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Announcement

EDITED VOLUME

on

Shaping Self-Reliant Bharat through Knowledge and Innovation

An Edited Volume titled '*Shaping Self-Reliant Bharat through Knowledge and Innovation*' is being published. The publication will feature the contributions from eminent educationists on the aforementioned theme. Readers of the University News are also invited to contribute to the Volume by submitting papers/articles on the above theme by **July 15, 2026**. All submissions will be subject to the approval of the Editorial Committee of the University News. The contributions are invited on the following Subthemes:

Integrating Traditional Wisdom in Curriculum and Research.

- Embedding Indian Knowledge Systems (IKS) into Curricula & Faculty Development.
- Interdisciplinary Research Linking Ancient Wisdom with Modern Science & Technology.
- Futuristic Dimensions of IKS.

Promoting Sustainability and Social Responsibility in Higher Education Institutions.

- Research and Innovation in HEIs for Sustainable Development Goals.
- University Social Responsibility (USR) for Promoting Swadeshi.
- Futuristic Digital and Technological Pathways to Sustainability.

Fostering Entrepreneurship and Startups in Higher Education Institutions.

- Education for Increasing Entrepreneurship Mindset in Students.
- Establishing Incubation and Innovation Centres to promote Techno-Nationalism.
- University-Industry Collaboration for Startup Development.

Creating AI and Quantum-enabled Higher Education Institutions.

- Integrating AI and Quantum Technologies into Higher Education Curriculum, Pedagogy and Governance.
- AI-Driven Indigenous Research and Product Development.
- Global Regulatory Framework for AI and Ethics in AI.

Advancing Self-Reliant Bharat through Swadeshi, Economic Patriotism, and Techno-nationalism.

- Redesigning Educational Ecosystem to Promote Swadeshi.
- Promoting Research and Development in Indigenous Technologies.
- Economic Patriotism Leading to Economic Indigenisation.

Any Other Relevant Subthemes

Your expertise and vision in the field of higher education, along with your ideas and strategies, will greatly enrich the upcoming publication. Manuscripts of papers/articles should be approximately 3,000-4,000 words in MS Word format, following APA style for citations and adhering to general publication norms. Please submit your manuscripts by **July 15, 2026** to the Editor, University News, through E-mail: ramapani.universitynews@gmail.com, unaiu89@gmail.com and universitynews@aiu.ac.in.

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Blended Learning: A New Paradigm for Higher Educational Institutions

Shilpi Rijhwani*, Payal Chaturvedi** and T N Mathur***

“Technology will not replace great teachers, but technology in the hands of great teachers can be transformational.”

— George Couros

This quote highlights the synergy between technology and traditional teaching, aligning seamlessly with the vision of the National Education Policy (NEP) 2020 on teacher-led digital education in HEIs. This concept of blended learning is aimed at enhancing accessibility, flexibility, and student engagement by incorporating virtual classrooms, multimedia content, and AI-driven personalised learning. The approach enables learners to progress at their own pace while benefiting from direct interactions with educators, making education more inclusive and learner-centric. In line with NEP's objectives, blended learning will foster multidisciplinary learning, skill development, and a technology-driven educational ecosystem, transforming the landscape of higher education in India. The NEP also emphasises the integration of technology to ensure equitable access to quality education, particularly in remote and far-off areas and also socio-economically disadvantaged regions of the country.

Digital tools such as online courses, AI-powered learning platforms, and adaptive technologies enable institutions to offer personalised learning experiences, bridging gaps in accessibility and inclusivity. Additionally, blended learning supports the flexible curricular structures proposed in NEP, allowing students to explore interdisciplinary courses and acquire industry-relevant skills alongside their core academic programs. The affordability of digital learning further reduces financial barriers, making higher education more accessible to a wider segment of society. While the initial cost of installing systems may be higher, it is a one-time expense, ultimately enhancing long-term accessibility.

The transformation of higher education under NEP is further driven by blended learning's ability to balance academic pursuits with work and personal commitments. By leveraging digital platforms, HEIs can facilitate interactive and self-directed learning, nurturing critical thinking, collaboration, and innovation beyond traditional classroom settings. Universities can optimise resources by combining online and in-person learning, ensuring academic excellence while reducing infrastructural constraints.

*Professor, Department of Botany, IIS (Deemed to be University), Jaipur-302020 (Rajasthan). E-mail: shilpi.rijhwani@iisuniv.ac.in

** Coordinator-IQAC, IIS (Deemed to be University), Jaipur-302020 (Rajasthan). E-mail: payal.mehtani@iisuniv.ac.in

***Vice Chancellor, IIS (Deemed to be University), Jaipur-302020 (Rajasthan). E-mail: tn.mathur@iisuniv.ac.in

More importantly, students gain valuable digital literacy, problem-solving abilities, and lifelong learning skills, preparing them for evolving job markets and global workforce demands. The NEP's focus on technology-driven education, industry-academia collaboration, and global outreach is well-supported by blended learning, making it a fundamental pillar in reshaping the future of higher education in India.

Key Benefits of Blended Learning

Blended learning aligns with the National Education Policy (NEP) 2020 by making education more accessible, flexible, and engaging. By integrating digital tools with traditional teaching, it enhances learning outcomes and supports NEP's emphasis on multidisciplinary education, skill development, and digital transformation in higher education institutions (HEIs).

Accessibility

Accessibility is one of the most significant advantages of blended learning, as it removes geographical barriers and extends quality education to students in remote and underserved areas. Online platforms, virtual classrooms, and digital resources enable learners to enroll in courses that may not be available locally, helping bridge educational gaps. This approach is particularly beneficial for individuals with disabilities, working professionals, and students from economically disadvantaged backgrounds. By leveraging digital infrastructure, HEIs can create an inclusive education system that aligns with NEP's vision of equitable access to knowledge.

Flexibility

Flexibility is another key feature that blended learning offers, catering to diverse learner needs. Unlike traditional classroom-based education, which follows a fixed schedule, blended learning allows students to access lectures, assignments, and resources at their convenience. This model benefits part-time students, adult learners, and professionals who wish to upskill while managing other responsibilities. The ability to revisit course content, progress at an individual pace, and personalise learning experiences enhances student engagement and learning efficiency. NEP's introduction of multiple entry

and exit options, credit-based learning, and interdisciplinary programs is well-supported by blended learning's adaptable nature.

Cost-effectiveness

Cost-effectiveness plays a crucial role in making education more sustainable and widely available. By integrating online components, HEIs can reduce infrastructure and operational costs, allowing institutions to focus on improving the quality of education rather than expanding physical campuses. For students, the financial burden of commuting, accommodation, and purchasing textbooks is minimised, making higher education more affordable. Digital learning resources can also be reused and continuously updated, ensuring students have access to the latest knowledge and skill-based courses. This approach aligns with NEP's goal of making higher education more financially accessible and scalable.

Enhanced Engagement

Enhanced engagement is a key advantage of blended learning, as it introduces interactive elements that make learning more dynamic and student-centred. Traditional lecture-based teaching often struggles to maintain student interest, whereas blended learning incorporates digital tools such as gamification, AI-driven personalised learning, multimedia content, simulations, and virtual labs. These innovations promote active learning, critical thinking, and problem-solving skills. Additionally, features like discussion forums, collaborative projects, and virtual reality experiences encourage student participation, ultimately improving knowledge retention, academic performance, and employability. The NEP's push for experiential learning, industry-academia collaboration, and competency-based education is well-supported by these engaging learning methodologies.

Challenges and Limitations

Digital Divide

One of the most significant challenges in implementing blended learning within HEIs is the digital divide. Many students, particularly those in rural and economically disadvantaged areas, lack access to high-speed internet, digital devices, and a reliable power supply. This disparity creates unequal learning opportunities,

where students from well-equipped urban areas have a clear advantage over their peers from underserved regions. Bridging this gap requires significant investment in digital infrastructure, affordable internet solutions, and initiatives that provide students with the necessary technological resources.

Teachers' Training

For blended learning to be effective, educators must possess the necessary digital literacy and instructional design skills. Many faculty members, particularly those accustomed to traditional teaching methods, face challenges in adapting to online platforms, digital assessments, and interactive teaching tools. Effective integration of technology requires a shift in pedagogy, content delivery, and student engagement strategies. Without proper training and continuous professional development programs, educators may struggle to fully utilise the benefits of blended learning, reducing its impact on student learning outcomes.

Student Motivation and Time Management

Blended learning offers flexibility, but it also demands self-discipline, motivation, and time management skills from students. Without the structure of regular classroom attendance, some learners may struggle with procrastination, lack of focus, and disengagement from coursework. This is particularly challenging for students who are new to self-paced learning or who lack a strong academic support system. To address this, HEIs must implement strategies such as mentorship programs, regular check-ins, interactive discussions, and gamified learning approaches to maintain student motivation and ensure accountability.

Assessment Challenges

Assessing students in a blended learning environment presents unique difficulties. Traditional assessment methods, such as written exams and in-person evaluations, may not always be applicable in an online or hybrid setting. Ensuring academic integrity during remote assessments is a major concern, as students may have access to external resources, making it harder to gauge genuine understanding. HEIs must explore alternative assessment models, such as project-based

evaluations, AI-driven monitoring, open-book exams, and competency-based assessments, to ensure fair and effective evaluation of student performance.

Resistance to Change

Despite the numerous advantages of blended learning, resistance to change remains a challenge among both faculty and students. Many educators are hesitant to shift from conventional teaching methods, fearing increased workload, technological difficulties, or diminished student engagement. Similarly, students who are accustomed to traditional face-to-face instruction may struggle with adapting to digital platforms and self-paced learning. Overcoming this resistance requires a cultural shift within HEIs, supported by institutional policies that provide adequate training, infrastructure, and incentives to encourage the adoption of blended learning.

The Role of Blended Learning in Higher Education Under NEP

The National Education Policy (NEP) envisions a transformative shift in higher education by integrating blended learning as a core pedagogical approach. By combining digital tools with traditional teaching methods, NEP aims to provide students with greater flexibility and expanded access to high-quality education. Online degree programs, endorsed under the policy, facilitate remote learning while maintaining academic excellence, allowing students to earn certifications without geographical constraints. Additionally, MOOCs (Massive Open Online Courses) align with NEP's vision of democratizing education, offering affordable and globally recognised learning opportunities from premier institutions. The introduction of virtual labs further strengthens this framework, enabling students in science, engineering, and medical disciplines to gain hands-on experience through simulations and augmented reality. By fostering digital proficiency, interactive learning, and skill-based education, NEP positions blended learning as a key driver in modernising HEIs and making education more inclusive and future-ready.

Conclusion: The Future of Blended Learning

The National Education Policy (NEP) envisions a future where blended learning plays

a pivotal role in transforming higher education, bridging the gap between traditional and digital learning methodologies. With its emphasis on accessibility, flexibility, and cost-effectiveness, blended learning aligns with NEP's goals of making education more inclusive, skill-driven, and globally competitive. By integrating digital technologies with conventional teaching, this approach enhances workforce training, lifelong learning, and interdisciplinary education, equipping students with future-ready skills.

As advancements in AI-driven personalisation, VR-based simulations, and adaptive learning continue to evolve, blended learning will further revolutionise engagement and knowledge retention. HEIs will expand their online and hybrid degree programs, while industries will increasingly integrate digital training modules

to prepare graduates for the demands of the modern workforce. To fully realise NEP's vision, significant investment in digital infrastructure, teacher capacity-building, and student support systems is crucial. Collaborative efforts from the government, educational institutions, and private stakeholders will be essential in ensuring that technology-driven learning reaches all learners, bridging the digital divide.

Blended learning is no longer just an alternative approach—it is an essential pillar of NEP's roadmap for higher education reform. By embracing technological advancements, inclusive policies, and innovative pedagogies, HEIs can maximize its potential, making education more accessible, engaging, and future-ready for a knowledge-driven economy. □

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Recent Progress in Tamil Nadu's Economic Development (2021–2025): A Comprehensive Theoretical Assessment of Growth in Agriculture, Industry, Services, and Socioeconomic Infrastructure

G Yoganandham*

Tamil Nadu's economic journey from 2021 to 2025 paints a dynamic tapestry of thriving farms, rising factories, buzzing service hubs, and empowered communities. Fueled by innovation and inclusive policies, the state emerged as a model of balanced and forward-looking growth. This theoretical assessment explores the state's strategic advancements and policy-driven transformations aimed at inclusive and sustainable development. In agriculture, Tamil Nadu enhanced crop diversification, improved irrigation efficiency, and adopted precision farming, leading to increased productivity and resilience in the face of climate change. Industrial growth was driven by sectoral expansion in automobiles, electronics, and renewable energy, backed by strong MSME support and foreign direct investment. Strategic industrial corridors and special economic zones further bolstered the manufacturing base.

The services sector continued to dominate the state economy, particularly in information technology, financial services, healthcare, and education. Chennai's emergence as a digital and fintech hub accelerated employment and innovation. Socioeconomic infrastructure saw major improvements through investments in rural roads, health systems, and skill development initiatives, including schemes like Naan Mudhalvan and the Chief Minister's Skill Development Mission. The integration of digital governance, public-private partnerships, and green infrastructure signalled Tamil Nadu's commitment to inclusive growth and climate sustainability. The period also witnessed notable reductions in multidimensional poverty and improvements in social indicators such as literacy, maternal health, and access to sanitation. Tamil Nadu's comprehensive development model, emphasising economic diversification, human capital, and environmental sustainability, offers

a replicable framework for other Indian states. This research explores pressing and contemporary issues that are highly relevant in today's rapidly evolving and interconnected world, highlighting their importance in the present-day context.
(Abstract)

Introduction

Tamil Nadu has emerged as one of India's most economically progressive states, exhibiting balanced growth across agriculture, industry, services, and socioeconomic infrastructure. With a vision to become a trillion-dollar economy, the state has implemented a range of development-oriented policies and institutional reforms aimed at fostering inclusive and sustainable economic growth. These efforts reflect a synergy between public investment, private sector participation, and policy innovation. In agriculture, Tamil Nadu has made notable strides through climate-resilient farming, integrated water management, and crop diversification strategies. The government's consistent push for agri-tech adoption, improved irrigation coverage, and direct market access has enhanced agricultural productivity and farmer incomes. The agriculture budget has evolved into a distinct and dynamic policy tool, reinforcing the rural economy. The industrial sector has experienced renewed momentum due to strategic investments in the manufacturing, automobile, and electronics sectors. Industrial corridors, skill development initiatives, and investor summits have strengthened the state's global competitiveness. Tamil Nadu's focus on green energy, industrial automation, and MSME development has also contributed to employment generation and technological upgrading.

Services have become the backbone of the state's economy, accounting for over half the Gross State Domestic Product (GSDP). IT and IT-enabled services, financial services, tourism, healthcare, and education have expanded rapidly, supported by digital infrastructure, urban reforms, and skill-building programs like "Naan Mudhalvan."

**Professor & Head, Department of Economics, Director-Centre for Knowledge, Thiruvalluvar University Serkkadu, Vellore, Tamil Nadu-632 115.*

Equally critical has been the state's investment in socioeconomic infrastructure, roads, ports, power, water supply, education, and healthcare, which has laid a strong foundation for inclusive growth. Programs like "*Makkalai Thedi Maruthuvam*" and "*Namakku Naame Thittam*" have furthered access to services and community participation. This theoretical assessment explores the recent progress in Tamil Nadu's economic development by examining sectoral growth patterns and their broader socioeconomic implications, offering insights into the state's evolving development paradigm.

Statement of the Problem

Tamil Nadu has experienced notable economic growth from 2021 to 2025, marked by a consistent real Gross State Domestic Product (GSDP) growth rate of over 8% annually. This trajectory positions the state as a significant contributor to India's economy, accounting for approximately 9.21% of the national GDP in 2023–24. The state's economic structure is diversified across agriculture, industry, and services. Agriculture's contribution to GSDP has remained steady at around 13%, while the industrial sector, particularly manufacturing, has shown robust growth. Tamil Nadu leads in sectors such as automobile production, textiles, and leather exports, and has become a hub for electric vehicle manufacturing. The services sector, encompassing information technology, education, and healthcare, constitutes over 50% of the GSDP. Infrastructure development has been a focal point, with significant investments in transportation, digital connectivity, and urban amenities. Projects like the Bengaluru–Chennai Expressway and the establishment of TIDEL Park Pattabiram exemplify the state's commitment to enhancing its infrastructure.

Despite these advancements, challenges persist in achieving balanced regional development, addressing social disparities, and ensuring sustainable growth. The state's economic policies and initiatives must be critically assessed to understand their effectiveness in fostering inclusive and equitable development. This study aims to provide a comprehensive theoretical assessment of Tamil Nadu's economic development from 2021 to 2025, focusing on the growth dynamics within agriculture, industry, services, and socioeconomic infrastructure. By examining these sectors, the

research seeks to identify key drivers of growth, underlying challenges, and policy implications for sustainable development. This research explores pressing and current challenges that hold great importance in our fast-changing and interconnected global environment, highlighting their significance in the present day.

Objective of the Article

The overall objective of the article is to provide a comprehensive assessment of Tamil Nadu's economic progress from 2021 to 2025, highlighting the state's balanced growth across agriculture, industry, and services. It focuses on policy-driven transformations that promote inclusivity, sustainability, and innovation. The objective is to showcase Tamil Nadu's strategic advancements in human capital development, infrastructure, and climate resilience. Ultimately, it presents the state as a model for sustainable and inclusive development for other regions to emulate with the help of secondary sources of information and statistical data pertaining to the theme of the article.

Research Methodology

The research methodology of this article is primarily based on the systematic review and analysis of secondary sources of information, including government reports, policy documents, economic surveys, academic studies, and statistical databases from 2021 to 2025. Quantitative data on agriculture, industrial growth, services sector performance, human development indicators, and infrastructure investments have been collected from reliable sources such as the Tamil Nadu government's publications, the Reserve Bank of India, the Ministry of Statistics and Programme Implementation, and international organisations. Qualitative analysis involves assessing policy frameworks, developmental schemes, and initiatives like Naan Mudhalvan and the Chief Minister's Skill Development Mission to understand their impact on inclusive growth and sustainability. Comparative analysis with previous years and other Indian states is used to contextualise Tamil Nadu's progress. This mixed-method approach ensures a holistic evaluation of economic, social, and environmental dimensions, providing an evidence-based understanding of Tamil Nadu's balanced and forward-looking development trajectory. This method ensures a comprehensive evaluation, leading to meaningful insights, robust

conclusions, and informed recommendations for policy-making.

Economic Trends and Policy Developments in Tamil Nadu (2021–2025)

Tamil Nadu has demonstrated robust economic growth and progressive policy initiatives, positioning itself as a dynamic state in India. Tamil Nadu's Gross State Domestic Product (GSDP) for 2024–25 is projected at ₹31.55 lakh crore, reflecting a 16% increase over the previous year. In 2023–24, the state's economy grew by 8.2%, with the services sector contributing 53%, manufacturing 34%, and agriculture 13% to the GSDP. The per capita GSDP rose by 14% to ₹3.5 lakh in 2023–24. The fiscal deficit for 2024–25 is estimated at 3.4% of GSDP (₹1.08 lakh crore), while the revenue deficit stands at 1.6% (₹49,279 crore). The state has prioritised infrastructure to attract investments. The Bengaluru–Chennai Expressway, expected to be completed by August 2025, will reduce travel time between the two cities from 7–8 hours to 2–3 hours, fostering industrial growth along its corridor. Additionally, a ₹10,000 crore mega shipyard project is proposed in Thoothukudi, aiming to bolster India's shipbuilding capabilities. The Tamil Nadu Global Investors Meet 2024 attracted investment commitments totaling ₹6.64 lakh crore, doubling the figures from the 2019 meet. Major investors include Tata Power (₹70,800 crore) and Adani Group (₹42,768 crore), focusing on sectors like renewable energy, electric vehicles, and manufacturing. To streamline industrial operations, the state expanded its 'white category' industries from 37 to 609, exempting them from certain environmental clearances to promote ease of doing business.

Tamil Nadu has implemented several welfare schemes to enhance human capital. The 'Magalir Vidiyal Payanam Thittam' provided free bus rides to women, saving them an average of ₹888 per month. The 'Kalaigal Magalir Urimai Thittam' offers ₹1,000 monthly assistance to 1.15 crore women. In education, the 'Illam Thedi Kalvi' program engaged over 200,000 volunteers to teach 3.3 million students, addressing learning losses post-COVID-19. In 2021, Tamil Nadu presented its first agriculture budget, aiming to increase cultivable land from 60% to 75%. The 'Kalaigal Anaiyaru Grama Orunginaindha Velan Valarchi Thittam' was launched to convert wastelands into productive agricultural areas,

enhancing food security and rural livelihoods. Tamil Nadu's strategic focus on infrastructure, industrial growth, and social welfare between 2021 and 2025 has fostered economic resilience and inclusivity. Continued emphasis on fiscal prudence and human capital development will be crucial for sustaining this momentum.

Revitalising Tamil Nadu's Agriculture: Embracing Growth, Innovation, and Sustainability

Tamil Nadu's agriculture sector is undergoing a transformative phase, marked by significant growth, technological adoption, and a strong commitment to sustainability. The state's strategic initiatives aim to enhance productivity, support farmers, and ensure environmental stewardship. Tamil Nadu has demonstrated impressive strides in agricultural productivity. The gross cropped area expanded from 146.77 lakh acres in 2019-20 to 151 lakh acres in 2023-24. Notably, the double-cropped area increased from 29.74 lakh acres to 33.60 lakh acres during the same period. The state leads nationally in ragi production and ranks second in maize, oilseeds, and sugarcane. In 2021–22, Tamil Nadu produced 7.9 million tonnes of rice, 16.1 million tonnes of sugarcane, and 4.95 million tonnes of bananas. The Tamil Nadu government has allocated ₹45,661 crore for agriculture and allied sectors in the 2025-26 budget, marking an 8% increase from the previous year. Key provisions include ₹12,500 crore for food subsidies, ₹525 crore for paddy procurement incentives, and ₹17,000 crore for cooperative crop loans. Additionally, ₹841 crore is earmarked for crop insurance covering 35 lakh acres. Specific support for sugarcane farmers includes a ₹349 per metric ton incentive, raising the total price to ₹3,500 per metric ton, benefiting approximately 1.3 lakh farmers.

The state is embracing sustainable agricultural practices to ensure long-term viability. The 'Chief Minister's Mannuyir Kaathu Mannuyir Kaappom Scheme' focuses on soil fertility conservation with a ₹206 crore allocation. Under the Green Tamil Nadu Mission, 1,700 hectares of degraded mangrove forests have been restored, enhancing carbon sequestration and coastal protection. The 'One Village – One Crop' initiative aims to boost production in rural areas by focusing on specific crops in each village. Additionally, 100 Uzhavar Angadis are being established to provide direct access to quality agricultural produce for urban consumers. Tamil Nadu is at the forefront of integrating technology

into agriculture. The TN-IAMWARM project promotes water-saving technologies and precision farming techniques, including drip fertigation for crops like sugarcane and banana. The state is also fostering agri-tech startups, providing subsidies to encourage innovation in the sector. Tamil Nadu's agricultural sector is a model of growth, innovation, and sustainability. Through strategic investments, adoption of modern technologies and a focus on environmental conservation, the state is paving the way for a resilient and prosperous agricultural future.

Factors Influencing Industrial Growth in Tamil Nadu: Diversification, Micro, Small, and Medium Enterprises, Manufacturing Hubs, and Government Incentives

Tamil Nadu has emerged as a pivotal industrial powerhouse in India, driven by diversification, robust MSME participation, strategic manufacturing hubs, and proactive government incentives. The state's industrial landscape is characterised by a diversified portfolio encompassing textiles, automobiles, electronics, and agritech. Tamil Nadu contributes approximately one-third to India's manufacturing Gross Value Added (GVA), with significant outputs in textiles, automobiles, and electronics. Coimbatore, often dubbed the "Manchester of South India," is renowned for its extensive textile industry, while Chennai's automotive sector, termed the "Detroit of India," accounts for over 35% of India's automobile production. Micro, Small, and Medium Enterprises (MSMEs) are integral to Tamil Nadu's industrial framework. The state is home to 49.48 lakh MSMEs, representing about 8% of India's total, and employing approximately 96.73 lakh individuals. These enterprises are pivotal in sectors like leather goods, engineering, and textiles. In 2021, commercial banks disbursed ₹1.06 lakh crore in credit to over 18.6 lakh MSMEs in Tamil Nadu.

Tamil Nadu's strategic infrastructure bolsters its manufacturing prowess. The state hosts major industrial parks and SEZs, such as the Tidel Park in Coimbatore and the Salem Steel Plant. Additionally, the establishment of the Kochi-Bangalore Industrial Corridor, with the Palakkad node in Kerala, aims to enhance connectivity and industrial synergy between Tamil Nadu and neighboring regions. The Tamil Nadu government has implemented several policies to stimulate industrial growth. The

Industrial Policy 2021 targets attracting ₹10 lakh crore in investments and generating 20 lakh jobs by 2025. Incentives include SGST reimbursements, capital subsidies up to 40%, and interest subsidies for sectoral modernisation. Programs like "Naam Mudhalvan" focus on skill development, while the "Single Window Portal" streamlines business approvals, enhancing the ease of doing business. Tamil Nadu's industrial growth is a testament to its strategic diversification, MSME empowerment, infrastructural development, and supportive government policies. These factors collectively position the state as a leading industrial hub in India, attracting both domestic and international investments.

Driving Economic Growth: The Role of Information Technology, Information Technology-Enabled Services, Fintech, Education, and Tourism in the Services Sector

Tamil Nadu is one of India's most industrialised and economically vibrant states. The state's economy has transitioned from a predominantly agricultural base to a more diversified one, where the services sector plays a pivotal role. Among the many service-driven industries, Information Technology (IT)/Information Technology Enabled Services (ITES), fintech, education, and tourism stand out as key contributors to Tamil Nadu's economic growth. Tamil Nadu, particularly Chennai, is recognised as one of the leading IT/ITES hubs in India. With more than 200,000 employees in the sector, Tamil Nadu contributes significantly to India's IT export revenue. The state's IT exports were valued at around \$12 billion in 2022, and Chennai alone accounts for approximately 60% of the total IT/ITES revenue in the state. This industry is crucial for economic growth, creating job opportunities and fostering innovation, particularly in software development, business process outsourcing (BPO), and IT consulting. The fintech sector in Tamil Nadu is also burgeoning. Chennai is home to several leading fintech startups, which have capitalised on the growing demand for digital financial services. In 2023, Tamil Nadu's fintech ecosystem attracted investments totaling \$1.2 billion, positioning it as a major player in India's financial technology landscape. The rise of digital payment solutions, mobile banking, and blockchain applications has contributed to financial inclusion, offering both urban and rural populations access to efficient financial services.

Education is another cornerstone of Tamil Nadu's services sector. With over 30,000 educational institutions, including top-tier universities like the Indian Institute of Technology (IIT) Madras, Tamil Nadu has positioned itself as an educational hub. In 2022, the state saw over 15 lakh students enrol in higher education, contributing to the state's workforce's skill development. The education sector not only supports local demand but also attracts international students, boosting the local economy. Tourism is one of the largest service industries in Tamil Nadu. The state's rich cultural heritage, historical sites, and scenic landscapes attract millions of tourists annually. In 2023, Tamil Nadu ranked as the second-highest state in India for domestic tourist arrivals, with over 350 million visitors. The tourism sector contributed approximately ₹46,000 crore to the state's economy, supporting millions of jobs in hospitality, transport, and retail industries. In short, Tamil Nadu's services sector, driven by IT/ITES, fintech, education, and tourism, has been a major engine of economic growth. These industries not only generate employment and foster innovation but also create a diverse and resilient economic base, propelling Tamil Nadu towards sustained growth in the coming decades.

Economic Implications of Infrastructure Development in Transportation, Energy, and Connectivity

Infrastructure development in Tamil Nadu particularly in transportation, energy, and connectivity has significantly influenced the state's economic growth, industrial expansion, and social welfare. Tamil Nadu boasts an extensive road network of approximately 271,000 km, with a road density of 2,084.71 km per 1,000 km², surpassing the national average. The upcoming Bengaluru–Chennai Expressway, set to be completed by August 2025, will reduce travel time between the two cities from 7–8 hours to just 2–3 hours, enhancing trade and industrial development along its corridor. However, road safety remains a concern. In 2019, road accidents cost the Tamil Nadu economy ₹56,543 crore, nearly 2.5% of its GDP. As of FY24, Tamil Nadu's total installed power generation capacity stands at 39.80 GW, with renewable energy contributing 20.03 GW. The state leads in wind power capacity, exceeding 8,000 MW, primarily in regions like Palghat Gap and Muppandal. To integrate renewable energy into the grid, a transmission system costing ₹719.76

crore is planned under the Green Energy Corridor-II scheme, aiming to add 4,000 MW of renewable capacity.

The Chennai Metro Rail project, funded through land value capture mechanisms, is expanding to improve urban mobility and fund affordable housing. Additionally, the 'Magalir Vidiyal Payanam Thittam' scheme has facilitated over 682 crore free bus rides for women, differently-abled individuals, and transgender persons, with women saving an average of ₹888 per month. These infrastructure initiatives have attracted significant investments. Between October 2019 and March 2024, Tamil Nadu received cumulative FDI inflows of US\$10.93 billion. The state's merchandise exports reached US\$43.56 billion in FY24, reflecting its robust industrial base. In short, Tamil Nadu's strategic investments in infrastructure have not only propelled economic growth but also enhanced social equity and environmental sustainability.

Human Capital Formation: Advancing Education, Health, and Skill Development

Tamil Nadu has emerged as a frontrunner in human capital development in India, driven by progressive initiatives in education, healthcare, and skill development. These efforts have significantly enhanced the state's socio-economic indicators, positioning it as a model for holistic growth. Tamil Nadu boasts a robust educational infrastructure, with 26 universities, 15 engineering colleges, 35 arts and science colleges, 8 management institutes, and 8 medical colleges ranked among the top 100 in India as per the 2023 National Institutional Ranking Framework (NIRF). The state has implemented the 'Vaanaivil Mandram' initiative, introducing 100 mobile science and mathematics laboratories to over 13,200 schools, benefiting approximately 2 million students. This program emphasizes activity-based learning in STEM subjects, moving away from rote memorization. Tamil Nadu has made remarkable strides in healthcare, particularly in reducing maternal and infant mortality rates. The state's Infant Mortality Rate (IMR) declined from 13 per 1,000 live births in 2020 to 8.2 during April-December 2023. Notably, Coimbatore district recorded the lowest IMR in the state at 5.5 per 1,000 live births in 2024-25, with the city corporation achieving an even lower rate of 3.9.

The Maternal Mortality Ratio (MMR) also saw a significant decline, dropping from 52.2 per

100,000 live births in 2022-23 to 45.5 in 2023-24. Virudhunagar Health Unit District achieved a milestone by recording zero maternal deaths from April 2023 to March 2024. Despite producing the highest number of graduates in India, Tamil Nadu faces challenges related to skill mismatches in the workforce. Over 5.4 million individuals have registered with the state's District Employment and Career Guidance Centres, indicating a need for targeted skill development programs. The ICT Academy, a public-private partnership initiative, addresses this gap by focusing on faculty development, student skill enhancement, entrepreneurship, and industry-institute collaboration. Tamil Nadu's integrated approach to education, healthcare, and skill development has significantly contributed to human capital formation. While the state has made commendable progress, ongoing efforts to align educational outcomes with industry requirements are essential to sustain and enhance this growth trajectory.

Bridging Urban-Rural Linkages and Addressing Regional Imbalances for Inclusive Growth

Bridging urban-rural linkages and addressing regional imbalances is crucial for achieving inclusive growth in Tamil Nadu. The state, while being one of India's leading economic powerhouses, faces stark regional disparities. Urban centres such as Chennai, Coimbatore, and Madurai are economic hubs, contributing significantly to the state's GDP, while rural areas remain underdeveloped. Addressing these regional imbalances is essential for fostering equitable economic development. Urban areas in Tamil Nadu drive much of the state's economic activity, with Chennai alone accounting for nearly 60% of the state's GDP. However, a vast majority of Tamil Nadu's population (around 48% as per the 2011 census) still resides in rural areas. Bridging the gap between these urban and rural areas is essential for inclusive development. Strengthening infrastructure, improving connectivity through better roads, railways, and broadband access, and promoting rural-urban trade linkages can be key strategies to achieve this. For instance, enhancing rural access to urban markets will facilitate the sale of agricultural produce, reduce transaction costs, and ensure better prices for farmers. Additionally, encouraging the establishment of rural industries (like agro-processing units) in these areas can create jobs and reduce migration pressures on

urban centres. According to a 2021 report by the National Institute of Rural Development and Panchayati Raj (NIRDPR), 67% of rural households in Tamil Nadu still rely on agriculture, which remains vulnerable to climate risks and market fluctuations. Diversifying rural economies and promoting skill development can help break this cycle of dependence on agriculture. In Tamil Nadu, the disparity between the more developed regions (like Chennai, Coimbatore, and Tiruchirappalli) and the underdeveloped regions (like Dharmapuri, Villupuram, and Nilgiris) is evident. Data from the Tamil Nadu State Planning Commission shows that while Chennai and Coimbatore contribute a combined 30% to the state's industrial output, districts like Dharmapuri and Ariyalur have significantly lower industrial growth, leading to employment and income disparities.

To address these imbalances, the state government has initiated several schemes like the Tamil Nadu Rural Transformation Project, which focuses on creating rural clusters for entrepreneurship and industrial growth. These initiatives aim to improve the investment climate in lagging regions and provide better opportunities for local populations. Moreover, enhancing access to education and healthcare in underdeveloped regions can boost human capital and lead to long-term sustainable growth. Bridging urban-rural linkages and addressing regional disparities in Tamil Nadu requires a multi-pronged approach that includes infrastructure development, economic diversification, and the promotion of inclusive growth policies. By focusing on these areas, Tamil Nadu can ensure that its growth is both sustainable and equitable, ultimately contributing to a more inclusive state economy.

Impact of Welfare Schemes on Poverty Alleviation

Between 2020 and 2025, Tamil Nadu's welfare schemes have significantly contributed to poverty alleviation, focusing on women, education, infrastructure, and marginalized communities. The *Kalaignar Magalir Urimai Thogai Thittam* allocates ₹1,000 monthly to 1.15 crore women, amounting to ₹13,807 crore in the 2025-26 budget. This scheme strengthens women's financial independence. Similarly, the Pudhumai Penn Scheme provides ₹1,000 monthly to over 2.73 lakh female students pursuing higher education, contributing to a 34% rise in college admissions. Both programs play a

vital role in empowering women by improving their economic status and increasing access to education, ensuring that women are better positioned to contribute to society and the economy. The *Magalir Vidiyal Payanam Thittam* has provided 682.02 crore free bus rides for women, differently-abled individuals, and transgender persons, allowing women to save around ₹888 monthly. This initiative significantly lowers transportation costs, making travel more affordable and accessible. By reducing financial barriers, the scheme promotes greater mobility and enhances access to various opportunities, including employment, education, and healthcare. This transportation subsidy is a crucial step in ensuring the inclusivity of marginalised groups, allowing them to participate more fully in social and economic activities.

The *Illam Thedi Kalvi* program, initiated in 2021, utilises 200,000 women volunteers to teach 3.3 million students in 92,000 communities, helping recover learning losses. At the same time, the Naan Mudhalvan scheme has equipped 28 lakh students with skills, including coding and robotics, thereby improving their job prospects. These programs focus on empowering women and enhancing education and skill development, ultimately boosting employability and addressing educational disparities. Through these efforts, students gain the necessary tools to contribute more effectively to the workforce and society. The Chief Minister's Thayumanavar Scheme, introduced in February 2024, earmarks ₹27,922 crore over two years to support 5 lakh of the most vulnerable families, including the destitute, elderly, orphaned children, single-parent households, and individuals with disabilities. This initiative provides a holistic approach, addressing essential needs such as education, employment, housing, and healthcare. By targeting marginalised groups, the scheme aims to improve their quality of life and offer opportunities for empowerment, ensuring a more inclusive society where basic needs and opportunities for progress are accessible to all.

The government has revived 5,000 water bodies with an investment of ₹500 crore to enhance irrigation and water access. Additionally, the Hut-free Mission plans to build 8 lakh concrete houses by 2030, improving living conditions for low-income families. In 2025, the state launched a ₹20,000 subsidy for 2,000 gig workers to buy e-scooters and introduced an insurance scheme for 150,000 workers, aiming

to address employment challenges and improve the welfare of those in the gig economy. NITI Aayog reports Tamil Nadu's multidimensional poverty index at just 2.2%, highlighting the success of welfare schemes in reducing poverty. These initiatives empower individuals, improve access to education and employment, and raise living standards, showcasing the state's dedication to poverty alleviation.

Green Initiatives and Climate Resilience in Tamil Nadu

Tamil Nadu has been actively promoting green initiatives to combat climate change, focusing on renewable energy, particularly wind and solar power. The state has implemented various afforestation projects, sustainable agriculture practices, and water conservation efforts to enhance resilience against climate impacts. The Tamil Nadu Green Climate Fund supports local climate adaptation initiatives. Additionally, the state's climate action plans aim to reduce carbon emissions and increase disaster preparedness. Tamil Nadu's commitment to environmental sustainability positions it as a leader in climate resilience within India. Between 2020 and 2025, Tamil Nadu has made significant strides in promoting environmental sustainability and climate resilience through green initiatives, renewable energy advancements, and disaster mitigation efforts. Tamil Nadu has emerged as a leader in renewable energy in India. As of September 2024, the state's total installed power capacity stood at 41,126.68 MW, with 23,659.34 MW from renewable sources, accounting for approximately 52% of the total capacity. This includes 11,042.44 MW from wind and 9,270.2 MW from solar energy, making Tamil Nadu the second-largest producer of wind energy and the third-largest producer of solar energy in the country. The state has set an ambitious target to increase its renewable energy capacity by 30 GW over the next six years, aiming for 50% of its energy consumption to come from renewable sources by 2030. To achieve this, Tamil Nadu has introduced policies for wind repowering, small hydel projects, and pumped hydro storage development.

In 2022, the Tamil Nadu government launched the Green Tamil Nadu Mission with the goal of increasing the state's green cover from 23.7% to 33% by 2032. The mission facilitates tree planting

initiatives and encourages public participation through an online portal for purchasing seedlings. Additionally, the state has supported the development of solar manufacturing facilities. Notably, Tata Power Solar Systems Limited began commercial production of a 2 GW solar cell line in Tirunelveli in September 2024, with plans to expand to 4.3 GW. First Solar also established a 3.3 GW annual capacity production facility in the state, including a solar PV recycling plant. Tamil Nadu has implemented several measures to enhance disaster resilience. The *Kudimaramathu* Scheme, initiated in 2017, focuses on the restoration of 16,098 tanks and lakes, benefiting over six lakh farmers by improving irrigation and groundwater levels. Furthermore, the state has conducted disaster preparedness drills at major dams and water reservoirs, simulating scenarios such as pipeline ruptures and fires to evaluate emergency response capabilities. In wildlife conservation, the government inaugurated eco-friendly housing for mahouts and *cavadies* at the *Theppakadu* elephant camp in the Nilgiris, enhancing the living conditions of caregivers and promoting sustainable practices. Through strategic investments in renewable energy, implementation of green initiatives, and proactive disaster mitigation measures, Tamil Nadu is making significant progress toward environmental sustainability and climate resilience. These efforts not only contribute to the state's ecological health but also set a benchmark for other regions in India.

Tamil Nadu's Vision 2030: Path to a \$1 Trillion Economy

Tamil Nadu aims to become a \$1 trillion economy by 2030, a goal set by Chief Minister MK Stalin. As of 2023–24, the state's Gross State Domestic Product (GSDP) stood at ₹27.22 trillion, growing at 8.23% at constant prices. To achieve this target, the state must sustain an annual growth rate of over 12%, focusing on industrial expansion, infrastructure development, and technological advancements. Tamil Nadu plans to boost industrial growth by developing key corridors like Chennai-Bangalore and Chennai-Kanyakumari, fostering industrial and port-based economic expansion. The state also aims to enhance infrastructure with significant road projects, including the construction of 2,000 km of rural roads and 4,457 km of urban roads during 2024–25. These initiatives are designed to improve connectivity, support economic growth, and strengthen the state's

industrial framework. Through these projects, Tamil Nadu is prioritising infrastructure development to ensure sustained progress and regional economic integration.

The state is focusing on emerging sectors like high-tech electronics, semiconductors, biotechnology, and defence to drive economic growth. Additionally, Tamil Nadu hosts 150–170 Global Capability Centres (GCCs), contributing up to 10% of the \$1 trillion target. The 'Skill Gap Assessment and Action Plan for Tamil Nadu, 2019' highlights the need for 32.78 lakh skilled and semi-skilled workers by 2025. To address this gap, the state is focusing on educational and vocational training initiatives aimed at equipping the workforce with the necessary skills. These efforts are designed to enhance employability and meet the growing demand for skilled labour in various sectors. The Economic Survey highlights the importance of inclusive growth by fostering rural entrepreneurship, increasing women's workforce participation, and incorporating emerging technologies into both industrial and service sectors. These strategies aim to ensure broader economic participation and sustainable development across various segments of society. In 2024, the Tamil Nadu Global Investors Meet secured ₹6.64 lakh crore in investments, double the amount raised in the 2019 edition. The state has also implemented policies such as the Tamil Nadu Export Promotion Strategy and the Tamil Nadu FinTech Policy to drive economic growth and support key sectors. Achieving a \$1 trillion economy by 2030 is an ambitious yet attainable goal for Tamil Nadu. With strategic investments in infrastructure, technology, workforce development, and inclusive growth, the state is poised to become a significant economic powerhouse in India.

Overall Economic Development from 2020-21 to 2024- 25

Between 2020–21 and 2024–25, Tamil Nadu has demonstrated robust economic growth, driven by strategic investments, industrial expansion, and progressive social policies. Tamil Nadu's Gross State Domestic Product (GSDP) grew at 8.23% in 2023–24, following 8.13% in 2022–23 and 7.89% in 2021–22, surpassing the national average. The state's per capita income at constant prices reached ₹1,79,732 in 2023–24, 1.68 times the national average. The agriculture sector grew at an average of 5.56% over four years, up from 1.36% previously. Cultivated

area expanded from 36.07 lakh hectares in 2020–21 to 38.33 lakh hectares in 2023–24. Tamil Nadu leads in motor vehicle, apparel, and leather production. It is a top exporter of engineering goods, electronics, and textiles. The state houses over 1,500 automobile and auto component factories. Contributing 45.90% to GSDP in 2023–24, the services sector grew at 9.25% in real terms.

Merchandise exports doubled from \$26.15 billion in 2020–21 to \$52.07 billion in 2024–25. Electronic goods exports surged from \$1.66 billion to \$14.6 billion, making Tamil Nadu the top exporter in this category. The Tamil Nadu Global Investors Meet 2024 attracted ₹6.64 lakh crore in investments, double that of 2019. Major investors include Tata Power and Adani Group. Infrastructure projects like the Bengaluru–Chennai Expressway, set for completion by August 2025, are expected to boost regional development. Welfare schemes such as Pudhumai Penn and Naan Mudhalvan have enhanced education and skill development. The state's poverty rate declined from 36.54% in 2005–06 to 1.43% in 2022–23. In short, Tamil Nadu's strategic focus on diversified economic growth, infrastructure development, and social welfare has significantly advanced its economic development from 2020–21 to 2024–25.

Conclusion

Tamil Nadu has made significant strides in economic development between 2021 and 2025, marked by steady growth across agriculture, industry, and services. The state's emphasis on technology adoption, industrial diversification, and digital services has boosted productivity and employment. Investments in rural infrastructure and welfare schemes have improved socioeconomic indicators. The integration of sustainability and inclusive growth has enhanced long-term development prospects. Overall, Tamil Nadu's balanced growth model positions it as a leading economic force in India. Between 2021 and 2025, Tamil Nadu has showcased remarkable progress across its economic, social, and environmental sectors, establishing itself as a dynamic and resilient state. Strategic focus on infrastructure development, technological innovation, and policy reforms has propelled growth in agriculture, industry, and services, while fostering inclusivity and sustainability. The state's robust GDP growth, rising per capita income and substantial investments culminating in the Tamil Nadu Global

Investors Meet 2024 highlight its appeal to domestic and international investors. Initiatives such as the Bengaluru–Chennai Expressway, mega shipyard projects, and the expansion of industrial parks have significantly enhanced connectivity and industrial capacity, positioning Tamil Nadu as a manufacturing and logistics hub.

Simultaneously, Tamil Nadu's agricultural sector has embraced technological advances and sustainable practices, leading to increased productivity and food security. Social welfare schemes targeting women, education, healthcare, and marginalised communities have contributed to poverty alleviation and human capital development, fostering a more inclusive growth model. The state's emphasis on green energy, climate resilience, and environmental conservation underscores its commitment to sustainable development, with renewable energy capacities surpassing national averages. Looking ahead, Tamil Nadu's vision to attain a \$1 trillion economy by 2030 hinges on continued investments in emerging sectors, infrastructure, and skill development. The collective efforts in fostering innovation, diversification, and inclusive policies position Tamil Nadu as a leading economic powerhouse in India. Sustained focus on balancing rapid growth with environmental and social responsibility will be essential to realise its ambitious goals and ensure long-term prosperity for all its citizens.

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The DIAMOND Framework: A Structured Pathway to AI Literacy and Collaborative Learning in Education

Sneh Bansal*, Mursidi Murah**, Carmen Radulescu*** and Yuanting Liao****

As artificial intelligence (AI) continues to transform educational landscapes, there is a growing need for frameworks that guide its ethical and effective integration into classrooms. The DIAMOND framework offers a structured, multi-stage approach specifically designed to build AI literacy, foster collaborative learning, and promote ethical awareness among students. Rooted in sociocultural constructivism, experiential learning, and cognitive load management, DIAMOND comprises seven sequential stages: Diving, Inquiring, Analysing, Manipulating, Organising, Networking, and Demonstrating. These stages guide students through a complete learning journey, from initial exploration and inquiry to hands-on experimentation, collaboration, and reflection. Organised into Pre-class, In-class, and Post-class phases, the DIAMOND framework provides educators with a practical roadmap for embedding AI across diverse educational contexts. This paper outlines the theoretical foundations of DIAMOND, compares it with existing frameworks such as TPACK, SAMR, and Computational Thinking, and discusses its potential for fostering future-ready skills. By emphasising ethical considerations and collaborative practices, DIAMOND prepares students to navigate the complexities of an AI-driven world with confidence and responsibility. [Abstract]

Introduction

In today's rapidly evolving educational landscape, artificial intelligence (AI) is reshaping how educators teach and how students learn. As AI technologies gain prominence, there is a growing need for structured and adaptable frameworks to guide their effective integration into classroom settings. The DIAMOND framework addresses this need by offering a clear, step-by-step model that aligns with contemporary educational

demands and prepares students for future learning environments. The purpose of the DIAMOND framework is to guide educators in the responsible and systematic use of AI tools across all stages of the educational process—from preparation to execution and reflection. This structured approach, grounded in sociocultural constructivist theory, emphasises collaboration, cultural relevance, and communicative learning practices that meaningfully engage students with AI technologies. For students, the DIAMOND framework offers a structured pathway to not only grasp AI tools but also develop essential skills through interactive, hands-on learning. Each of the framework's stages—*Diving, Inquiring, Analysing, Manipulating, Organising, Networking, and Demonstrating*—supports the development of critical skills such as independent research, teamwork, and ethical AI use. By encouraging exploration, inquiry, and application, the framework prepares students to navigate and utilise complex technologies confidently and responsibly. Additionally, the DIAMOND framework fosters critical thinking, adaptability, and self-reflection, empowering students as proactive, capable learners equipped for both academic and real-world challenges.

The DIAMOND framework also aligns with Sustainable Development Goal 4 (SDG 4), which promotes inclusive and equitable quality education for all. By fostering adaptability, sustainability, and inclusivity, the framework supports educators in teaching core subjects while enhancing students' digital literacy, ethical AI understanding, and critical thinking skills. Ultimately, the DIAMOND framework aims to cultivate a learning environment where AI acts as a tool to build essential skills and lifelong learning habits, equipping students for future educational and career opportunities.

The Diamond Framework

The DIAMOND framework provides a structured model that guides educators in the effective integration of artificial intelligence (AI) tools into teaching and learning. Designed to foster engagement, collaboration, and skill-building, DIAMOND offers educators a clear and systematic approach to

*Assistant Professor (Special Education), NCERT, New Delhi, E-mail: snehbansal46@gmail.com

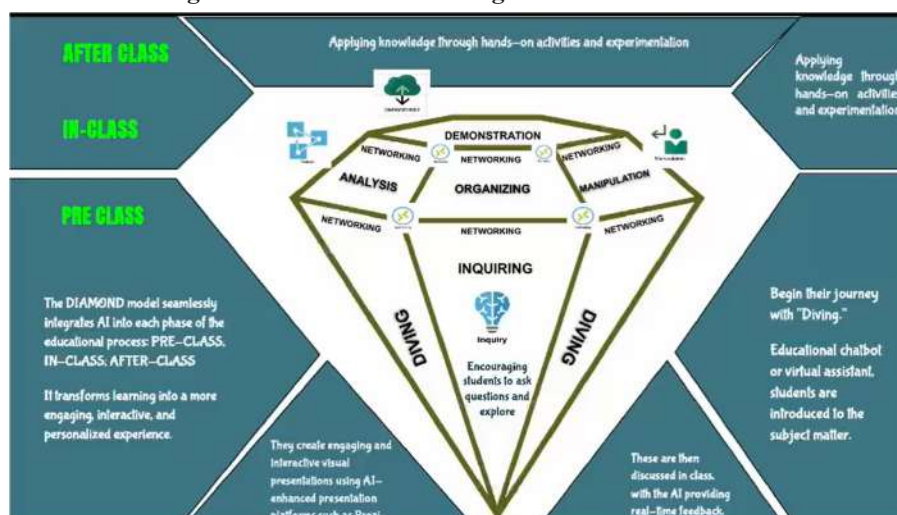
**Senior Master Academic, Masin Secondary School, Brunei

***Professor, Scientific Sciences Socio-humane, Colegiul Economic "Ion Ghica Târgoviște, Romania

****Chemistry Educator, No.10 High School in Kunming, China

leveraging AI technologies in ways that are accessible, relevant, and impactful. Each stage—Diving, Inquiring, Analysing, Manipulating, Organising, Networking, and Demonstrating—represents a critical step in the learning journey, from initial exploration to final demonstration, helping students progressively acquire essential skills. *Figure 1* exemplifies the DIAMOND Framework to summarise its different parts.

Figure 1: Phases of Learning in DIAMOND framework



The visual representation of the DIAMOND framework in *Figure 1* outlines a structured approach to integrating AI in educational settings, organised into three key phases: Pre-class, In-class, and Post-class (for reference, look at the sample lesson plan in Table 1). Each phase includes specific stages that guide students through the learning process, supported by four essential pillars: Teacher (Scaffolding), Student (Language), Other Students (Social Interaction), and Artificial Intelligence.

Phases of Learning

• Pre-class Phase

- *Diving*: This initial stage allows students to explore new topics and become familiar with AI tools, setting the foundation for their learning journey.
- *Inquiring*: Here, students engage in questioning and research, developing curiosity and critical thinking skills as they prepare to delve deeper into AI applications.

Goal: These stages aim to build a foundation of understanding and generate interest, encouraging students to take ownership of their learning before entering the classroom.

• In-class Phase

- *Analysing*: Students interpret data using AI tools, developing analytical skills and learning to draw insights from complex information.
- *Manipulating*: This hands-on stage encourages experimentation, where students

interact directly with data or content using AI tools, fostering problem-solving skills.

- *Organising*: Students structure their findings, manage resources, and collaborate with peers, building teamwork and organisational skills.

Goal: These stages aim to facilitate active, collaborative learning within the classroom, supported by both peer interactions and teacher guidance.

• Post-class Phase

- *Networking*: In this stage, students communicate their findings, share insights, and engage in peer review, enhancing communication skills and collaborative problem-solving.
- *Demonstrating*: This final stage allows students to present their work and reflect on their learning journey, reinforcing self-assessment and continuous improvement.

Goal: These stages encourage reflection and knowledge-sharing, allowing students to consolidate their understanding and receive constructive feedback.

Supporting Pillars

- *Teacher - Scaffold*: The teacher's role is to provide guidance and structure throughout each phase, supporting students' learning and helping them navigate AI tools and concepts effectively.
- *Student - Language*: Language is an essential component for internalising knowledge,

articulating ideas, and refining understanding, particularly during collaborative and reflective stages.

- *Other Students - Social Interaction:* Peer interaction fosters social learning, allowing students to exchange ideas, provide feedback, and build a collaborative learning environment.
- *Artificial Intelligence:* AI serves as both a tool and a learning resource throughout the DIAMOND framework, enabling data analysis, enhancing personalisation, and facilitating complex problem-solving.

Sustainability

The concept of *sustainability* is integrated across all stages, emphasizing the long-term benefits of developing AI literacy, digital competencies, and ethical awareness. The framework supports students in building transferable skills that are valuable for both academic and real-world applications.

Diving

- *Overview:* The Diving stage serves as the entry point, enabling students to explore new topics and AI tools while setting the context for learning. This stage emphasizes self-paced discovery, encouraging students to build foundational knowledge independently.
- *Purpose:* By engaging with content at their own pace, students cultivate curiosity and lay a solid foundation for deeper inquiry. This stage is vital for sustaining student interest and engagement throughout the learning process.

Inquiring

- *Overview:* In this stage, students engage in questioning and research, using AI tools to support independent inquiry and critical examination of concepts.
- *Purpose:* Inquiring builds students' critical thinking abilities by encouraging them to explore different perspectives and deepen their understanding. The goal is to foster a habit of inquiry that enhances analytical thinking and promotes lifelong learning.

Analysing

- *Overview:* During the Analysing stage, students use AI tools to process and interpret data, focusing

on developing analytical skills for understanding complex concepts and drawing meaningful conclusions.

- *Purpose:* This stage helps students learn to critically evaluate information, which is essential for data-driven insights and informed decision-making in both academic and real-world scenarios.

Manipulating

- *Overview:* The Manipulating stage involves hands-on experimentation, where students engage directly with data or content using AI tools, building practical understanding through exploration.
- *Purpose:* This stage enables students to gain confidence with AI tools through experimentation, fostering problem-solving skills and technological proficiency.

Organising

- *Overview:* In organising, students structure their findings, manage resources, and collaborate with peers. AI tools support data management, team coordination, and project planning, enhancing organisational skills.
- *Purpose:* This stage promotes teamwork and project management, equipping students with collaborative skills that are essential for academic and professional success.

Networking

- *Overview:* The Networking stage centres on communication and feedback, as students present ideas, engage in peer reviews, and provide constructive critique using AI tools.
- *Purpose:* Networking builds communication and interpersonal skills, preparing students for collaborative environments where knowledge-sharing and constructive feedback are key.

Demonstrating

- *Overview:* In the final stage, Demonstrating, students showcase their understanding, present their work, and reflect on their learning journey, receiving feedback and self-assessing.
- *Purpose:* This stage fosters self-assessment and a sense of accomplishment, encouraging continuous improvement and the development of responsible, independent learners.

Table 1: Sample Lesson Plan Using DIAMOND Framework

Sample Lesson Plan for Learning Idioms in an English Language Classroom Grade Level: Year 9 Subject: English Language Duration: 1 week, 1~2 lessons						
Day	Phase	DIAMOND Framework Activity	Description	Resources	Outcome	Time allocation
1	Pre-class	Diving	Pre-lesson homework task/Flipped classroom: ChatGPT research, prompt “definition of ‘idioms’ with examples”	Own devices	Students come to class with some level of prior knowledge.	Own time
		Inquiring	Collating knowledge on FigJam, “characteristics of idioms.” Frayer model on FigJam, AI tools include - Brainstorming - Generating flowcharts - Summarising - Scheduling	Own devices https://www.figma.com/figjam/	Establishes common definition and understanding of idioms.	Own time
	In-class	Analysis	Analyse the meaning of newly generated idioms: - Students generate original idioms via ChatGPT - Students evaluate the definition of the newly generated idioms according to the identified characteristics	ChatGPT enabled devices https://chatgpt.com/	Tests students’ checklist of idioms characteristics and expands their understanding.	25mins
		Manipulation	Manipulate the definition proffered by AI to satisfy the characteristics identified previously - ChatGPT via - Supply your own interpretation of ChatGPT idioms - Compare and evaluate the supplied and your own interpretation	ChatGPT enabled devices https://chatgpt.com/	Reviews students’ checklist of idioms characteristics and expands their understanding.	25mins
	Post-class	Organising/ Networking	Students collate data on Padlet using the various AI tools available on the app: - Summarising - Generating AI images - Translations to L1	Internet-enabled devices https://padlet.com/	Students consolidate facts and understanding of idioms.	Own time
		Demonstration	Summative assessment: - Online assessment on Kahoot! - In-class assessment using Diffit generated resources	Internet enabled devices https://create.kahoot.it/details/93d5d32f-8496-4708-af8c-c924834028ab https://web.diffit.me/	Final test of student understanding and knowledge of idioms.	Own time or class time

Note: This lesson effectively incorporates the DIAMOND framework from the initial introductory Diving phase through to the summative Demonstration phase. It includes AI tools essential for developing understanding and consolidating learning. The lesson is also grounded in sociocultural constructivist theory, utilising language (communication), social interaction (collaboration), and scaffolding (zone of proximal development) effectively (McLeod, 2024). Additionally, from the perspective of connectivism’s theory of learning (Kropf, 2013), various nodes of information are seamlessly connected through AI tools and students’ interactions with the materials.

Theoretical Foundations and Supporting Research for the Diamond Framework

The DIAMOND framework rests on a robust theoretical foundation, drawing from key educational theories to support a structured, comprehensive approach to AI integration. By combining sociocultural constructivism, experiential learning, and cognitive load management, DIAMOND emphasises not only the technical application of AI tools but also their ethical, collaborative, and educational potential. Research on related frameworks reinforces DIAMOND's relevance and effectiveness as an innovative model for incorporating AI into educational settings.

Sociocultural Constructivism and AI Integration in Education

DIAMOND is deeply grounded in sociocultural constructivism, a theory of learning developed primarily by Lev Vygotsky, which highlights the importance of social and cultural contexts in knowledge construction. This approach posits that learning is a socially mediated process, where interactions with others, language, and cultural tools shape individual understanding (Vygotsky, 1978). In DIAMOND, this theory is embedded in stages like Networking and Organising, where students learn collaboratively with AI tools, fostering shared knowledge creation and critical discussions. Vygotsky's concept of the "More Knowledgeable Other" (MKO)—a peer or teacher who introduces new perspectives—underscores DIAMOND's approach. Students and instructors, through collaborative activities and feedback, co-construct knowledge, particularly in the Networking stage, where students interact and critique one another's work (Vygotsky, 1978). Furthermore, DIAMOND's stage-based design reflects the Zone of Proximal Development (ZPD), supporting students from guided activities in Diving and Inquiring to more autonomous tasks in Manipulating and Demonstrating. This scaffolded approach helps students gradually build confidence and mastery over AI tools, fostering motivation and a sense of competence (Ertmer C Newby, 2013). Language also plays a central role in sociocultural constructivism, serving as a tool for learners to articulate, negotiate, and refine their understanding. DIAMOND leverages this through stages like Networking and Demonstrating, where students use AI to facilitate discussions, receive

feedback, and articulate their insights, mirroring real-world professional interactions and enhancing communication skills.

Experiential Learning and Inquiry-Based Learning in Technology-Enhanced Learning

The DIAMOND framework integrates experiential learning and inquiry-based learning (IBL) principles, both of which encourage active student engagement, critical thinking, and deeper understanding, especially in technology-rich contexts. David Kolb's Experiential Learning Theory (1984) advocates learning through experience, where students engage in cycles of concrete experience, reflection, and application. In DIAMOND, stages like Manipulating and Analysing align with this theory by encouraging hands-on interaction with AI, allowing students to test hypotheses and analyse data. Research underscores the value of experiential learning in digital environments. Day and Goldstone (2011) found that experiential tasks enhance students' understanding and retention of complex information, a principle that DIAMOND applies by immersing students in AI-driven tasks. Additionally, DIAMOND's design resonates with the situated cognition approach, which suggests that knowledge is most meaningful when applied in realistic contexts (Brown, Collins, C Duguid, 1989). Inquiry-Based Learning further enriches DIAMOND by nurturing curiosity and independent exploration, particularly in the Diving, Inquiring, and Analysing stages. Students are encouraged to ask questions, investigate AI applications, and synthesise findings, fostering analytical skills and self-driven learning (Kuhn C Pease, 2008). Studies indicate that IBL promotes critical thinking and engagement, especially in digital classrooms (Zion C Sadeh, 2007). DIAMOND's design capitalises on these benefits by structuring a pathway for students to explore, inquire, and understand AI's potential impact.

Cognitive Load Management in Sequential Frameworks

DIAMOND's sequential structure is grounded in Cognitive Load Theory (CLT), developed by John Sweller (1988), which posits that learning is optimised when instructional design minimises unnecessary cognitive load. CLT defines three types of cognitive load: intrinsic load, inherent to the material's complexity; extraneous load, imposed by poorly designed instruction; and germane load,

the mental effort dedicated to understanding and schema-building. DIAMOND reduces extraneous load by offering clear, scaffolded steps, allowing students to focus cognitive resources on each stage. Studies affirm the benefits of structured frameworks in managing cognitive load. Mayer and Moreno (2003) demonstrated that segmenting content reduces cognitive overload and improves comprehension, aligning with DIAMOND's gradual progression through each stage. By reducing extraneous load and fostering germane load, DIAMOND allows students to acquire and retain complex AI concepts effectively. One objective of DIAMOND's structure is to minimise extraneous load by providing clear, purpose-driven steps, allowing students to focus on mastering each phase. This approach, supported by Paas, Renkl, and Sweller (2003), demonstrates that structured frameworks reduce unnecessary cognitive strain, enhancing students' ability to learn complex content effectively. DIAMOND's scaffolding ensures that students can progress from simpler tasks in Diving and Organising to more advanced activities in Analysing and Manipulating, maintaining engagement without overwhelming cognitive resources.

Application in Education

The DIAMOND framework offers educators a structured yet adaptable approach to integrating artificial intelligence (AI) into teaching practices.

By following its stages—*Diving, Inquiring, Analyzing, Manipulating, Organizing, Networking, and Demonstrating*—educators can create engaging learning experiences that promote AI literacy, critical thinking, and collaborative learning. Below are potential applications across different subjects, practical steps for implementation, and insights into DIAMOND's collaborative potential.

Potential Uses in Various Educational Contexts

The DIAMOND framework is highly adaptable and can be used in multiple subject areas and educational levels:

- **STEM Classrooms**

In science or technology courses, DIAMOND can guide students through data-driven projects where they collect and analyse real-world information with AI tools. For example, during the Analysing and Manipulating stages, students might use AI-powered data visualisation to

interpret complex datasets, enhancing analytical skills (Koehler C Mishra, 2009).

- **Social Studies**

The framework's stages encourage students to explore the societal implications of AI, such as its impact on employment, privacy, and ethics, particularly during the Inquiring and Networking stages. This approach allows students to contextualise AI within broader societal frameworks, connecting learning to real-world issues (Siemens, 2005; Buckingham, 2007).

- **Language Arts**

For language studies, students can utilise AI in the Organising and Demonstrating stages to enhance their writing and analytical skills. For instance, AI-driven grammar tools support sentence structure and clarity, while the Demonstrating stage enables students to present AI-enhanced projects or reflective insights, fostering both technical and linguistic proficiency (Vygotsky, 1978).

Practical Steps for Educators to Implement DIAMOND

Implementing DIAMOND effectively requires a series of strategic steps, ensuring students' progress at each stage:

- **Introduce AI Basics in the Diving Stage**

Begin by familiarising students with core AI concepts, such as data processing and ethics. Providing a foundational understanding enhances students' ability to engage with AI meaningfully throughout the learning process (Ertmer C Newby, 2013).

- **Foster Inquiry in the Inquiring Stage**

Encourage students to form research questions related to AI in their subject areas, allowing them to investigate AI's role and relevance in real-world contexts. Inquiry-based learning has been shown to improve critical thinking and curiosity (Kuhn C Pease, 2008).

- **Support Hands-On Learning in the Analysing and Manipulating Stages**

Provide AI tools that enable students to manipulate data, such as text analysis software or predictive modelling applications. These stages encourage experiential learning, helping students develop practical skills with AI (Kolb, 1984).

- ***Encourage Teamwork in the Networking Stage***
Use collaborative activities to help students share their findings, provide peer feedback, and engage in group discussions using AI-based tools like collaborative documents or presentations. This aligns with the Connectivist theories, promoting knowledge-sharing within digital networks (Siemens, 2005).
- ***Promote Reflection in the Demonstrating Stage***
Guide students to present their work and reflect on the learning process, assessing both their outcomes and the journey. Structured reflection enhances knowledge acquisition and application (Mayer C Moreno, 2003).

Collaborative Potential of DIAMOND

DIAMOND fosters collaboration by creating digital spaces where students interact with AI tools, exchange ideas, and engage in meaningful discussions. The Networking stage, in particular, emphasises peer interaction and collaborative problem-solving, fostering a sense of community and shared learning (Hrastinski, 2009). In these spaces, students explore ethical dimensions, such as data privacy and AI biases, encouraging thoughtful, culturally aware use of technology (Vygotsky, 1978; Kop C Hill, 2008). As students move through DIAMOND's stages, they develop AI literacy collaboratively, starting with exploration and advancing toward complex applications. By working together, students gain insights into technical skills, ethical considerations, and critical thinking perspectives. As Buckingham (2007) suggests, collaborative digital discussions enhance ethical awareness, supporting students in making responsible choices when using AI.

Implications and Benefits

The DIAMOND framework provides a structured approach to integrating artificial intelligence (AI) in education, with clear implications for enhancing student engagement, fostering AI literacy, and aligning with broader educational goals. This section explores the anticipated benefits of DIAMOND in the classroom, including its impact on learning outcomes, ethical AI use, and the development of future-ready skills.

Impact on Learning and Engagement

The DIAMOND framework offers significant potential for improving learning outcomes by creating interactive and personalised learning

experiences. By guiding students through stages that progress from foundational understanding to advanced applications, DIAMOND supports sustained engagement and deepens critical thinking. Research suggests that scaffolded, experiential learning enhances motivation and comprehension, particularly when students are engaged in hands-on tasks (Kolb, 1984; Furtak et al., 2012). Stages such as Manipulating and Demonstrating allow students to explore and experiment with AI, building skills in data analysis, project management, and problem-solving. Furthermore, DIAMOND supports personalised learning, allowing students to engage with AI at their own pace and choose topics relevant to their interests and goals. In stages like Diving and Inquiring, students can independently explore AI concepts, which fosters autonomy and allows for tailored learning experiences. Research by Ertmer and Newby (2013) underscores the value of personalized learning in increasing student autonomy and engagement, outcomes that DIAMOND actively promotes through its scaffolded approach.

Supporting AI Literacy and Ethics

A primary goal of DIAMOND is to build AI literacy while promoting ethical awareness. By embedding ethical discussions and reflective activities into stages like Networking and Demonstrating, the framework encourages students to consider AI's social and ethical implications. This approach aligns with Buckingham's (2007) emphasis on fostering digital literacy and ethical awareness, as students reflect on data privacy, bias, and responsible AI use. Ethical reflection prepares students for the complexities of AI, cultivating an awareness of their responsibilities as digital citizens. Moreover, DIAMOND's structure is designed to make AI accessible and understandable for students of various backgrounds. As AI literacy becomes increasingly essential, DIAMOND provides an inclusive introduction to AI that balances technical skill development with ethical considerations. This approach prepares students to interact with AI thoughtfully and responsibly, aligning with initiatives advocating for responsible AI use, which highlight the need for both practical and ethical competencies (Siemens, 2005; Koehler C Mishra, 2009).

Alignment with Educational Goals

The DIAMOND framework supports several key educational objectives, including digital

literacy, critical thinking, and the cultivation of future-ready skills. In an era where digital literacy is fundamental, DIAMOND's structured engagement with AI enables students to develop essential digital competencies. For instance, stages like Diving and Manipulating introduce students to AI tools in ways that build problem-solving skills and technical understanding, supporting educational standards that prioritise digital literacy (Kop C Hill, 2008). Additionally, DIAMOND fosters critical thinking by encouraging students to inquire, analyse, and reflect on AI's societal and ethical dimensions, aligning with objectives in global educational initiatives. By guiding students to critically assess AI's benefits and limitations, DIAMOND helps them develop analytical skills that are crucial for future academic and career pursuits. Wing (2006) emphasises that competencies like computational thinking and problem-solving are essential for students navigating digital environments; DIAMOND's scaffolded stages create an ideal platform for fostering these skills. Ultimately, DIAMOND prepares students to become future-ready learners equipped with digital literacy, ethical understanding, and collaborative abilities. The framework's adaptability across subjects and focus on real-world applications make it a valuable tool for educators preparing students for a technology-driven world where AI and digital competencies are increasingly indispensable (Dabbagh C Kitsantas, 2012).

Comparative Analysis of Diamond and Extant Frameworks

The DIAMOND framework provides a structured, sequential approach for integrating artificial intelligence (AI) into education, with unique emphases on ethical considerations, collaborative learning, and AI literacy. To better understand DIAMOND's distinct contributions, this section compares it to three widely recognised frameworks for technology integration in education: TPACK (Technological Pedagogical Content Knowledge), SAMR (Substitution, Augmentation, Modification, Redefinition), and Computational Thinking (CT). While each of these frameworks addresses different aspects of digital literacy and technology-enhanced learning, DIAMOND stands out as a holistic, AI-focused model.

TPACK (Technological Pedagogical Content Knowledge)

The TPACK framework is a foundational model that emphasises the intersection of technological,

pedagogical, and content knowledge, encouraging educators to integrate these three dimensions to create effective teaching practices.

Similarities: Both TPACK and DIAMOND advocate for thoughtful integration of technology in the classroom. Like DIAMOND, TPACK emphasises that technology should be used with clear pedagogical and content goals in mind, rather than as an end in itself.

Differences: While TPACK provides a valuable lens for selecting and blending technology with pedagogy and content, it does not offer a specific, stage-by-stage guide for using particular technologies like AI. DIAMOND, by contrast, provides a structured pathway through distinct stages—Diving, Inquiring, Analysing, Manipulating, Organising, Networking, and Demonstrating—which educators and students follow to build AI literacy and collaborative skills. Furthermore, TPACK does not explicitly address ethical considerations, an aspect that DIAMOND integrates throughout its stages to prepare students for responsible technology use.

Conclusion : DIAMOND builds upon TPACK's core principles by focusing specifically on AI literacy and ethical use, offering educators a concrete roadmap that addresses the technical, ethical, and social dimensions of AI in education.

SAMR (Substitution, Augmentation, Modification, Redefinition)

The SAMR model, developed by Ruben Puentedura, is a popular framework that helps educators assess how technology transforms learning tasks, moving from basic substitution of traditional tools to redefined learning experiences that were previously unimaginable.

- ***Similarities:*** SAMR and DIAMOND both encourage educators to move beyond simple technological substitution and explore the transformative potential of technology in learning. They share a commitment to enhancing learning experiences and developing digital competencies.
- ***Differences:*** SAMR is a flexible model that leaves much of the implementation to the discretion of the educator, without offering specific guidelines for advanced technologies like AI. DIAMOND's structured, sequential stages guide educators and students through the entire process of AI

integration, providing concrete actions and objectives at each stage. In addition, SAMR does not emphasise collaborative or ethical dimensions, which are integral to DIAMOND's Networking and Demonstrating stages, where students engage in peer review, feedback, and ethical reflections on AI applications.

Conclusion: While SAMR's open-ended structure allows educators to adapt technology to various levels of complexity, DIAMOND offers a specialised framework for AI that incorporates ethical considerations and collaborative learning, making it a more comprehensive tool for navigating the unique challenges of AI in education.

Computational Thinking (CT)

Computational Thinking is a framework widely adopted in digital literacy initiatives, emphasizing essential problem-solving skills that draw on computer science principles such as abstraction, decomposition, and algorithmic thinking.

- **Similarities:** Both Computational Thinking and DIAMOND aim to equip students with problem-solving skills and technical understanding, preparing them to engage with technology in meaningful ways. Each framework promotes active engagement and hands-on learning.
- **Differences:** While Computational Thinking focuses on developing technical thinking processes, DIAMOND takes a broader approach by also addressing social, ethical, and collaborative aspects of AI literacy. Stages like Networking and Demonstrating in DIAMOND emphasise ethical reflection, collaboration, and communication—skills that go beyond technical

problem-solving. Additionally, DIAMOND is structured to guide students through a complete learning journey, from initial exploration to final presentation, with a specific focus on the application and implications of AI in education.

Conclusion: DIAMOND extends beyond Computational Thinking by incorporating collaborative and ethical components, offering a holistic framework that not only builds technical proficiency but also fosters responsible and informed use of AI. Table 2 provides a summary of each framework.

To provide a quick reference, Table 2 summarises the strengths and focal points of each framework

While TPACK, SAMR, and Computational Thinking each provide valuable approaches to technology integration and digital literacy, DIAMOND's unique contributions lie in its structured, stage-based progression tailored specifically for AI literacy. By integrating ethical considerations and emphasising collaborative learning, DIAMOND provides educators with a comprehensive roadmap for guiding students through the complexities of AI. This holistic approach prepares students not only for technical challenges but also for responsible and informed participation in an AI-driven world.

Conclusion

The DIAMOND framework offers a structured, adaptable model for integrating artificial intelligence (AI) into education, equipping educators with a practical tool to foster AI literacy, critical thinking, and ethical awareness

Table 2: Strengths and Focal Points of Each Framework

Framework	Focus	Structure	Collaborative Learning	Ethical Considerations	AI-Specific
DIAMOND	AI literacy, ethical AI use, and collaboration	Sequential, structured stages	Yes	Yes	Yes
TPACK	Integration of tech, pedagogy, and content knowledge	Flexible, non-linear	Limited	No	No
SAMR	Transformative potential of technology	Four- tiered, evaluative model	Limited	No	No
Computational Thinking	Problem- solving using computer science principles	Non-linear, skill-based	No	Limited	No

among students. By guiding learners through seven distinct stages— Diving, Inquiring, Analysing, Manipulating, Organising, Networking, and Demonstrating—DIAMOND supports a holistic educational journey that enhances engagement, collaborative skills, and digital citizenship. Each stage builds on the last, creating a scaffolded learning experience that empowers students to explore, apply, and reflect on AI in a meaningful and responsible way.

DIAMOND's unique strengths lie in its structured yet flexible design, making it accessible across various subjects, educational levels, and cultural contexts. Through its staged approach, students gain a comprehensive understanding of AI tools, developing competencies in data analysis, problem-solving, communication, and collaboration. The emphasis on ethical AI use prepares students to engage with digital technologies thoughtfully, fostering a sense of responsibility and integrity in digital environments (Buckingham, 2007; Siemens, 2005). Furthermore, the framework's scaffolded structure supports personalised, self-directed learning, which enhances motivation, autonomy, and retention (Kolb, 1984; Ertmer C Newby, 2013). In comparison to existing models such as TPACK, SAMR, and Computational Thinking, DIAMOND offers a targeted framework specifically for AI integration. It combines technical skill- building with ethical reflection and collaboration, addressing the complex social and ethical dimensions of AI that are often overlooked in other frameworks. This combination makes DIAMOND a comprehensive and forward-looking approach to modern education.

Future Directions for Development

As AI technology continues to evolve, so too can the DIAMOND framework. Customising DIAMOND for specific domains—such as scientific data analysis in STEM or natural language processing in the humanities—could make the framework even more relevant and impactful. Adapting its stages to suit different educational levels is another promising avenue; for instance, elementary students might benefit from simplified activities and visual aids in the Diving and Manipulating stages, while more advanced students could explore nuanced ethical issues in the Networking stage. Creating supplementary resources, such as curriculum guides, sample lesson plans, or AI toolkits tailored

for various educational levels, could further support educators in implementing DIAMOND effectively. Additionally, future research could examine the framework's impact on learning outcomes, ethical reasoning, and digital literacy, providing valuable insights into DIAMOND's long-term effectiveness and adaptability. Ultimately, DIAMOND's focus on ethical, collaborative, and sustainable AI use positions it as a powerful tool for preparing students to thrive in a rapidly changing, AI-driven world. By continuing to refine and adapt DIAMOND for diverse educational contexts, educators can ensure that AI literacy and responsible technology use remain foundational to modern education, equipping students to navigate the digital landscape with confidence and integrity.

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Instagram Usage Patterns, Motivations and FoMO among College Students in India

Vijay M Kumbhar*

Social media platforms, particularly Instagram, have become an integral part of college students' academic, social, and personal lives. This study investigates usage patterns, purposes, and psychological impacts of Instagram among 530 college students in India, examining variables such as daily hours of engagement, frequency of checking the platform, purposes of use, and fear of missing out (FoMO) across educational levels. The findings indicate that degree students dominate Instagram usage in terms of both frequency and diversity of activities, whereas junior college students primarily use it for academic purposes and postgraduates engage more intensively for leisure and sharing content. Education and entertainment emerge as the primary purposes, with a smaller proportion of students experiencing moderate to high levels of FoMO. The study highlights that Instagram usage is widespread, purpose-driven, and influenced by educational level, suggesting a dual role as both an academic and social tool. Implications include the need for digital literacy initiatives, balanced usage strategies, and awareness of psychological impacts to maximise positive outcomes while minimising distractions and potential negative effects on academic performance and mental well-being.

[Abstract]

Introduction

Social media has become an indispensable part of daily life, particularly among young people, with platforms like Instagram serving not only as sources of entertainment but also as tools for education, communication, and self-expression. The rapid proliferation of Instagram has transformed the way individuals interact, access information, and balance their academic and social responsibilities. However, this widespread usage has also raised concerns regarding excessive engagement, digital dependency, and the fear of missing out (FoMO), which can affect students' mental health, academic

performance, and social well-being (Dhiman, 2024; Lele & Hadole, 2023).

The relevance of this study lies in understanding how Instagram shapes the daily lives and behaviors of college students in India, a demographic that is increasingly reliant on digital platforms for both academic and social purposes. While social media offers numerous benefits, such as collaborative learning, information sharing, and creative expression, it also has the potential to distract students and contribute to psychological stress. By examining patterns of use, motivations, and FoMO across different educational levels, this study addresses a critical gap in the literature regarding how Instagram usage varies among junior college, undergraduate, and postgraduate students.

The need for this research is underscored by the growing penetration of Instagram among young adults in India, combined with limited empirical studies exploring its impact on academic engagement, social interaction, and psychological well-being. Insights from this study can inform educators, policymakers, and students themselves about balanced social media usage, the promotion of digital literacy, and strategies to mitigate potential negative effects, ensuring that Instagram serves as a constructive tool rather than a disruptive influence.

Objectives of the Study

The primary objectives of this study are to analyse the demographic profile of students and their Instagram usage patterns, including daily hours of engagement and frequency of checking the platform, to identify the major purposes for which students of different educational levels use Instagram, and to assess the extent of fear of missing out (FoMO) across these educational categories. Collectively, these objectives aim to provide a comprehensive understanding of how Instagram influences students' academic, social, and psychological behaviours.

Research Methodology

The study adopts a descriptive research design to analyse and interpret patterns of Instagram

*Department of Business Economics & Bank Management, Dhananjayrao Gadgil College of Commerce, Maharashtra-415001. E-mail: kumbharvm@gmail.com

use among students. The design is appropriate for explaining characteristics, attitudes, and behaviours of the selected sample population. A convenience sampling method was employed to collect data from accessible student populations across institutions. While this method ensures adequate responses within time and resource constraints, it also limits the generalizability of findings beyond the sample. The study sample consists of 530 respondents, representing a cross-section of junior college, degree, and postgraduate students. Among them, 32.8% are from junior college, 51.7% are degree holders, and 15.5% are postgraduates. The gender distribution shows a higher proportion of female respondents (64.3%) compared to males (35.7%). In terms of education streams, commerce dominates (56.4%), followed by arts (23.4%) and science (20.2%). The majority of respondents (57%) fall within the 18–20 years age group, making the study largely representative of adolescents and young adults.

Table -1: Education Level-wise User

Education Level	Frequency	Percent
Jr. College	174	32.8
Degree	274	51.7
PG	82	15.5
Total	530	100

Source: Primary Data

Data Collection and Analysis

Primary data was collected using a structured online questionnaire, designed to capture respondents' demographic profiles, Instagram usage patterns, purposes of use, and psychological perceptions (such as FoMO). The responses were analysed using frequency distributions and crosstabulations. Percentages were calculated to provide clarity on the distribution of responses across education levels. The data is presented through tables and supported with interpretations for meaningful insights.

Reviews on the Instagram Social Media Platform

A growing body of literature has examined Instagram as a multidimensional social media platform, with research spanning education, psychology, creativity, and digital safety. In the educational domain, studies show that Instagram can enhance learning by fostering creativity,

narrative skills, and peer interaction, particularly in language learning (Nugraheni & Priyatmojo, 2024; Nasution, 2023). Bibliometric findings further confirm its increasing use in higher education and professional training (Yelmen et al., 2025). However, scholars caution that general Instagram use may not directly improve digital skills unless structured for academic purposes (Perifanou et al., 2021). From a behavioral perspective, researchers highlight both positive and negative consequences of Instagram engagement. While it supports information sharing and mental health awareness (Haq et al., 2022), excessive use can contribute to distraction, social isolation, and addiction, particularly among students (Balani & Jaisinghani, 2025; Joorabchi et al., 2025). Studies on privacy and safety reveal that teenagers often struggle with navigating Instagram's privacy norms, leading to risks of overexposure and cyberbullying (Zhao et al., 2022; Hosseinmardi et al., 2015). At the same time, Instagram has emerged as a cultural and creative space where users negotiate authenticity and algorithmic pressures, as seen in the practices of poets and digital creators (De & Lu, 2024). Overall, the literature underscores Instagram's dual role as both an educational and creative tool and a source of psychological and social challenges, making it a critical subject of study in contemporary digital culture.

Instagram has emerged as a dominant social media platform among college students in India, influencing various aspects of their academic and personal lives. A study by Anandhiprabha and Gayathri (2024) explored the impact of social media engagement on college students' lifestyle patterns, focusing on platforms like Instagram. The research indicated that frequent use of these platforms significantly influences students' daily routines, social interactions, and overall well-being, highlighting the need for strategies to manage social media's effects on academic and personal aspects of student life. Similarly, Dhiman (2024) examined Instagram dependency among Indian youth, assessing its impact on students' lives. The study found that while Instagram serves as a significant part of youth culture, its excessive use can have both positive and negative effects on students' physical and mental well-being, emphasising the importance of balanced usage.

A study by Lele and Hadole (2023) investigated the determinants of Instagram usage intentions

among young Indians, applying User Gratification Theory. The research concluded that factors such as entertainment and self-expression significantly influence students' intentions to use Instagram, suggesting that these motivations play a crucial role in shaping usage patterns. In a study focusing on Instagram addiction and procrastination among college students, the researchers found a significant relationship between high levels of Instagram addiction and increased procrastination behaviors. This finding underscores the potential negative impact of excessive Instagram use on students' academic performance and time management skills.

Moreover, a study by Giunchiglia et al. (2020) examined the correlation between mobile social media usage and academic performance. The research indicated that excessive use of social media platforms like Instagram negatively affects students' academic performance, highlighting the need for effective time management strategies. Hosseinmardi et al. (2015) explored the detection of cyberbullying incidents on Instagram, emphasising the platform's role in facilitating both positive and negative social interactions among users. The study suggests that while Instagram offers opportunities for social engagement, it also poses risks related to online harassment. Zhao et al. (2022) investigated teenage perceptions and configurations of privacy on Instagram, revealing that teenagers' understanding of privacy on the platform is complex and influenced by various factors. The study provides insights into how privacy concerns shape students' usage behaviors on Instagram.

Lukose and Agbeyangi (2025) conducted a case study at Walter Sisulu University, examining the impact of social media on academic performance.

The study found that while social media can facilitate academic work, it predominantly acts as a distraction, negatively affecting academic performance, particularly for first-year students. Additionally, a study by Barman et al. (2024) analyzed the pattern of social media platform use among students, finding that Instagram was the most commonly used social networking site among students, followed by YouTube. The research highlighted that a significant proportion of students use social media primarily for entertainment purposes, with a smaller percentage using it for academic reasons. Finally, a systematic review by Al-Menayes (2014) examined the relationship between mobile social media use and academic performance in university students. The review concluded that excessive use of mobile social media platforms like Instagram negatively impacts students' academic performance, suggesting the need for balanced usage.

Social Media Engagement

The crosstabulation (Table 2) of daily use versus education level reveals important behavioural patterns. Among junior college students, about half (50.6%) use digital media for 1 hour daily, with 29.3% spending 2 hours, and only 2.3% exceeding 6 hours, indicating relatively moderate usage. Degree holders show a more dispersed distribution, where 33.9% use for 1 hour and 29.2% for 2 hours, but higher proportions extend usage to 3–4 hours (15.0% and 10.9% respectively), and 6.6% exceed 6 hours, suggesting broader variability. Postgraduate students show a distinct profile, with 31.7% using for 2 hours daily, 20.7% for 1 hour, and a higher proportion (12.2%) using more than 6 hours, which indicates greater digital dependence or academic requirements. Overall, junior college users are more time-restricted, degree students fall in the middle range with balanced patterns, and postgraduates

Table 2: Hours Spent on Instagram

Daily Use	Jr. Clg.	Degree	PG	Total
1 Hour	88 (44.4%)	93 (47.0%)	17 (8.6%)	198 (100.0%)
2 Hour	51 (32.5%)	80 (51.0%)	26 (16.6%)	157 (100.0%)
3 Hour	18 (25.0%)	41 (56.9%)	13 (18.1%)	72 (100.0%)
4 Hour	7 (15.2%)	30 (65.2%)	9 (19.6%)	46 (100.0%)
5 Hour	6 (24.0%)	12 (48.0%)	7 (28.0%)	25 (100.0%)
>6 Hours	4 (12.5%)	18 (56.3%)	10 (31.3%)	32 (100.0%)
Total	174 (32.8%)	274 (51.7%)	82 (15.5%)	530 (100.0%)

Source: Primary Data

tend to engage for longer hours. The cumulative trend suggests a progressive increase in daily usage with higher education levels, possibly due to academic demands, research work, and lifestyle changes. This distribution highlights that education level strongly influences digital usage patterns, with greater intensity seen at advanced stages of study.

Punching Frequency in One Hour

The data in Table 3 illustrates the distribution of Instagram punching frequency across different education levels. The most common behaviour is checking Instagram twice in an hour (155 users, 29.2%), dominated by degree students (49.7%), and followed by junior college (38.7%) and postgraduates (11.6%). Punching once in an hour is also frequent (112 users, 21.1%), again with degree students contributing the largest share (50.9%). For moderate to higher frequencies, such as three to five times in an hour, degree students remain the leading group (ranging between 51%–58%). Notably, in the >6 times per hour category, postgraduates show a higher relative share (30.8%) compared to their proportions in other categories, suggesting heavier usage at advanced education levels. Meanwhile, 51 users (9.6%) reported “very less time,” indicating

low engagement, with representation across all groups. Overall, the findings highlight that degree students are the most active users across almost all categories, junior college students follow with moderate engagement, and postgraduates demonstrate a smaller but more intensive usage pattern, especially in the high-frequency group.

Purpose of Using Instagram

The analysis (Table 4) reveals that entertainment (27.4%) and education (35.3%) are the primary purposes of social media use across the sample, with education showing the highest total count (187 users). Within education-related use, junior college students contribute the largest share (38.0%), highlighting their academic dependence on social media. For entertainment, the majority come from degree holders (52.4%), suggesting a more leisure-oriented approach in this group. Communication with friends and relatives is relatively low overall (56 users), and strongly dominated by degree holders (58.9%). News and information is a significant purpose (104 users), again led by degree holders (52.9%). Interestingly, postgraduates show a higher tendency toward sharing photos and information (28.6%), compared

Table 3: Punching Frequency in One Hour

Social Media Use per Hour	Jr. Clg	Degree	PG	Total
1 Time in an hour	41 (36.6%)	57 (50.9%)	14 (12.5%)	112 (100.0%)
2 Times in an hour	60 (38.7%)	77 (49.7%)	18 (11.6%)	155 (100.0%)
3 Times in an hour	20 (26.0%)	45 (58.4%)	12 (15.6%)	77 (100.0%)
4 Times in an hour	17 (33.3%)	28 (54.9%)	6 (11.8%)	51 (100.0%)
5 Times in an hour	13 (28.9%)	23 (51.1%)	9 (20.0%)	45 (100.0%)
>6 Times in an hour	6 (15.4%)	21 (53.8%)	12 (30.8%)	39 (100.0%)
Very Little Time	17 (33.3%)	23 (45.1%)	11 (21.6%)	51 (100.0%)
Total	174 (32.8%)	274 (51.7%)	82 (15.5%)	530 (100.0%)

Source: Primary Data

Table 4: Purpose of Using Instagram

Purpose of Use	Jr. Clg	Degree	PG	Total
Entertainment	42 (29.0%)	76 (52.4%)	27 (18.6%)	145 (100.0%)
Communicate with Friends/Relatives	19 (33.9%)	33 (58.9%)	4 (7.1%)	56 (100.0%)
News and Information	31 (29.8%)	55 (52.9%)	18 (17.3%)	104 (100.0%)
Education	71 (38.0%)	89 (47.6%)	27 (14.4%)	187 (100.0%)
Sharing Photos/Information	3 (21.4%)	7 (50.0%)	4 (28.6%)	14 (100.0%)
Other	8 (33.3%)	14 (58.3%)	2 (8.3%)	24 (100.0%)
Total	174 (32.8%)	274 (51.7%)	82 (15.5%)	530 (100.0%)

Source: Primary Data

to other groups. Across all categories, degree holders dominate in absolute numbers, reflecting their larger sample size and diverse usage patterns. Junior college students show a stronger inclination toward education, while postgraduates lean slightly toward both academic use and sharing. Overall, the table suggests that social media is primarily an educational and entertainment tool, with varying emphasis across educational levels.

Fear about Missing Social Media Touch

Table 5 highlights the perceptions of users regarding their fear of missing social media touch, categorised across educational levels. The largest group consists of respondents who reported that they do not feel fear about missing social media (369 users, 69.6%). Within this group, degree students make up the highest proportion (51.5%), followed by junior college (32.8%) and postgraduates (15.7%). This indicates that a majority of students are confident about staying away from social media without experiencing anxiety. A smaller but important group, 111 respondents (20.9%), reported that they sometimes feel fear about missing social media touch. Again, degree students dominate this category (53.2%), followed by junior college students (34.2%) and postgraduates (12.6%). This suggests that while occasional fear exists, it is more common among undergraduates than postgraduates.

The group that feels fear strongly and consistently is the smallest, with only 50 respondents (9.4%). Within this group, half (50.0%) are degree students, while 30.0% belong to junior college, and 20.0% are postgraduates. This pattern reflects that while intense fear of missing social media is not very widespread, it is present across all education levels, with degree students showing relatively higher vulnerability. Overall, the findings indicate that the fear of missing out (FoMO) is not dominant among the respondents, but a notable proportion (about 30%) either sometimes or always experiences it. Degree students consistently show

the highest shares across all categories, which can be attributed to their larger population and possibly greater reliance on social media for both academic and social interactions. Junior college students display moderate levels of fear, while postgraduates appear less affected, possibly due to mature coping mechanisms or reduced dependence on online engagement.

Major Findings

The analysis of the study reveals significant insights into Instagram usage patterns, purposes, and psychological impacts among college students across different educational levels. The findings highlight clear variations in daily engagement, frequency of platform access, and motivations for use, with degree students generally exhibiting higher activity and more diverse purposes compared to junior college and postgraduate students. In addition, the study identifies the prevalence of Fear of Missing Out (FoMO) and its distribution across educational categories, providing a comprehensive understanding of how Instagram influences students' academic, social, and psychological behaviors. The following subsections present these findings in detail.

- **Demographic Profile**

The study sample consisted of 530 students, with a majority being female (64.3%). Most respondents were degree holders (51.7%), followed by junior college (32.8%) and postgraduates (15.5%). Commerce was the predominant stream of education (56.4%), and the largest age group was 18–20 years (57%), indicating a youth-centric, female-majority, commerce-oriented profile (Anandhiprabha & Gayathri, 2024; Dhiman, 2024).

- **Daily Instagram Use**

Instagram usage varies across educational levels. Junior college students primarily use the platform for 1–2 hours daily, degree students show a wider range of usage from 1–4 hours,

Table 5: Fear about Missing Social Media Touch

Fear about Missing Touch	Jr. Clg	Degree	PG	Total
Sometimes I Feel Fear about Missing	38 (34.2%)	59 (53.2%)	14 (12.6%)	111 (100%)
I Feel Fear about Missing	15 (30.0%)	25 (50.0%)	10 (20.0%)	50 (100%)
I Don't Feel Fear about Missing	121 (32.8%)	190 (51.5%)	58 (15.7%)	369 (100%)
Total	174 (32.8%)	274 (51.7%)	82 (15.5%)	530 (100%)

Source: Primary Data

and postgraduates tend to use it for longer durations, with some exceeding 6 hours per day. This aligns with findings from Lele and Hadole (2023), who noted that higher education levels correlate with more intensive social media use.

- **Punching Frequency**

Checking Instagram twice per hour was the most common behaviour (29.2%), with degree students leading across most frequency categories. Postgraduates displayed higher engagement in the >6 times per hour category, suggesting intensive usage among advanced students. Similar trends were reported in Dhiman (2024), highlighting that excessive engagement is more common among degree and postgraduate students.

- **Purpose of Instagram Use**

The main purposes of Instagram use were education (35.3%) and entertainment (27.4%). Junior college students showed higher reliance on Instagram for educational purposes, whereas degree students favoured entertainment and social communication. Postgraduates were more involved in sharing photos and information. This finding is consistent with Barman et al. (2024), who noted that Instagram serves both educational and leisure functions among Indian students.

- **Fear of Missing Out (FoMO)**

The majority of students (69.6%) reported that they do not feel fear about missing social media content. About 20.9% sometimes experience FoMO, and 9.4% consistently feel anxious when disconnected. Degree students reported higher FoMO across all categories, followed by junior college students, while postgraduates reported lower levels. These results are consistent with prior studies suggesting that FoMO is more prevalent among younger undergraduate populations (Joorabchi et al., 2025; Dhiman, 2024).

- **Overall Patterns**

Degree students dominate Instagram use across most dimensions, showing both high frequency and diverse purposes. Junior college students exhibit moderate engagement, often oriented toward academic purposes, while postgraduates, although smaller in number, demonstrate intensive usage patterns. These findings are in line with international studies on social media

engagement and academic levels (Al-Menayes, 2014; Lele & Hadole, 2023).

Conclusions

The research concludes that Instagram is an integral part of college students' academic, social, and personal lives in India. Usage patterns are significantly influenced by education level, with degree students showing the highest engagement across most metrics. The platform serves dual roles: supporting educational activities for younger students and facilitating entertainment, social interaction, and creative expression for older students (Barman et al., 2024; Nugraheni & Priyatmojo, 2024). Fear of missing out (FoMO) is present but limited to a minority, with degree students being more susceptible (Joorabchi et al., 2025). Overall, the study highlights that Instagram usage is widespread, varied, and purpose-driven, suggesting that educators and policymakers should recognise both the benefits for learning and social connection as well as the potential for overuse and distraction (Al-Menayes, 2014; Dhiman, 2024). Promoting digital literacy, self-regulation strategies, and balanced social media use can enhance positive outcomes while mitigating negative effects on academic performance and psychological well-being (Lele & Hadole, 2023; Barman et al., 2024).

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CAMPUS NEWS

International Seminar on Emerging Research Trends

A two-day International Seminar on ‘Emerging Research Trends in Computer Science’ was organised by the Department of Computer Science, St. Anthony’s College, Shillong, Meghalaya through hybrid mode, recently. The event brought together distinguished experts and scholars from across the globe to discuss cutting-edge developments in computer science.

The large language models and industry transformation speaker, Mr. Biswajeet Mishra, Google Gemini, USA delivered insights on LLMs’ revolutionary impact on industry practices, highlighting their evolution from basic autocomplete systems to sophisticated tools capable of complex problem-solving and creative tasks. His presentation emphasised the transformative potential of multimodal models and their applications across healthcare, education, and gaming sectors.

AI, crowdsourcing, and gamification speaker, Dr. Rajiv Vaid Basaiawmoit, Aarhus University, Denmark, presented innovative approaches combining artificial intelligence with crowdsourced solutions. His session demonstrated how gamification platforms like Foldit and Genes in Space have solved complex scientific problems through collective intelligence, highlighting the potential for citizen science initiatives.

The quantum computing and IoT innovation speaker, Mr. Shrikrishna S. Chippalkatti, C-DAC Bangalore, detailed India’s indigenous technological developments, focusing on Hexa-scale supercomputing initiatives, Indigenous microprocessor development, IoT research lab innovations, and Quantum technology advancement programs.

The speaker of the session on ‘Large Language Models: An Introduction’ was Prof. Jugal Kalita, College of Engineering and Applied Science, University of Colorado. He recounts his journey through the evolution of language modelling, from ancient grammatical systems to modern neural networks and large language models like ChatGPT. Drawing from his recent lecture. He explored key

developments in the field, including rule-based modelling, statistical n-gram models, and the transformative impact of neural architectures—particularly transformers. He also reflected on the applications, benefits, and challenges posed by tools like ChatGPT in educational contexts and beyond. This is not only a technological shift but a cultural and ethical one, demanding critical engagement from educators, researchers, and policymakers alike.

AI-Augmented Robotic Neurorehabilitation Speaker, Prof. Shyamanta M. Hazarika, Indian Institute of Technology Guwahati, presented groundbreaking work in robotic neurorehabilitation, demonstrating how AI-integrated prosthetic devices and exoskeletons are revolutionising healthcare. His research showcased the integration of EEG and EMG signals with machine learning techniques for personalised rehabilitation solutions.

Mr. Subhash Puyam, North Eastern Space Applications Centre, Indian Space Research Organisation, spoke during the session on ‘Space Technology Applications’. He highlighted the transformative role of space technology in governance and societal applications, particularly focusing on disaster management systems, environmental monitoring, AI-driven spatial analytics, and regional development initiatives.

The event was supported by the State Council of Science, Technology and Environment, Meghalaya, and NEEPCO, Shillong, enabling comprehensive coverage of emerging trends in computer science. The event successfully fostered cross-disciplinary knowledge exchange, industry-academia collaboration opportunities, research networking platforms, and future technological innovation pathways. The seminar concluded with a strong emphasis on continuing research collaborations and technological innovation, setting the stage for future editions and cementing its position as a premier academic event in the region.

Conference on Quantum Condensed Matter

A four-day Annual Conference on ‘Quantum Condensed Matter’ is being jointly organised by the School of Physical Sciences, Jawaharlal Nehru

University, New Delhi, Indian Institute of Technology (IIT) Delhi, National Physical Laboratory (NPL) New Delhi, and Bennett University, Greater Noida from July 05-08, 2026. The event aims to bring together national and international researchers working in theoretical and experimental aspects of quantum condensed matter systems. The Themes of the event are:

Topological Quantum Materials and Edge States

Exploration of topological phases of matter, including quantum spin Hall systems, Weyl and Dirac semimetals, and higher-order topology. Emphasis on protected edge states, Berry curvature effects, and topological transport signatures.

Unconventional Superconductivity and Pairing Mechanism

Investigation of non-BCS pairing symmetries, multiband superconductivity, competing orders, and vortex matter. Focus on microscopic pairing mechanisms in correlated and low-dimensional materials.

Frustrated Magnetism and Correlated Systems

Studies of quantum magnetism, spin liquids, frustrated lattices, and exotic magnetic ground states. Discussions on correlation-driven phenomena and emergent quasiparticles in strongly interacting systems.

Quantum Transport and Spectroscopy

Experimental and theoretical advances in electrical, thermal, and optical transport measurements. Includes ARPES, STM, neutron scattering, and spectroscopic probes of quantum materials.

Quantum Phase Transitions and Critical Phenomena

Investigation of zero-temperature phase transitions driven by quantum fluctuations. Focus on scaling behaviour, universality classes, and emergent criticality in correlated electron systems and low-dimensional materials.

Advanced Materials Synthesis and Characterisation

Novel synthesis routes for quantum materials, including thin films, heterostructures, and high-quality single crystals. Advanced structural and microscopic characterisation techniques enabling

precise control of electronic and magnetic properties.

2D Moiré Systems, Twistronics and vdW Heterostructures

Physics of moiré superlattices, flat bands, and correlation effects in twisted bilayer and multilayer structures. Engineering quantum states in van der Waals heterostructures and atomically thin materials.

Quantum Devices: Sensors and Computing

Development of superconducting qubits, quantum sensors, hybrid platforms, and scalable architectures for quantum technologies. Focus on coherence, control, and device integration.

Non-Equilibrium Dynamics and Many-Body Localisation

Nonequilibrium quantum systems, Floquet engineering, thermalisation dynamics, and localisation phenomena. Investigation of quantum chaos, entanglement growth, and driven many-body systems.

Theoretical Models and Methods

Advances in density functional theory, renormalisation group methods, numerical many-body techniques, and quantum simulation platforms. Emphasis on predictive modelling of complex quantum materials.

AI/ML in Quantum Materials Discovery

Application of machine learning, data-driven modelling, and high-throughput computation for materials prediction and optimisation. Integration of AI tools with experimental and theoretical workflows.

Quantum Information and Communication

Foundations of quantum information, entanglement theory, quantum cryptography, and communication protocols. Connections between condensed matter systems and quantum information processing.

For further details, contact the Organising Secretary, Jawaharlal Nehru University, New Mehrauli Road, New Delhi – 110067 through Phone No: 011-26704783, and E-mail : qmat2026@gmail.com. For updates, log on to: <https://www.jnu.ac.in/QMAT2026/>

International Conference on Innovations in Biotechnology

A four-day International Conference on ‘Innovations in Biotechnology for Sustainable Developments’ is being organised by the National Institute of Technology (NIT) Puducherry in association with the Biotech Research Society, India (BRSI) from October 22-25, 2026 at Puducherry. The scientists, academicians, researchers, practising engineers, consultants, planners, policymakers, economists, social scientists, managers & leaders from around the world may participate in the event to share knowledge and advancements in biotechnology for sustainable development. The event may provide a platform for interdisciplinary collaboration, innovation, and technology transfer to address global challenges related to sustainability, climate change, and resource management in alignment with the UN Sustainable Development Goals (SDGs). The topics of the event are:

Environmental Biotechnology and Bioengineering

- Anaerobic Digestion.
- Biodegradation and Bioremediation.
- Circular Bioeconomy and Energy and Environmental Sustainability.
- Solid Waste Treatment.
- Wastewater Treatment.

Food and Agricultural Biotechnology

- Food Fermentation
- Plant-Microbe Interaction
- Plant Tissue Culture
- Probiotics and Nutraceuticals

Industrial Biotechnology and Bioprocess Engineering

- Advanced Bioprocessing (Genetic/Metabolic Engineering, AI/ML, etc.).
- Algal and Lignocellulose Biorefineries.
- Biofuels.
- Biomass to Fuels and Chemicals.
- Microbial Products (Biopolymers, Enzymes, Organic Acids, etc).

Medical and Health Biotechnology

- Cancer Biology.

- Drug Development and Delivery.
- New and Emerging Viruses.
- Vaccines Development.

For further details, contact the Convenor, Dr Sivakumar Ramalingam, National Institute of Technology Puducherry, Karaikal, through E-mail: ibsd2026nitpy@gmail.com, and ibsd2026@gmail.com. For updates, log on to: www.nitpy.ac.in/events/

International Conference on Recent Trends in Materials Science and Technology

A three-day International Conference on ‘Recent Trends in Materials Science and Technology’ is being jointly organised by the Indian Institute of Space Science and Technology (IIST), Thiruvananthapuram, Kerala and the Materials Research Society of India (MRSI), Thiruvananthapuram Chapter from November 19-21, 2026 at the IIST campus. The theme of the event is ‘Next-Generation Materials: Bridging Science, Technology, and Society’. The various areas of the event are:

- Nanomaterials and Sensors.
- Energy Storage and Conversion Materials.
- High-temperature Materials.
- Computational Chemistry.
- Metal Organic Frameworks (MOFs).
- Materials for Aerospace and Defence.
- Metals, Alloys, and Optoelectronic Materials.
- Polymers, Blends, and Composite Materials.
- Quantum Materials.
- Smart, Functional and Biomaterials.
- Sustainable Materials and Green Processes.
- AI and ML in Materials Science.

For further details, contact the Convenor of the event, Department of Chemistry, Indian Institute of Space Science and Technology, Valiamala P.O., Thiruvananthapuram—695 547, Kerala through Phone No: 0471 2568 541 and E-mail: icmst2026@iist.ac.in. For updates, log on to: <https://events.iist.ac.in/ICMST2026/>



Student Column

An Exploration of Integrating Indian Classical Music as a Core Pedagogical Strategy for Holistic Education

Pranita Uprale*

For a long time, schools have treated music as just a fun break from “serious” study. It is often seen as a hobby or a way to relax after a hard math or science class. However, new research shows that this view is incorrect. This paper argues that Indian Classical Music is not just an art form; it is actually a sophisticated type of brain training.

This study looks at music through three specific examples: therapy sessions with children who have special needs, math classes in Kolkata that use rhythm to teach numbers, and the traditional teaching methods of ancient Gurus. Through these examples, we find that music does much more than entertain. It helps children speak more clearly, understand the logic of numbers better, and manage their emotions.

The paper explores how the Indian Knowledge System (IKS) has always understood this secret connection. It shows how the complex beats of Indian drums (Tabla) work like a code for mathematics, and how simple vocal scales can act as therapy for a stressed mind. Finally, this paper proposes that under the new National Education Policy (NEP) 2020, music should not be an optional activity. Instead, it should be treated as a core subject—just like math or science—because it gives students the mental tools and focus they need to succeed in every other part of their education. (Abstract)

Introduction

In the world of education today, we face some difficult challenges. Many young children are terrified of Mathematics; they find numbers abstract and scary. Others struggle with focus, speech, or managing their big emotions. The National Education Policy–2020 (NEP–2020) has asked us to look back at our own traditions to find new ways of teaching.

*Research Scholar, National Institute of Educational Planning and Administration, 17-B, Sri Aurobindo Marg, NCERT Campus, New Delhi-110016.

This write up brings together three different sources of evidence to solve these problems. First, we look at how music heals the mind and helps children speak². Second, we look at how the rhythm of Indian music is actually just mathematics in disguise³. Finally, we look at the specific “brain games” used in Indian music training that sharpen memory and logic⁴. When we put these three things together, we see that music is not just an art; it is a necessary tool for growing a healthy, smart child.

Music as Therapy: Healing the Mind and Soul

Education is not just about filling a bucket with facts; it is about lighting a fire. However, before a child can even begin to learn how to read, write, or count, there is a basic requirement: they need to feel safe, calm, and emotionally secure. If a child is anxious or scared, their brain shuts down, and learning becomes impossible.

This is where the unique perspective of Dr. Shambhavi Das, a noted music therapist, becomes very important. She explains that the true power of music is not just entertainment. Its real power lies in its ability to create “stability of mind and soul.” When the mind is stable, learning happens naturally.

This approach is quite different from the standard Western model of music education. In many Western systems, music class is often about performance. The focus is usually on “motor skills” (like how fast your fingers can move on a piano keys) or “cognitive thinking” (reading sheet music). While these are good skills, they often miss the deeper purpose. The Indian perspective, as highlighted by Dr. Das, treats music as a healing tool first. It focuses on the inner feelings of the child rather than just their outer performance.

Helping “Divine Children” Speak

One of the most touching and significant findings in this research is how music helps children with special needs, particularly those with autism.

Dr. Das lovingly calls these students “Divine Children.”

For many of these children, the world is a very loud and confusing place. Regular talking can be extremely stressful for them because spoken language is fast and unpredictable. This often causes them to withdraw into silence. However, music acts as a gentle bridge between their inner world and the outside world.

Why does this work? Because music is organized. It has a steady beat and a predictable melody. This structure makes children feel safe. Research shows that music therapy is especially effective in “remediation.” Remediation means fixing or improving a problem. In this context, music helps fix speech delays.

- ***The “Backdoor” to Language***

For a child who struggles to speak, music offers a different path. A child who cannot say the sentence “I want water” might be able to *sing* “I want water.” The melody carries the words for them.

- ***Removing Fear***

Music allows them to communicate without the fear of making a mistake. It turns the scary task of talking into a fun game of singing, helping them find their voice.

The “Wish to Learn”

Beyond therapy, music fundamentally changes how a child feels about coming to school. It transforms the classroom from a place of pressure into a place of joy. The research identifies four key feelings that music creates:

1. ***Connections:*** Feeling linked to the teacher and other students.
2. ***Closeness:*** Feeling emotionally safe and supported.
3. ***Confidence:*** Believing in one’s own ability to do things.
4. ***Communication:*** Being able to share thoughts and feelings.

There is a famous quote by John Lubbock used in the session notes that perfectly explains this philosophy: “*The important thing is not so much that every child should be taught, as that every child should be given the wish to learn.*”

Music provides this essential “wish.” It makes children *want* to participate. Furthermore, music is a natural tool for learning languages.

- ***Natural Listeners***

Babies and toddlers are “natural listeners.” Long before they know what words mean, they understand the “music” of their parents’ voices—the pitch, the tone, and the rhythm. They are biologically tuned to listen to sound.

Learning Without Trying

When a child sings a song in a different language, they are doing something amazing. They are learning new vocabulary, difficult pronunciation, and sentence structure without any stress. They don’t feel like they are studying hard grammar rules; they feel like they are playing. This “hidden learning” is often more effective than traditional textbook study because the rhythm helps stick the information in their memory.

The Hidden Mathematics: Rhythm is Just Numbers

We often hear people say “Music is Math,” but what does that actually mean? Research by Smita Guha in schools in Kolkata gives us a clear answer. She found that Indian music is built on a foundation of logic and numbers.

Rhythm is Division and Ratio

In music, we have something called a “beat.” When a child learns to clap a rhythm, they are learning “the subdivision of a beat”¹². This is basically a lesson in fractions and ratios. They are learning that a whole can be broken into parts—halves, quarters, and thirds. This is the exact same logic used in mathematics, but instead of writing it on a blackboard, the child feels it in their body¹³.

The Heartbeat Connection

One of the most fascinating parts of Indian music is how natural it feels. The senior Guru interviewed in the study explained that the concept of “Taal” (rhythm) originally comes from the human heartbeat¹⁴. A normal heart beats about 72 times per minute. In Indian music, the standard speed is often set to 72 beats per minute to match this biological rhythm¹⁵. Because of this, the math of the music feels natural to the child, not forced.

Better Concentration = Better Math Scores

Does this actually help in school? The answer is yes. The study in Kolkata found that children

who learned Indian music were able to solve math puzzles more effectively and creatively than those who did not¹⁶. Both teachers and parents agreed that music builds concentration¹⁷. When a child learns to focus on a song, they are training the same “focus muscle” they need for a math exam.

The Mechanics of the Brain: How we Teach Logic

Now that we know *why* it works, let’s look at *how* it works. Emily Sayers conducted a deep study into the teaching methods of North Indian Classical Music. She found that the exercises students do are actually complex algorithms—step-by-step logical procedures.

The “Khandamēru” Game: The Logic of Combinations

One of the most powerful tools in Indian music is a process called Khandamēru¹⁸. This is essentially a math game.

1. The teacher gives the student a set of notes, for example, three notes: Sa, Re, and Ga.
2. The student is then challenged to sing every single possible combination of these notes.
3. They must sing: Sa-Re-Ga, Sa-Ga-Re, Re-Sa-Ga, Re-Ga-Sa, Ga-Re-Sa, and Ga-Sa-Re.

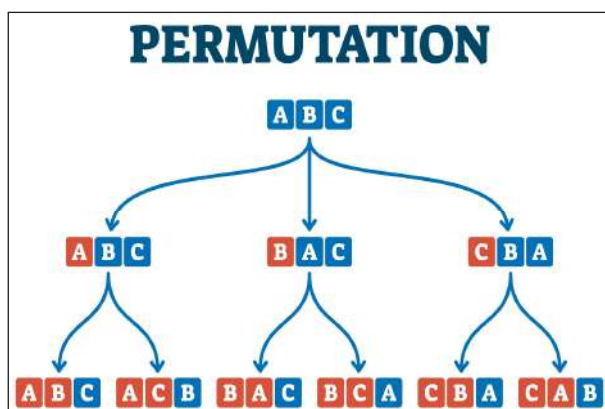


Table 1. Comparative Analysis of Musical Exercises and Their Academic Benefits.

Activity	What the Child Does	What they are Actually Learning	Source
The Permutation Game	Sing 3 notes in every possible order.	Math: Combinations and Logic.	
Hand Counting	Count 16 beats on finger joints.	Math: Division and Cycles.	
Healing Chants	Singing simple Om or Sargam chants.	Therapy: Calming anxiety & speech help.	
Action Songs	Skipping or jumping to a beat.	Physical: Motor skills & coordination.	
Language Songs	Singing the same tune in different languages.	Language: New words & phonetics.	

This might sound simple, but the brain is doing something very advanced called “combinatorics”¹⁹. The student is calculating permutations (combinations) instantly. This trains the brain to handle “all possible combinations” of a problem, which is a key skill in higher-level mathematics and logic.

“Paltās”: Building Mental Maps

Students also practice exercises called Paltās. These are patterns that loop and repeat, like “1-2, 2-3, 3-4”²¹. This isn’t just a warm-up. Sayers explains that this builds “content-addressable memory”²².

Think of a computer. You can find a file instantly without looking through every folder. Indian music training builds this kind of memory in the brain. A student can jump to any part of a complex musical phrase instantly because they have a mental “map” of the tonal space²³. This improves “Working Memory,” which is crucial for all academic learning.

Cheironomy: Counting on the Hand

Finally, there is the physical act of counting. In Indian music, students count the rhythm cycle (Taal) using the joints of their fingers²⁴.

1. Imagine a child improvising a song with their voice.
2. At the exact same time, their hand is counting a complex cycle of 16 beats (Teen Taal).
3. They have to make sure their song lands exactly on the first beat (Sum) of the next cycle.

This is a massive “dual-task” challenge. The brain has to process the creative melody and the rigid mathematical cycle at the same time²⁵. This strengthens Executive Function—the part of the brain responsible for planning and managing tasks.

Table 2. Mapping Math Logic to Musical Patterns

Intervention Type	Methodology		Cognitive/Educational Goal	Source
Mixed Intervention	Blending Indian (Stability) and Western (Motor) music.		Holistic development of mind, soul, and body.	
Visual-Music	Creating songs based on a given drawing.		Linking visual processing with auditory creativity.	
Khandamēru Game	Singing all permutations of a note set (SRG, RSG, etc.).		Combinatorial mathematics and logic.	
Rhythmic Counting	Using Tāl (cycles) and hand gestures (Cheironomy).		Understanding ratios, division, and fractions.	
Therapeutic Chant	Using Om or simple chants with “Divine Children.”		Speech remediation and emotional regulation.	
Sequence Type	Math Logic (n!)	Musical Permutation (Sargam)	Cognitive Skill Developed	
Root Order	1–2–3	Sa - Re - Ga (SRG)	Linear sequencing	
Variation A	2–1–3	Re - Sa - Ga (RSG)	Interruption & Return	
Variation B	1–3–2	Sa - Ga - Re (SGR)	Non-linear mapping	
Variation C	3–1–2	Ga - Sa - Re (GSR)	Interval jumping	
Variation D	2–3–1	Re - Ga - Sa (RGS)	Rotational symmetry	
Variation E	3–2–1	Ga - Re - Sa (GRS)	Inversion (Descending)	

Conclusion: A New Way Forward for Schools

This paper has shown that Indian Classical Music is not just an old tradition or a hobby. It is actually a complete way of learning.

Usually, schools treat subjects separately—math is for the mind, and music is just for fun. But this research shows that Indian Classical Music brings everything together. It connects the feelings of the heart with the logic of the brain. Based on all the examples we have seen, we can list three main benefits:

- **For the Heart**

Music works like medicine for feelings. As we saw with the “Divine Children” (children with special needs), music creates a safe place. It helps children who are scared or shy to feel calm. For children who find it hard to speak, music

gives them a voice. It helps them communicate when words are too difficult.

- **For the Mind**

Music helps children understand math naturally. When a child learns rhythm (Tala), they are actually learning how to count and divide numbers. They don’t need a textbook to understand patterns; they learn them by clapping and singing. This makes math feel easy and natural instead of scary.

- **For the Brain**

This system is like a workout for the brain. The specific exercises we discussed, like the permutation games (Khandamēru) and vocal patterns (Paltās), are not just songs. They are brain puzzles. Doing these exercises makes a student’s memory sharper and helps them focus better.

Table 3. Levels of Complexity: Linking Music Exercises to Math Concepts

Level	Exercise Structure	Pattern Logic (Algorithm)	Mathematical Concept	Level
Foundation	Simple Scale	1–2–3–4–5–6–7–1’	Number Line / Linear Progression	Foundation
Patterning	Paltā (Jod)	1–2–3–3,2–3–4–4...	Sets and Subsets (n, n+1)	Patterning
Recursive	Complex Paltā	1–3–2–1–3–2–1,2–4–3–2–4–3–2...	Recursion and Loops	Recursive
Expansion	Alāp Expansion	1...1–2...1–2–3...	Cumulative Increase / Slope	Expansion

The Future: NEP–2020

As we look at the future with the new National Education Policy---2000 (NEP—2020), we have a great chance to change schools for the better. The new policy says we should not separate arts from science. Therefore, we should stop looking at music as just a performance for the stage. We should see it as a “Gym for the Brain.” Just like we have sports to make our bodies strong, we need music to make our brains strong. By bringing these simple but powerful Indian traditions into the classroom, we can help every child become a better thinker, a confident speaker, and a much happier learner.

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AIU Publication on

IMPLEMENTING NATIONAL EDUCATION POLICY–2020: A ROADMAP

By

Dr (Ms) Pankaj Mittal & Dr Sistla Rama Devi Pani

‘Implementing National Education Policy—2020: A Roadmap’ edited by Dr (Ms) Pankaj Mittal and Dr S Rama Devi Pani is a step towards getting to understand the concept of NEP and its rollout expectations from the side of the practitioners of education. It is a collection of essays by some of the greatest thinkers in the field of Indian higher education. Each essay in the book examines one or more of the critical topics and provides solutions and methods to overcome the issues involved in the implementation of NEP—2020. The book generates a corpus of new ideas that are significant for reforming the Indian higher education system to align with the Policy. The book aims to provide a roadmap to the government as well as the universities to gear themselves towards becoming more responsive to the Policy which in turn can secure the present and future demands of higher education. The Book is available at the AIU Website: www.aiu.ac.in

For further details, contact the Editor at E-mail : ramapani.universitynews@gmail.com

THESES OF THE MONTH

SOCIAL SCIENCES

**A List of doctoral theses accepted by Indian Universities
(Notifications received in AIU during the month of March-April, 2026)**

Accountancy

1. Agarwal, Shreya. **Corporate environmental reporting practices in Indian oil and gas industry.** (Prof. L N Koli), Department of Accountancy and Law, Dayalbagh Educational Institute, Agra.
2. Duggal, Jasleen Kaur. **An integration of Sustainable Development Goals (SDGs) with Corporate Social Responsibility (CSR) for attaining sustainability and value creation.** (Prof. Pravin Saxena), Department of Accountancy and Law, Dayalbagh Educational Institute, Agra.
3. Jain, Abhishek. **Environmental, Social and Governance (ESG) factors and financial performance: An analysis of investors sagaciousness towards ESG in India.** (Prof. Pramod Kumar), Department of Accountancy and Law, Dayalbagh Educational Institute, Agra.
4. Jain, Adima. **Effectiveness and challenges of accounting education in higher educational institutions, Uttar Pradesh: With special reference to skill development.** (Prof. Pravin Saxena), Department of Accountancy and Law, Dayalbagh Educational Institute, Agra.
5. Nikhil Kumar. **Reporting of financial frauds in Indian banks and its impact on financial performance of Indian banking sector: With special reference to private and public sector banks in India.** (Prof. L N Koli), Department of Accountancy and Law, Dayalbagh Educational Institute, Agra.
6. Nimeshwari, Deeksha. **An analytical study on the effectiveness for government expenditure on Samagra Shiksha Abhiyan: With special reference to selected states in Northern Region of India.** (Prof. Pravin Saxena), Department of Accountancy and Law, Dayalbagh Educational Institute, Agra.
7. Shah, Kanisha Umang. **Impact of Indian accounting standards related to financial instruments on financial statements of selected Indian companies.** (Dr. Vinod Nayak), School of Commerce, Gujarat University, Ahmedabad.

8. Sharma, Tanu. **Impact of key banking indicators on the credit risk of selected public and private sector banks in India prior to and during the Covid-19.** (Prof. Pramod Kumar), Department of Accountancy and Law, Dayalbagh Educational Institute, Agra.
9. Singh, Priyanka. **Performance evaluation of select equity schemes of Indian mutual funds.** (Prof. Pramod Kumar), Department of Accountancy and Law, Dayalbagh Educational Institute, Agra.

Business Administration

1. Mohsina Bano. **A study on financial awareness among employed women in India: With special reference to Madhya Pradesh.** (Prof. Y S Thakur), Department of Business Management, Dr Harisingh Gour Vishwavidyalaya, Sagar.

Commerce

1. Arega, Enbiale Setegn. **A study on marketing mix and its impact on the tourists satisfaction with special reference to selected Ethiopian tourist attraction places.** (Dr. G P Japee), School of Commerce, Gujarat University, Ahmedabad.
2. Halam, Harsanglian. **Status of road transport network connectivity: A study of North Eastern Region of India.** (Prof. Subir Kumar Sen), Department of Commerce, Tripura University, Suryamaninagar.
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4. Hauhnar, Albert Lalrinsanga. **Risk management practices with reference to credit risk management among the selected banks in Mizoram.** (Dr. Gurram Ramakrishna), Department of Commerce, Mizoram University, Aizawl.
5. Karthik, J P. **Adoption intention and investor's behaviour towards mutual funds: An empirical analysis of digital mutual fund platforms.** (Dr. Ranjith Kumar S), School of Economics & Commerce, CMR University, Bengaluru.

6. Rajput, Ankita. **An analytical study of pre and post merging evaluation on Indian banks: With special reference to selected public sector banks and private sector banks.** (Dr. Gautam Prasad), Department of Commerce, Dr Harisingh Gour Vishwavidyalaya, Sagar.
7. Rath, Sugyani. **An exploratory research on socioeconomic dynamics of Kisan Credit Card (KCC) scheme on agricultural borrowers in Odisha.** (Dr. Saswat Kishore Mishra), KIIT School of Economics and Commerce, Kalinga Institute of Industrial Technology, Bhubaneswar.
8. Santpal. **Challenges and rejuvenation strategies of Micro, Small and Medium Enterprises (MSMEs): A study of Haryana State.** (Prof. Sanjay Kumar Hooda), Department of Commerce, Indira Gandhi University, Meerpur.
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Economics

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1. Bajaj, Ruchi. **Study of subject specific language use in the teaching learning process.** (Dr. Eisha Kannadi), School of Education, Indira Gandhi National Open University, New Delhi.

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Psychology

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4. Varu, Jignaben Rambhai. **A study of emotional adjustment, aggression and personality relation to there gender and generation gap.** (Dr. R G Parmar), Department of Psychology, Saurashtra University, Rajkot.

Social Work

1. Lalnunhlui, Rebecca LP. **Rural leadership, social capital and community development in Lunglei District, Mizoram.** (Prof. Kanagaraj Easwaran), Department of Social Work, Mizoram University, Aizawl.

Sociology

1. Lalrindiki. **Inmate life and incarceration experiences of women in prison: A study in Mizoram.** (Prof. R K Mohanty), Department of Sociology, Mizoram University, Aizawl.
2. Saunand, Somasi. **Evaluation of common services centres in select Districts of Maharashtra.** (Dr. Pradeep Kumar and Prof. Nehal A Farooquee), School of Extension and Development Studies, Indira Gandhi National Open University, New Delhi.

Womens Studies

1. Arya, Manju. **Uttar bhumandlikaran ke daur mein Chitrakoot ke Kol Samudaye mein lengik sambandh ek vishleshnatamak adhyayan.** (Dr. Sunita Dhal and Prof. Nilima Srivastava), School of Gender and Development Studies, Indira Gandhi National Open University, New Delhi.
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Applications are invited from all over the country for the posts of Dean, College of Veterinary & Animal Sciences/ Dean, College of Fisheries/Dean, College of Agribusiness Management/Dean, College of Agriculture/Dean, College of Community Science/ Dean, College of Basic Sciences & Humanities/Dean, College of Technology/Dean, College of Post Graduate Studies/Director Research & Director Extension Education. Last date for the receipt of the complete application direct and through proper channel is 25.6.2026. Full details regarding Application Form, Fees, Academic Qualification and Score Card will be available at university website www.gbpuat.ac.in on 22.5.2026.

Chief Personnel Officer

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Applications are invited for the following teaching posts in unaided section of senior college, for the **one academic year i.e 2026-2027**. Eligible Candidates shall submit their application to the Principal during office hours **within 10 days** of publication of this advertisement.

Sr. No	Particulars	Vacant Posts
Assistant Professor on Fixed/Consolidate Pay		
1	M.A English	2
2	M.A Urdu	2
3	M.Sc Chemistry	2
4	B.C.S	3
5	Home Science	3
6	Psychology	3
7	Sociology	3

Eligibility: As per the UGC, Government of Maharashtra & University Norms and Rules of Appointments.

Note: In service candidates should apply through proper channel. No TA/DA will be paid to the candidates for attending the Interview.

Dr. Maqdoom Farooqui
Principal

Dr. Rafiq Zakaria Campus

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Following posts of teaching staff (Full time/Fix Pay) in Non Grant Courses are vacant in our College for academic Year 2026-27. Eligible candidates shall submit their application alongwith Xerox Copies of their documents to Principal, Maulana Azad College, Dr. Rafiq Zakaria Campus, Rauza Baugh, Aurangabad through Speed Post / in person within 10 days of the publication of this advertisement:

Sr	Name of Subject	Course	No. of Posts	Sr	Name of Subject	Course	No. of Posts
1.	Chemistry	P.G. (Non-Grant)	02	11	M.Com (HR)	P.G. (Non-Grant)	02
2.	Analytical Chemistry	P.G. (Non-Grant)	02	12	BBA	U.G. (Non-Grant)	03
3.	Industrial chemistry	P.G. (Non-Grant)	02	13	B. Com E com	U.G. (Non-Grant)	03
4.	Computer Science	P.G. (Non-Grant)	02	14	B.C.A.	U.G. (Non-Grant)	04
5.	Mathematics	P.G. (Non-Grant)	02	15	B.C.S.	U.G. (Non-Grant)	04
6.	Commerce	P.G. (Non-Grant)	02	16	BSc. (Biotech)	U.G. (Non-Grant)	04
7.	Geology	PG.DDT (Non Grant)	02	17	Psychology	U.G. (Non-Grant)	02
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10.	Biotechnology	P.G. (Non-Grant)	02	20	Economics	U.G. (Non-Grant)	02

- Numbers of posts are liable to be changed and Management's decision for filling up the posts will be final.
- Eligibility criteria as per the UGC, University and Government of Maharashtra norms.
- All the appointments are subject to the approval of Dr Babasaheb Ambedkar Marathwada University, (Aurangabad) Chhatrapati Sambhaji Nagar.
- No TA/DA will be paid to candidates for attending the interview.

Dr. Mazahar Ahmed Farooqui
Principal



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