



Science education in Tripura: A historical analysis of institutional growth and policy reforms

Dr. Gourab Roy

Associate Professor & Head, Department of Zoology, Maharaja Bir Bikram College, Agartala, Tripura, India

Abstract

Science education has played a pivotal role in shaping the intellectual and socio-economic development of Tripura, a northeastern state of India with distinct historical and cultural contexts. This paper presents a comprehensive historical and policy-oriented analysis of the evolution of science education in Tripura from the nineteenth century to the present. The study traces the gradual transition from early elite-centric educational initiatives under royal patronage to a more inclusive and institutionalized system following the state's integration into the Indian Union. Particular emphasis is placed on the establishment of key institutions such as Maharaja Bir Bikram College, Tripura Engineering College, Tripura University, and the National Institute of Technology Agartala, which collectively laid the foundation for higher and technical science education in the state. The paper also examines the role of policy reforms, teacher training mechanisms, and curriculum development agencies, especially SCERT, in strengthening school-level science education. Recent developments, including the implementation of the National Education Policy (NEP) 2020, the introduction of the *Saharsh* Curriculum, and the expansion of digital and blended learning models, are critically discussed in the context of regional needs and challenges. While Tripura has made significant strides in expanding access to science education and fostering region-specific research in biodiversity and environmental sciences, persistent challenges such as infrastructural disparities, limited research capacity, and weak industry-academia linkages remain. The study concludes that sustained investment in infrastructure, pedagogical innovation, and research integration is essential for translating the growth of science education into long-term sustainable development in Tripura.

Keywords: Science education, Tripura, institutional development, educational policy reforms, NEP 2020

Introduction

Science education serves as the backbone of intellectual, technological, and socio-economic development. In Tripura, the evolution of science education is closely intertwined with the region's historical, political, and socio-cultural transformation from its period as a princely state under Maharaja Bir Bikram Manikya Bahadur to its present status as a north eastern state of India. Initially shaped by royal patronage and missionary initiatives, education in Tripura gradually transitioned from elite-centered learning to mass-oriented public schooling and higher education systems (Bhattacharjee, 2003; Chakraborty, 2010)^[1, 2]. The geographical isolation of Tripura, coupled with socio-economic constraints and rich tribal diversity, posed persistent challenges to the establishment and expansion of formal science education institutions. Despite these limitations, substantial progress has been achieved, particularly after Tripura's integration into the Indian Union and the subsequent development of national- and central-level institutions. This paper presents a historical and policy-oriented analysis of the growth of science education in Tripura, focusing on institutional development, curricular reforms, and contemporary policy initiatives.

Early Developments (Nineteenth Century–1947)

1. Beginnings of Modern Education: The first recorded modern school in Tripura was established around 1862 during the reign of Maharaja Ishan Chandra Manikya. Early educational initiatives primarily emphasized basic literacy, arithmetic, and clerical training, with science subjects largely absent from the curriculum (Chakraborty, 2010)^[2]. By the late nineteenth century, missionary and government-assisted schools in

Agartala and nearby areas began introducing elementary science concepts, laying the groundwork for formal science education.

- 2. Royal Patronage and Educational Expansion:** Maharaja Bir Bikram Manikya Bahadur (1908–1947) is widely regarded as the architect of modern Tripura. His progressive vision emphasized institutional development and the inclusion of modern subjects, including science, within the school curriculum. During the 1930s and 1940s, several state-supported high schools introduced science as a component of the matriculation syllabus, reflecting a gradual shift toward scientific education (Bhattacharjee, 2003)^[1].
- 3. Establishment of Maharaja Bir Bikram College:** The visionary "*Vidyapattan*" scheme conceptualized by Maharaja Bir Bikram Kishore Manikya aimed to establish a comprehensive centre of higher learning in Agartala. Although his untimely death prevented its immediate realization, the establishment of Maharaja Bir Bikram (MBB) College in 1947 fulfilled this vision. As the first-degree college in Tripura, MBB College introduced undergraduate courses in Physics, Chemistry, Botany, and Zoology under the affiliation of the University of Calcutta, marking the formal institutionalization of higher science education in the state (Chakraborty, 2010)^[2].

Post-Independence Expansion (1947–1972)

- 1. State Integration and Institutional Consolidation:** Following Tripura's merger with the Indian Union in 1949, educational administration was reorganized under

national frameworks. The Directorate of Education initiated the expansion of secondary schools and colleges, significantly improving access to science education at both school and collegiate levels (Bhattacharjee, 2003) [1].

2. **Establishment of New Colleges:** The 1950s and 1960s witnessed the establishment of several government and aided colleges with dedicated science streams to meet the growing demand for trained scientific manpower. Notable among these institutions were Ramthakur College (1967) and Bir Bikram Memorial College (1969), both located in Agartala (Chakraborty, 2010) [2].
3. **Teacher Training and Curriculum Development:** The establishment of the State Council of Educational Research and Training (SCERT) marked a significant step in strengthening science education. SCERT played a pivotal role in teacher training, curriculum development, and the preparation of multilingual teaching-learning materials suited to Tripura's diverse socio-linguistic context (SCERT Tripura, 2022) [6].

Rise of Technical and Higher Scientific Education (1965–1987)

1. **Tripura Engineering College:** A major milestone in technical and applied science education was achieved with the establishment of Tripura Engineering College (TEC) in 1965. Initially affiliated with the University of Calcutta, TEC offered undergraduate programmes in Civil, Electrical, and Mechanical Engineering, representing the state's first specialized institution for engineering education (Government of Tripura, 2006) [4].
2. **Postgraduate Education under Calcutta University:** In the 1970s, the establishment of a Postgraduate Centre of the University of Calcutta in Agartala enabled students from Tripura to pursue postgraduate studies in core science disciplines such as Physics, Chemistry, Mathematics, and Zoology without migrating to other states.
3. **Formation of Tripura University:** The enactment of the Tripura University Act in 1987 transformed the postgraduate centre into Tripura University, the first comprehensive university in the state. With an initial focus on science and social science disciplines, the university emphasized teaching and research in areas relevant to regional ecology, biodiversity, and natural resource management (Tripura University, 2023) [9].

Modernization and National Integration (1987–2006)

Between 1987 and 2006, science education in Tripura expanded considerably at both undergraduate and postgraduate levels. Financial support from the University Grants Commission (UGC) and the state government facilitated the development of laboratories, libraries, and research infrastructure across colleges. During this period, Tripura University emerged as a key centre for region-specific research, particularly in biodiversity, medicinal plants, and environmental sciences (Singh & Debbarma, 2019) [7]. A major landmark was the upgradation of Tripura Engineering College to the National Institute of Technology

(NIT) Agartala in 2006, integrating the state into the national technical education network (NIT Agartala, 2022) [5].

Centralization and Curricular Reforms (2007–2020)

1. **Tripura University as a Central University:** In 2007, Tripura University was accorded Central University status through an Act of Parliament. The university expanded its academic portfolio to include Biotechnology, Human Physiology, Computer Science, and Environmental Science, aligning science education with national priorities (Tripura University, 2023) [9].
2. **NEP 2020 and Curriculum Reform:** The National Education Policy (NEP) 2020 introduced a paradigm shift toward multidisciplinary, experiential, and inquiry-based learning. In response, Tripura's Directorate of Education and SCERT initiated reforms in school-level science curricula, emphasizing conceptual understanding, environmental awareness, and digital literacy (Government of India, 2020) [3].
3. **Teacher Education and Technology Integration:** Teacher education institutions, including District Institutes of Education and Training (DIETs), integrated digital tools, laboratory-based pedagogy, and blended learning approaches. These reforms were particularly significant in addressing infrastructural gaps in remote and tribal areas.

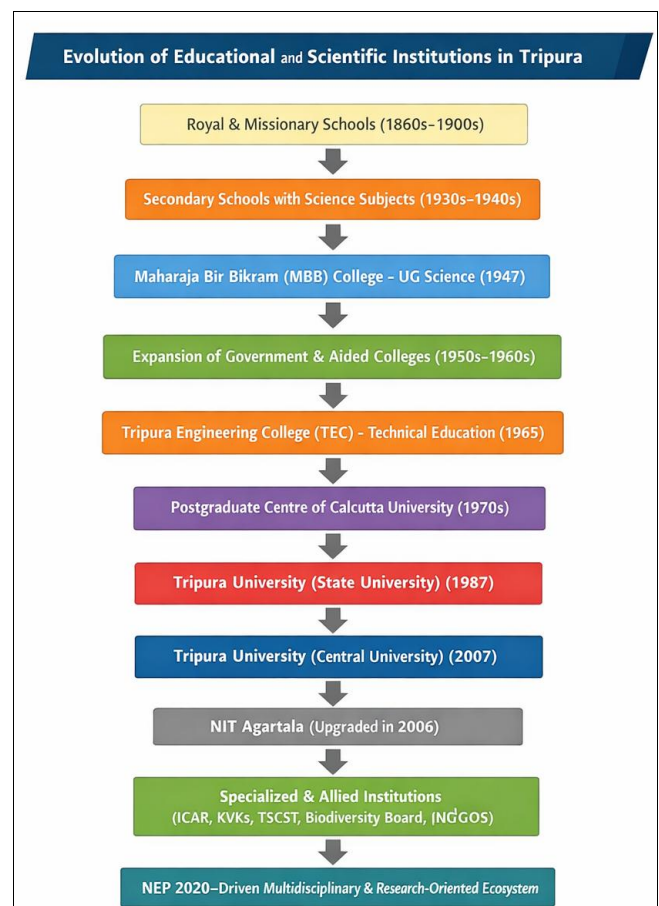


Fig 1: The diagram depicts the phased evolution of science education institutions in Tripura, showing a transition from early foundational schooling to higher education, national institutions, and policy-driven research integration under NEP 2020.

Recent Developments and Policy Innovations (2020–Present)

- 1. Saharsh Curriculum and NEP Implementation:** In alignment with NEP 2020, the Government of Tripura introduced the Saharsh Curriculum in 2022 for Classes I–VIII. This curriculum emphasizes activity-based, learner-centered science education, encouraging observation, experimentation, and environmental sensitivity (SCERT Tripura, 2022)^[6].
- 2. Expansion of Digital Education:** The COVID-19 pandemic accelerated the adoption of digital and hybrid learning models. Higher education institutions introduced Learning Management Systems (LMS), while NIT Agartala expanded the use of virtual laboratories and online assessments.
- 3. Research and Innovation Ecosystem:** Science departments at Tripura University and NIT Agartala have increasingly engaged in funded research through agencies such as DST, DBT, and UGC. Research initiatives focusing on climate change, biodiversity conservation, and bioresource management underscore the integration of science education with regional socio-ecological needs (Singh & Debbarma, 2019)^[7].

Strengths and Challenges

- 1. Strengths:** Tripura's science education ecosystem is characterized by the presence of national-level institutions, a high literacy rate exceeding 85 percent (Census 2011), strong governmental commitment to educational inclusion in tribal and rural areas, and a distinct regional research focus on biodiversity and sustainable development (Tripura Directorate of School Education, 2021)^[8].
- 2. Challenges:** Despite notable progress, challenges persist in the form of limited laboratory infrastructure in rural schools, comparatively weaker research facilities than larger states, inadequate industry–academia linkages, and continuing urban–rural disparities in the quality of science education.

Future Prospects and Recommendations: To strengthen science education in Tripura, strategic initiatives are required, including the enhancement of laboratory and digital infrastructure, continuous professional development for teachers through SCERT–University–NIT collaborations, promotion of interdisciplinary research addressing local environmental and agricultural issues, expansion of science outreach programmes, and inclusive ICT-based learning for tribal and marginalized communities in alignment with NEP 2020.

Conclusion

The historical evolution of science education in Tripura reflects the state's broader socio-economic transformation. From early royal patronage to the establishment of central and national-level institutions, the trajectory demonstrates a sustained commitment to knowledge, inclusivity, and regional development. As science education in Tripura stands at the intersection of tradition and modernity, continued investment in infrastructure, pedagogy, and

research integration will be essential for translating educational growth into sustainable societal progress.

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