



RESEARCH ARTICLE

Role of Blended Mode Learning for Strengthening the Undergraduate Educational System: A Study on the Higher Education Scenario of Tripura

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ABSTRACT

The implementation of the National Education Policy (NEP) 2020 has introduced significant systemic challenges for higher education (HE) institutions in Tripura. Primarily, these institutions face severe deficits in both human resources and infrastructure. This constraint will hinder institutions' ability to manage the increased academic workload effectively. While NEP-2020 prioritizes experiential learning, skill-development courses, value-based education, multidisciplinary and holistic approach of HE execution. This transformation has made the system further complicated. Such as a centralized single-window admission process, publications of results in the SAMARTH portal, and compulsory Academic Bank of Credit (ABC) registration to align with national standards. Over and above, the Tripura Government takes initiatives to enhance the Gross Enrolment Ratio (GER) by expanding the number of institutions, have added to this academic pressure many folds. This study proposes alternative strategies designed to streamline academic transactions and develop a more forward-looking educational framework in the higher education institutions of Tripura.

1. INTRODUCTION

Education acts as a catalyst for the socio-economic development of any country. Higher Education (HE) serves as the primary instrument for societal and national advancement of any region. A vigorous, efficient educational framework bridges the rural-urban divide, promotes inclusivity, and fosters innovation. Education is a vital tool to ensure meaningful employability and access to quality education. Consequently, up-to-date curricula must integrate skill development, vocational training, and strong industry-academia partnerships, which are necessary for national development and today's job

market. An efficient education system pays vital role in reducing unemployment and underemployment. A graduate equipped with theoretical knowledge along with practical expertise becomes a vital economic asset. Ultimately, the synergy between HE and employability drives profound social upliftment. Productively employed youth not only stimulate economic growth and gender equality but also reinforce social justice and other aspects of development.

For a developed nation, one of the primary criteria is the increase in the gross enrollment ratio (GER) in HE. In the traditional HE setup, it is not

possible to touch the desired GER. In the year 2007, the Government of India initiated an ICT-based education system. The objectives are connectivity, affordability, and high-quality e-content. Under the connectivity objective, it is to provide a broadband connection to all higher educational institutions so that students and teachers can access online learning resources in real time. All the institutions are connected through the National Knowledge Network (NKN), enabling seamless sharing of educational content. Under the second objective, it is to provide a low-cost computing device to students of the economically disadvantaged group. This initiative will bridge the gap in the digital divide in higher education. In the case of e-content development, a learning platform popularly known as SWAYAM has been launched. Under this platform, any student from the school level to the postgraduate level can do courses online. In the academic year 2022–23, the National Education Policy (NEP 2020) has been implemented across higher education institutions in India. The NEP will reshape the educational landscape across all higher educational institutions. In this context, the integration of ICT in higher education becomes a critical factor for achieving the GER target.

Blended Learning (BL): Traditional methods of teaching and learning are gradually being substituted by more interactive, flexible, and student-centered approaches. Over the past two to three decades, higher educational institutions have increasingly adopted digital platforms such as Learning Management Systems (LMS), Massive Open Online Courses (MOOCs), and other online assessment tools. These changes have substantially augmented the teaching–learning process by supporting personalized learning experiences. Blended learning also known as hybrid or mixed-mode learning, is an educational approach that combines traditional, in-person classroom instruction with an online learning platform. It has many advantages as well as a few limitations. BL can extend high quality education in rural, remote, and disadvantaged regions, thereby increasing participation in higher education. Learners who face socio-economic constraints, have family responsibilities, or work commitments can continue their studies at their own pace, reducing dropout rates. This gives students control over the time, pace, and path of their studies while maintaining the

benefits of face-to-face interaction with instructors. Presently, and the advent of AI digital platform provides diverse learning materials, language options, and adaptive content, making education accessible to marginalized groups. An Institution can enroll more than twice the present strength of students with the same infrastructure. This directly contributes to the rise in GER. NEP 2020 emphasizes blended learning as a tool to achieve the target of 50% GER in higher education by 2035. So, hybrid learning in an educational institution is not merely a pedagogical innovation but ensuring access, equity, and quality education. It is a strategic pathway to democratize HE and achieve GER targets. To make BL more efficient and impactful in HE institutions by adopting several mechanisms that strengthen both pedagogy and infrastructure. However, we have to design the curriculum so that it balances online and F2F components meaningfully so that learning outcomes become generative. For effective teaching and learning through BL, teachers should be trained both in instructional design and the use of Learning Management Systems (LMS). The institute must provide reliable internet connectivity, affordable devices, and access to digital platforms suitable for BL. The HE institute must have continuous assessment by AI-enabled analytics to track student progress and a necessary approved mechanism.

National Education Policy and GER: It has been established that education serves as the primary engine for societal and national advancement. A robust, efficient educational framework bridges the rural-urban divide, which in turn removes disparity in a society. To ensure meaningful employability, access to quality education has become an essential component. Consequently, modern educational curricula must integrate skill development, vocational training, and strong industry-academia partnerships. This will effectively prepare the youth for the evolving job market. A graduate equipped with both theoretical knowledge and practical expertise becomes a vital economic asset for any country. This directly reduces unemployment and underemployment in any society. Ultimately, the synergy between education and employability drives profound social upliftment. Productively employed youth not only help in economic growth and gender equality but also reinforce social justice, democratic engagement, and

community development. By aligning HE with career readiness, societies can naturally cultivate resilient economies, technological advancement, sustainable development and inclusive growth.

Tripura and its higher education set-up: Tripura is one of the northeastern states in India characterized by unique geographical and socio-economic dynamics. Approximately 70% of its geographical area is hilly terrain. It has many tribes and non-tribes living for centuries. Historically, Tripura was connected through Bangladesh to the mainland of India. Following the independence of India in 1947, international borders blocked traditional communication and transit channels. For the last few decades, regional connectivity has steadily improved. Earlier, accessing HE was a significant challenge for populations residing in these remote, hilly areas. Recently this landscape has shifted substantially with the establishment of numerous HE institutions. There have been distinguished progress made in expanding HE within the state of Tripura; however, several challenges still remain. These are inadequate teaching staff, physical as well as digital infrastructure, limited ICT competencies among teachers and students, and uneven preparedness across institutions.

In Tripura there are many nationally recognized higher learning institutions such as the National Institute of Technology (NIT), Indian Institute of Information Technology (IIIT), National Institute of Electronics & Information Technology (NIELIT), Central Institute of Petrochemicals Engineering & Technology (CIPET), and others. Tripura has three Medical Colleges (one Government, two are private), a Fisheries College, an Agriculture College, a Veterinary College. There are several important off-campus centers, including the National Forensic University, the Sanskrit University, and the National School of Drama (NSD). The Tripura state also has several private institutions, namely 4 Private Universities, 1 Private Engineering College (Techno India), 4 Private General Degree Colleges (Holy Cross, Kathiababa Mission, Rajeshwari Institute of Skill, and Bharatiya Vidya Bhawan), 2 Private B.Ed. Colleges (run by Bhavans Tripura), 8 Private Nursing Colleges, 3 Pharmacy Colleges, and 1 Paramedical College, 1 Hotel Management College.

2. LITERATURE REVIEW

For the last few decades and after the implementation of the massive internet network, there has been a huge scope for an alternative method of learning system. However, it is difficult for both students and teachers to shift from conventional classroom teaching to online teaching in a BL setting (Jeffrey et al., 2014 and Benson et al., 2011). BL is believed to be a teaching strategy that gives room for student-centered, active, critical, problem-based and collaborative learning (Azizah and Aloysius, 2023; Mielikainen et al., 2023). Other researchers explain that it employs a constructivist approach to impart knowledge and skills needed for career development (Anthony 2021; Zhang et al., 2022). BL is, at its simplest form, a pedagogic approach that integrates technology-mediated instruction with F2F learning (Antwi-Boampong, 2020; Dziuban et al., 2018). The integration aims to provide students with the affordances of digital technology and the advantages of F2F instruction. Several studies have shown that BL can enhance learner engagement and academic performance (Jesus et al., 2017; Xu et al., 2020). A plethora of research has been conducted to understand various aspects of this pedagogic approach of BL (Gao et al., 2020; Owston et al., 2013). Most of the attention in relation to adoption, however, has been given at subject levels (Porter et al., 2016). By purposefully integrating face-to-face (F2F) learning with online interactions, often the aim of blended learning is to provide students with personalized and enhanced learning experiences (Al Zumor et al., 2013; McKenzie et al., 2013). Studies from digitally mature regions revealed the gains in student engagement, collaboration, and learning outcomes where institutions possess robust digital infrastructure and sustained professional development (Bond et al., 2021; Raes et al., 2020; Howard et al., 2023).

Many researchers suggest that information and communication technology (ICT) can help remove geographical and situational learning barriers that are faced by students in remote locations. ICT offers better opportunities for learner and instructor interaction and leads to raising the quality of learning experiences (Bates 2000; Garrison and Anderson 2003). A mix of different teaching pedagogies and strategies has been regarded as good practice in

different countries. Blended learning offers an effective platform for employing different pedagogical strategies and has the potential to maximize the advantages of both face-to-face and online learning (Wu et al. 2010). The studies conducted by many researchers show that blended learning can improve learning outcomes, especially in the United Kingdom (Boyle et al. 2003, Sharpe et al. 2006). For the practical implementation of BL in a higher educational institution, several studies have been undertaken (Platonova et al., 2022; Vishwanathan et al., 2021). The socio-economic conditions and level of digital preparedness within a society are crucial factors for the implementation of BL (Sareen et al. 2024, Zakayo et al. 2025). It is obvious that the execution of technology-enabled education has several inherent challenges and these challenges have to be addressed efficiently (Rasheed et al., 2020). In a recent study for the successful implementation of hybrid learning, a comprehensive analysis has been conducted and outlining the road map for educators and policymakers (Gudoniene et al., 2025; Peng et al., 2026).

In the Indian context, many studies have been done on the implementation of BL pre- and post-NEP 2020. BL is effective in addressing the student's needs, particularly in addressing the diversified academic needs, their learning styles and different language backgrounds of Indian students (Kumar 2018). Online platforms have provided access to high-quality expert instructions to the students (Viswanathan et al., 2021). The digital and internet connectivity in Indian educational institutions provides accessibility and high quality (Shukla et al. 2022). The NEP 2020 emphasis on technology integration and for making education accessible, personalized and competency that can be achieved through blended learning Das et al. 2023). However, there are many challenges faced by Indian HE for implementing BL, especially cultural attitudes towards technology and online education may vary, with some stakeholders being more resistant to the adoption of blended learning methods (Muhria, et al., 2023).

3. RESULTS AND DISCUSSION

The Government of India has mandated a national target to reach a 50% Gross Enrollment Ratio (GER) by 2035. In alignment with this goal, the state

of Tripura aims to aggressively escalate its GER from the 20.7% recorded in the 2021-22 AISHE data. However, achieving this benchmark with current staffing levels is unrealistic without immediate policy intervention. While student enrollment across degree colleges remains high, undergraduates face limited subject options and compromised educational quality. Furthermore, severe faculty shortages have pushed student-to-teacher ratios as high as 1:100 in certain disciplines. Concurrently, colleges are experiencing a sharp decline in science and commerce enrollments, largely because graduation in these streams is perceived to lack viable employment opportunities in Tripura.

The present study will use qualitative techniques to investigate the opportunities and challenges of introducing BL in the colleges of Tripura. We will go through the AISHE data, DHE data reflected on the website, policy documents of NMEICT, post-NEP-2020 syllabus, personal experience, and case studies.

As per AISHE data 2021-22 data Tripura has 1 Central University, 2 Institutes of National Importance, 1 State Public University, 1 State Private University, number of registered colleges is 54, the number of colleges per lakh population is 11, total enrollment in these colleges, both Govt and Private 74901, average enrollment 1387 number of faculty posted 2505, with an equal number sanctioned post. The student-to-teacher ratio is 30:1. The state GER 20.7 whereas all India enrollment is 28.4.

Tripura's higher education started with the establishment of Maharaja Bir Bikram College in the year 1947. After that, three private colleges, Ramkrishna Mahavidyalaya (1950) at Kailasahar, Belonia College, now known as Iswar Chandra Vidyasagar College (1964) at Belonia and Ramthakur College (1967) at Agartala, were established. To improve HE in Tripura, in the year 1987 the Tripura University started its journey as a state university and currently it has become a Central University. The Maharaja Bir Bikram University, the state university, was established in the year 2015. As per state higher education data, there are general degree colleges in Tripura are at Agartala, Udaipur, Sonamura, Khowai, Sabroom, Amarpur, Fatikroy, Kamalpur, Dharmanagar, LT Valley, Kanchanpur, Teliamura, Bishalgarh, Mohanpur, Santirbazar, Gandacherra,

Khumulwng, Kakraban, Korbok, Panisagar, Nalchar and other strategic locations.

The Government of India has taken an initiative to implement an ICT-mediated education system via the National Mission on Education through ICT (NMEICT). It is also known as a National Knowledge Network (NKN). The objectives of the mission are to connect all higher learning institutions through a single window. Under the connectivity objective, it is to provide a broadband connection to all higher educational institutions so that students and teachers can access online learning resources in real time. Under this scheme, the Tripura government has provided to colleges a high-speed internet connection, digital classrooms and other accessories to promote an ICT-based educational system. Presently, all the eminent HE institutions are connected through the NKN, enabling seamless sharing of educational content.

In the academic year 2022–23, the National Education Policy (NEP 2020) has been implemented across higher education institutions in India. The same has been adopted by all colleges under Tripura University and MBB University. The NEP will reshape the educational landscape across all higher education. The major inclusions in the NEP-2020 are flexibility, inclusiveness, technology integration, and global competitiveness. Under technological integration, digital learning ecosystem like SWAYAM and inclusion of MOOCS in credit in the framework. Virtual lab is one of the initiatives to curb resource constraints, safety and learning pace. In this context, the integration of ICT in higher education becomes a critical factor for achieving the GER target.

In accordance with NEP-2020, HE affiliates universities MBBU and TU of Tripura now mandate experiential learning that includes internships, projects, and skill development for every student. This echoes a major pedagogical shift away from traditional, subject-centric learning toward a multidisciplinary, holistic, and future-focused curriculum. The previous syllabus offered by both universities prioritized isolated subject knowledge or domain-specific content, while the educational landscape under the NEP-2020 curriculum demands global competitiveness, innovation, multidisciplinary and employability. To thrive in this new era, HE in Tripura must move beyond conventional teaching and

focus on cultivating these practical, future-ready competencies.

ICT-enabled education system has become an integral component of the contemporary academic environment. In the aftermath of the COVID-19 pandemic, blended and online learning platforms have taken center stage, with widespread acceptance among educators, students and other stakeholders. Within this context, Virtual Laboratories (VL) setups have been included in the physics syllabus of TU. For both faculty and students, the integration of virtual and physical laboratories represents a first-time experience. This convergence has sparked considerable debate within the academic community, particularly among physics educators. In our earlier study (Deb et.al.), we have examined the factors and concerns associated with the use of virtual lab along with physical labs in undergraduate programmes. We have found that the implementation of the virtual lab in the syllabus enhanced students' understanding of experimental procedures and provides essential preparation for specific experiments. So, the inclusion of online learning along with face-to-face has enhanced the teaching and learning environment.

For case study, we focus on the three government degree colleges in the South district of Tripura mentioned earlier. These three colleges enrolled the highest number of students in the south region of Tripura. We examine the potential implementation of BL within these institutions. Following the introduction of the NEP-2020, student enrollment has steadily risen. However, the student-to-teacher ratio remains critically low, exceeding 1:100 for certain subjects. Managing such a large number of students with the present manpower and infrastructure complicates the effective teaching and learning process. An effective flip model of education significantly reduces this academic stress for both educators and students. It has been observed that the college academic calendar is routinely disrupted when numerous faculty members are deputed for centralized evaluation duties. Adopting BL across HE institutions in Tripura offers a viable alternative solution to retrieve these lost instructional hours. The current NEP guidelines, where the choice-based credit system (CBCS) and academic bank of credits (ABC) framework provide an ideal foundation for systematically introducing blended learning within

HE of Tripura. Successfully integrating online modules with the traditional F2F mode will require efficient instructional design by the affiliating university. Additionally, state government intervention is crucial to provide the financial and administrative requirements needed for content development in the local language and its delivery mechanism. To accommodate regional parity, online course materials should be produced bilingually and using local resources. One of the opportunities of introducing BL is that approximately 90% of students currently use smartphones in their name. These devices can be leveraged to deliver content, frame questions, and other modern pedagogies through an LMS portal. It has been seen that many public and private universities utilize multilingual, app-based LMS platforms. The colleges in Tripura could comfortably deliver up to 40% of their course credits online. This would reduce daily physical attendance requirements for students and teachers and allow for a more efficient, strategic utilization of teaching faculty. Similar types of observation are also observed in other writings (Mayer, 2021).

4. CONCLUSION

To successfully comprehend the objectives of the National Education Policy (NEP-2020), the HE institutions in Tripura must focus on experiential learning component, innovation, and research. To make these possible, institutions must shift focus from traditional, repetitive lecture-based models to Blended Learning (BL) and Artificial Intelligence (AI) based education system. The curriculum must be designed effectively to minimize the repetitive type of instructional design to innovative types of educational systems. The present digital infrastructure in HE in Tripura must be improved to provide multilingual content and adaptive learning resources for diverse student populations. The BL will ensure accessibility features for differently-abled learners. The successful execution of a hybrid model, such as combining an AI-based education system along with the present face-to-face educational system will make a positive transformation to Tripura's higher education system. However, the success of this transition depends entirely on comprehensive institutional preparedness and a collaborative approach of teachers, students and other stakeholders.

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CONFLICTS OF INTEREST

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