary, and skill-based learning. While these reforms are in many ways beneficial, they have also contributed to the diminishing status of Chemistry as a core subject. The decrease in student enrolment and the integration of Chemistry with other subjects might lead to weaker foundational knowledge in the discipline, potentially affecting students' readiness for higher education in science and related fields. Long-term consequences could include a decline in scientific research and industry expertise in Chemistry, which could impact India's global standing in science and technology. To mitigate this, policy-makers and educators must find ways to balance interdisciplinary learning with the need to maintain rigor in foundational scientific disciplines.

RECOMMENDATIONS

- Reinforce Chemistry in Curricula: Chemistry is an essential subject for scientific literacy and job chances in STEM disciplines, thus it should be made sure to stay prominent even in a multidisciplinary framework.
- Redesigning Curriculum: The syllabi should be restructured to prioritize student's interests and as per relevance to contemporary job opportunities. By incorporating practical skills, real-world applications, and interdisciplinary approaches, curricula can better prepare students for the demands of the workforce. This redesign should also focus on fostering critical thinking and adaptability, ensuring that Chemistry graduates are equipped to thrive in an ever-evolving job market. Ultimately, a student-friendly syllabus will empower learners to become proactive contributors in their chosen fields.

- Awareness Campaigns: Efforts should be made to raise awareness about the importance of Chemistry in various industries and research, encouraging students to pursue it as a core subject.
- Further Research: Continuous monitoring of enrolment patterns and academic performance in Chemistry post-NEP 2020 will be necessary to assess the long-term impacts and adjust educational policies accordingly.

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