ROLE AND IMPORTANCE OF CHEMISTRY IN NEP 2020: ISSUES AND CHALLENGES

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Abstract
The National Education Policy (NEP) 2020 has redefined the landscape of Indian education, emphasizing multidisciplinary learning, skill development, and research-oriented pedagogy. Chemistry plays a pivotal role in achieving the objectives of NEP 2020 by bridging natural sciences, technology, environment, and sustainable development. This paper examines the role and importance of chemistry in the framework of NEP 2020, explores its contributions to national goals such as innovation and sustainable development, and highlights the issues and challenges in effective implementation.
Keywords: *NEP 2020, Chemistry education, laboratory pedagogy, green chemistry, challenges*

Introduction

The main objective of NEP 2020 is to advance relevant, high-quality education. The advancement of any country is substantially impacted by development in technology and science. If the younger generation is enthusiastic about developing new scientific technologies, then more integration of science education might be possible. Teachers should significantly encourage students to think critically and imaginatively about their work, according to NEP 2020. Teaching science at the secondary level through hands-on activities is our challenge. NEP 2020 can demonstrate the path toward creative science education (Garima, 2023).

A flexible, multidisciplinary educational system that is in line with 21st century demands is what the NEP 2020 aims to achieve (Government of India, 2020). It emphasizes critical thinking, scientific inquiry, and experiential learning, which makes chemistry indispensable to its success. As chemistry integrates physics, biology, engineering, and environmental sciences, it serves as both a foundational and applied discipline. By equipping learners with knowledge and problem-solving skills, chemistry supports India's aspirations in areas such as green energy, healthcare, nanotechnology, and sustainable development (Kumar & Singh, 2021).

This study investigates how to include a creative approach to chemistry instruction with modern digital tools, namely, using Google and other internet resources. The aim is to enhance students' interest in understanding and ability to apply chemistry principles practically. For learning and active engagement, the study uses virtual labs, interactive simulations, and multimedia materials. Additionally, project-based learning is made easier by collaborative platforms like Google Classroom, which promote the collaboration and communication abilities essential to scientific research. Students are better prepared for post-secondary education and future professions in chemistry. (Mahima Sharma, Pratima Mishra).

Role of Chemistry in NEP 2020

1. Multidisciplinary Learning:

Chemistry connects physical, biological, and environmental sciences, fostering an integrated approach to solving real-world problems. NEP's focus on flexible curricula enables chemistry to be taught in relation to biology (biochemistry), engineering (materials science), and the environment (green chemistry).

2. Skill Development and Research Orientation:

Chemistry laboratories promote hands-on skills, critical thinking, and scientific inquiry. NEP 2020 encourages undergraduate research and innovation; chemistry provides vast opportunities in medicinal chemistry, nanotechnology, polymers, and renewable energy (Johnstone, 2010).

3. Contribution to Sustainable Development Goals:

Chemistry underpins areas such as clean energy, waste management, water purification, and eco-friendly materials. Green chemistry principles align directly with NEP's vision of environmental responsibility (Anastas & Warner, 1998).

4. Technology and Innovation:

Advances in chemical sciences contribute to pharmaceuticals, biotechnology, and artificial intelligence-driven materials discovery. NEP promotes industry–academia collaboration, where chemistry plays a key role in translating research into societal applications (Mahaffy et al., 2019).

5. Entrepreneurship:

Chemistry supports innovation in indigenous drug discovery, fertilizers, dyes, cosmetics, and agrochemicals. NEP 2020's emphasis on vocational education can foster chemistry-based startups and incubations (Sharma, 2022).

Importance of Chemistry in Achieving NEP Goals

1. Digital Education: Virtual chemistry labs and simulation tools can enhance online education (Mahaffy et al., 2019).
2. Teacher Training: Chemistry educators can integrate modern pedagogies like problem-based and project-based learning (Johnstone, 2010).
3. National Research Foundation (NRF): Chemistry research is central to NRF's focus on scientific innovation and global competitiveness.

Issues and Challenges

1. Infrastructure Gaps: Many institutions lack modern chemistry laboratories, instrumentation, and safety facilities. Limited access to digital labs in rural and semi-urban regions.
2. Equity and Accessibility: Rural and underprivileged students face a digital divide in accessing e-resources, simulations, and advanced laboratory experiences. The high cost of instruments and reagents limits inclusivity.

Recommendations

1. Establish chemistry labs in schools and colleges with digital integration.
2. Strengthen industry academia collaboration for internships, projects, and research translation.
3. Develop open-access digital chemistry resources in multiple languages for equitable learning.
4. Encourage green chemistry practices in curricula to align with sustainability goals.

Conclusion

Chemistry plays a central role in realizing the vision of NEP 2020 by fostering a promoting sustainability and driving innovation. Despite challenges in infrastructure, pedagogy, and equity, effective policy implementation and systemic reforms can transform chemistry education into a driver of India's scientific and socio-economic development. Addressing these issues will ensure that chemistry not only contributes to academic growth but also to societal well-being and global competitiveness.

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