ISSN: 2277-8985

VOLUME 15 ISSUE 2 SEPTEMBER 2026

AWADH INTERNATIONAL JOURNAL OF INFORMATION TECHNOLOGY AND EDUCATION (AIJITE)

(Peer Reviewed, Refereed Journal)

alfa Publications

New Delhi (India)

Awadh International Journal of Information Technology and Education (AIJITE)

(Peer Reviewed Refereed Journal)

alfa ***Publications***

NEW DELHI (INDIA)

Awadh International Journal of Information Technology and Education
(Peer Reviewed Refereed Journal)
ISSN: 2277-8985

Published by: Shilpa Goel
for
ALFA PUBLICATIONS
4398/5, Ansari Road, Daryaganj,
New Delhi - 110 002 (India)
Phone: +91-11-23275092
e-mail: alfapublications@gmail.com

© Awadh Centre of Education
(COMM-IT Career Academy & Institute of Vocational Studies)
Awadh Bhavan,
FC-31, Sheikh Sarai, Phase - II
Institutional Area,
New Delhi - 110017 (India)

Vol. 15 Issue 2, September 2026
Periodicity of Publication, Biannual

SUBSCRIPTIONS

Awadh International Journal of Information Technology & Education is published twice a year. All orders accompanied with payment should be sent directly to: **Alfa Publications**, 4398/5, Ansari Road, Daryaganj, New Delhi - 110002

ANNUAL SUBSCRIPTION CHARGES

TWO ISSUES Rs. 1500.00 / $ 100.00 (Overseas)

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, transmitted or utilized in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner. Application for such permission should be addressed to the publisher.

PRINTED IN INDIA

ADVISORY BOARD

Mr. Naushad Khalid, Managing Trustee, Awadh Public Charitable Trust, New Delhi, India

Mr. Khalid Hashmi, Director, Awadh Centre of Education, New Delhi, India

Prof. PK Sahu, Ex-Dean & Head of the Department, Department of Education, University of Allahabad, India

Prof. Sunil Kumar Singh, Professor**,** Faculty of Education, BHU, Varanasi, India

Prof. Harjeet Kaur Bhatia, Professor, Dept. of Educational Studies, Faculty of Education, JMI, New Delhi, India

Prof. Sangeeta Chauhan, Professor, GGSIPU, New Delhi, India

Prof. Mohd. Shafiq, Professor, Jamia Millia Islamia, New Delhi, India

Prof. Iqbal Mattoo, Professor, Dept. of Education, University of Kashmir, Srinagar, India

Prof. Jessy Abraham, Professor, Dept. of Teacher Training & Non Formal Education (IASE), JMI, New Delhi, India

Joanna Madalinska Michalak, Professor, University of Warsaw, Poland

CHIEF EDITOR

Dr. Mandira Gupta, Principal, Institute of Vocational Studies, New Delhi, India

EDITORIAL TEAM

Prof. Usha Sharma, Professor, NCERT, New Delhi, India

Dr. Arshad Ikram, Associate Professor, Department of Educational Studies, Faculty of Education, Jamia Millia Islamia, New Delhi, India

Dr. Sajjad Ahmad, Assistant Professor, Department of Educational Studies, Faculty of Education, Jamia Millia Islamia, New Delhi, India

Awadh International Journal of Information Technology and Education

Volume 15 **Issue 2** **September 2026**

Contents

1. *Corporate Partnerships for Teacher Development under NEP 2020: Reimagining CSR for Future- ready Teachers* 1
Dr. Arti Bhatnagar & Dr. Manvinder Kaur

2. *Technostress and Educational Technology use among Teachers: Challenges, Consequences and Teachers' Wellbeing* 10
Dr. Kriti Guleria

3. *Developing a Human-AI Collaboration Framework for Teaching and Learning in Higher Education: A Human-Centered Approach* 19
Dr. Tasneem Bano

4. *NEP 2020 and Indian Knowledge Systems: Exploring the Preparedness of Teacher Educators for IKS Integration* 36
Dr. M. Zainul Abedin Shamsi & Shoyeb Khan

5. *Status of Sustainable Development Goals (SDGs) in India* 47
Dr. Almas Parveen

Awadh International Journal of Information Technology and Education
ISSN: 2277-8985
Vol. 15, Issue - 2 September 2026
Pp. 1-9

1

Corporate Partnerships for Teacher Development under NEP 2020: Reimagining CSR for Future- ready Teachers

Dr. Arti Bhatnagar
Associate Professor,
Guru Ram Dass College of Education,
Delhi

Dr. Manvinder Kaur
Associate Professor,
Guru Ram Dass College of Education,
Delhi

ABSTRACT

Education systems are being reshaped by rapid technological change, evolving societal expectations and the need to prepare learners for an uncertain future. In this changing landscape, teachers are expected to move beyond traditional instruction and take on roles as facilitators of learning, designers of meaningful experiences and guides who help learners navigate new knowledge and complexity. Recognizing the central role of teachers in educational transformation, the National Education Policy (NEP) 2020 emphasizes continuous professional development (CPD), digital competence and innovative approaches to teaching and learning. However, access to sustained and high-quality professional learning remains uneven. Training may introduce teachers to new ideas and technologies but opportunities for continued practice, mentoring and reflection are often limited. This gap between training and classroom capability creates a need to explore additional avenues for strengthening teacher development.

In this context, Corporate Social Responsibility (CSR) has emerged as a potential contributor to teacher development through corporate-education partnerships that provide expertise, technology, training and exposure to contemporary practices. This conceptual paper examines how CSR-supported initiatives can contribute to meaningful and sustainable teacher development in India, drawing on thematic literature, theoretical perspectives and selected case studies. While CSR can expand access to professional learning and support pedagogical and digital innovation, its impact may be constrained by short-term programme design, limited contextual alignment and inadequate evaluation. The paper therefore argues for a shift

from activity-based CSR towards sustained, capability-focused partnerships that connect corporate resources and expertise with teachers' professional needs, school contexts and national educational priorities. Such an approach can strengthen teacher capacity while contributing to the broader goals of NEP 2020 and SDG 4: Quality Education

Keywords: CSR, Teacher Training, Professional Development, NEP 2020

INTRODUCTION

"The quality of an education system cannot exceed the quality of its teachers." This widely acknowledged idea has gained renewed urgency in today's rapidly changing world. As classrooms evolve and expectations from education expand, the focus is no longer just on what students learn, but on how effectively teachers are prepared to guide that learning journey.

Education today is undergoing a quiet but powerful transformation. Classrooms are no longer confined to textbooks and chalkboards; they are increasingly shaped by technology, global connectivity, and the need to prepare learners for an uncertain and rapidly changing future. In this evolving landscape, the role of the teacher has become more complex and demanding than ever before. Teachers are expected not only to deliver content but also to inspire curiosity, foster critical thinking, integrate digital tools, and support diverse learners with varying needs.

Recognizing this shift, the National Education Policy 2020 places teachers at the heart of educational reform. It acknowledges that no meaningful change in education is possible without empowering teachers and investing in their continuous professional development (CPD). The policy calls for teachers who are reflective practitioners, technologically competent, and capable of adopting innovative pedagogies. However, translating this vision into reality is not without challenges. Many teacher education systems continue to struggle with limited resources, fragmented training opportunities, and a gap between theoretical preparation and classroom realities.

This is where Corporate Social Responsibility (CSR) begins to take on a more meaningful role. Traditionally, CSR in education has focused on visible contributions such as building infrastructure, providing scholarships, or distributing learning materials. While these efforts are important, they often address access rather than quality. Over time, there has been a growing realization that improving the quality of education requires investing in the people who shape it-teachers. Corporate partnerships offer a unique opportunity to rethink how teacher development can be supported. Unlike conventional training models, corporate-led initiatives often bring in fresh perspectives, exposure to real-world practices, and access to advanced technologies. They can introduce teachers to innovative tools, contemporary skills, and experiential approaches that are otherwise difficult to access within traditional systems. For example, training programs supported by corporates frequently emphasize digital literacy,

problem-solving, collaboration, and design thinking -skills that are increasingly essential in modern classrooms. At the same time, it is important to approach this growing involvement of corporates with a critical lens. Not all CSR initiatives lead to meaningful or lasting change. Many programs are short-term, fragmented, or disconnected from the actual needs of teachers and schools. Without proper alignment with curriculum, follow-up support, and mechanisms to assess impact, even well-intentioned initiatives risk becoming one-time interventions rather than sustainable solutions.

This raises an important question: Can corporate partnerships truly contribute to building future-ready teachers, or do they remain peripheral to the core education system? This paper attempts to explore this question by examining the role of CSR-driven corporate collaborations in teacher development. It seeks to move beyond a purely descriptive understanding and instead critically analyze how such partnerships can be reimagined as long-term, meaningful contributors to educational transformation. By bringing together policy insights, existing research, and real-world examples, the study aims to highlight both the potential and the limitations of CSR in teacher development. More importantly, it argues for a shift in perspective -from viewing CSR as an act of charity to recognizing it as a strategic investment in human capital. Such a shift is essential if India is to realize the vision outlined in the National Education Policy 2020 and prepare a generation of teachers who are not only competent but also confident, innovative, and future-ready.

CONCEPTUAL FRAMEWORK

Understanding how corporate partnerships influence teacher development requires looking beyond isolated training programs and examining the broader process through which change actually happens. This study conceptualizes CSR-supported teacher development not as a one-time intervention, but as a dynamic, interconnected process involving inputs, experiences, transformations, and long-term outcomes. At its core, the framework is built on a simple but powerful idea: that teacher development becomes meaningful only when resources, opportunities, and support systems come together in a sustained and purposeful way.

i. **CSR as an Enabler, Not Just a Provider** Traditionally, CSR has been viewed as a source of funding or material support. However, in the context of teacher development, its role needs to be understood more deeply. CSR acts not merely as a provider of resources but as an enabler of new possibilities, with corporate partnerships providing access to technology and digital platforms, exposure to contemporary knowledge and industry practices and structured training through expert-led sessions. But more importantly, they introduce new ways of thinking about teaching and learning. Teachers are encouraged to move beyond routine methods and experiment with innovative, learner-centered approaches. In this sense, CSR becomes a catalyst for change, rather than just a supplementary support system.

ii. **The Process of Teacher Transformation -**The framework emphasizes that teacher development is not an immediate outcome of training; it is a gradual process of transformation. The process of professional growth can be understood through three stages: Exposure, Engagement and Internalization. At the Exposure stage, teachers are introduced to new ideas, tools and practices through workshops, digital platforms and training programmes. This creates awareness and opens up new possibilities. At the Engagement stage, teachers begin to interact with and apply these ideas by trying out digital tools, redesigning lessons and experimenting with new pedagogies. Mentoring, peer learning and collaborative activities can further support this process. Finally, at the Internalization stage, these practices gradually become part of the teacher's regular approach to teaching. The change therefore moves from being externally introduced to becoming internally sustained. Training alone does not lead to transformation - continuous engagement does.

iii. **Context Matters: The School Environment-**Teacher development does not happen in isolation. The impact of CSR initiatives depends on the school environment, including digital infrastructure, administrative support, teacher workload and openness to change. A supportive school can strengthen the impact of even modest interventions. Therefore, CSR programmes should be context-sensitive rather than one-size-fits-all, particularly in diverse school setting.

iv. **From Skills to Capability-**A key shift in this framework is the movement from skills to capability. While a skill refers to what a teacher knows or has been trained to do, capability refers to what the teacher is actually able to apply in real classroom situations. For instance, a teacher may receive training in digital tools through a CSR initiative but effective classroom use depends on several contextual factors such as the availability of devices, reliable internet connectivity, institutional encouragement, confidence and sufficient time to experiment. Thus, training alone does not guarantee meaningful change. Real transformation occurs when teachers are supported and empowered to convert their learning into sustained classroom practice.

v. **Outcomes: Beyond Immediate Gains-**The framework moves beyond measuring immediate outputs such as the number of teachers trained and focuses on the long-term impact of CSR initiatives. Meaningful outcomes include improved teaching practices, greater teacher confidence and motivation, increased use of innovative and digital pedagogies and more engaging learning experiences for students. This broader perspective shifts the focus from "How many teachers were trained?" to "What changed in teaching and learning as a result?" Ultimately, the goal is to create future- ready teachers- educators who are adaptable, reflective, and capable of responding to changing educational needs, as envisioned in the National Education Policy 2020.

vi. **A Holistic View of the Teacher Development Framework-**The conceptual framework views teacher development as a continuous and interconnected cycle rather than a linear

process with a fixed endpoint. CSR initiatives begin by providing resources, opportunities and learning experiences that expose teachers to new knowledge, technologies and practices. Teachers then engage with these opportunities and gradually develop the confidence and capability to apply their learning in real classroom situations. However, the extent to which this learning is implemented is shaped by contextual factors such as school infrastructure, institutional support, workload and openness to change. As teachers develop their capabilities, improvements in teaching practices and student learning experiences become visible. These outcomes in turn provide opportunities for reflection, further learning and improvement. Thus, teacher development is not a one-time achievement but an ongoing journey in which resources, learning, context, capability and outcomes continuously influence one another.

vii. Key Insight of the Framework: CSR as a Sustainable Partnership-The central insight of the framework is that corporate partnerships can make a meaningful contribution to teacher development when CSR moves beyond one-time training programmes and becomes a sustained, context-sensitive and capability-focused process. The value of CSR lies not simply in providing resources or conducting training but in creating opportunities for teachers to learn, practice, adapt and apply new knowledge in real classroom situations. This also connects the framework strongly with the Sustainable Development Goals (SDGs), particularly SDG 4: Quality Education and SDG 17: Partnerships for the Goals. Through teacher development initiatives, CSR can contribute to improving the quality of teaching and learning, strengthening teacher competencies and addressing disparities in educational opportunities. At the same time, meaningful corporate-school partnerships reflect SDG 17 by bringing together corporate expertise, technology, resources and institutional capacity to support educational development. In India, this is increasingly visible through initiatives focused on digital pedagogy, ICT integration, smart classrooms, STEM education and skill-based learning, where teacher training is becoming an important part of the intervention. However, the real impact of these initiatives depends on their design, relevance to local needs, institutional support and long-term sustainability. Thus, CSR in teacher development can be understood not merely as corporate support for education but as a potential mechanism for educational improvement and sustainable development through meaningful partnerships.

CASE STUDIES OF CSR-SUPPORTED TEACHER DEVELOPMENT

a) Tata ClassEdge Initiative

The Tata ClassEdge initiative represents a sustained approach to teacher development by integrating technology, curriculum support and professional training. Teachers are not simply introduced to digital tools but are guided in using them meaningfully within their regular classroom practices. The initiative therefore helps bridge the gap between training and actual implementation. Its broader approach shows that

teacher development is more effective when professional learning is connected with curriculum, classroom processes and ongoing support.

Key Insight: Teacher development is most effective when it is continuous, contextual and integrated with everyday teaching practice.

b) Satya Bharti School Programme

The Satya Bharti School Programme of Bharti Foundation focuses on improving educational quality through continuous professional development, mentoring and feedback. Rather than limiting teacher development to initial training, the programme provides ongoing support that enables teachers to reflect on their practices and gradually improve them. Its emphasis on community participation also creates a supportive environment for teachers and schools.

Key Insight: Sustainable teacher development requires long-term engagement, mentoring, feedback and a supportive school environment.

c) CSR Future-Ready School Programme: Sattva Model

The Sattva model reflects an outcome-oriented approach to CSR-supported teacher development. It focuses on areas such as STEM education, digital pedagogy and competency-based teaching while linking teacher training with student learning outcomes. This approach shifts the emphasis from simply counting teachers trained or sessions conducted to examining the actual changes produced through professional development.

Key Insight: Teacher training should move beyond participation and focus on measurable improvements in teaching and student learning.

Infosys Springboard Initiative

The Infosys Springboard initiative highlights the growing role of digital platforms in continuous teacher learning. Through online courses, training modules and learning resources, teachers can access professional development at their own pace and according to their needs. Such platforms can reduce geographical and institutional barriers and provide wider access to learning opportunities.

Key Insight: Digital platforms can make teacher development more accessible, flexible and continuous, particularly where traditional training opportunities are limited.

KEY CHALLENGES IN CSR-BASED TEACHER DEVELOPMENT

- **Fragmented Implementation**: Many CSR programmes are short-term and linked to funding cycles. Limited continuity and follow-up make it difficult for teachers to sustain new practices.
- **Limited Curriculum Integration**: Training may introduce innovative methods and digital tools but teachers can face difficulties in integrating them with existing curriculum, assessment patterns and classroom realities.

- **Limited Impact Assessment:** Evaluation often focuses on outputs such as the number of teachers trained or workshops conducted rather than changes in teaching practices, teacher capability or student learning.
- **Inequality in Access**: CSR initiatives may reach urban and well-connected schools more easily while teachers in rural, remote and resource-constrained schools may have limited access to quality professional development.
- **Inadequate Follow-up Support:** Without mentoring, peer learning and continued guidance, teachers may find it difficult to translate training into sustained classroom practice.
- **Contextual Differences:** A common CSR model may not work equally well across schools because infrastructure, teacher workload, leadership support and student needs vary considerably.

DISCUSSION

The analysis indicates that CSR has considerable potential to contribute to teacher development but its impact depends on how these initiatives are conceptualized and implemented. A significant shift is required from charity-based CSR, which often focuses on short-term interventions and visibility, towards capacity-building CSR, which emphasizes sustained professional growth and long-term educational impact. Teacher development should therefore be viewed as an ongoing process rather than a one-time training activity. CSR programmes need to be designed as meaningful partnerships involving continuous professional development, mentoring, peer learning, classroom application and follow-up support. Equally important is the need for outcome-based evaluation that examines how professional learning influences teaching practices and student experiences rather than focusing only on participation or the number of activities conducted. CSR should also respond to the specific needs and realities of schools rather than following a uniform model across different contexts. Ultimately, CSR can have greater educational value when it works with the education system rather than alongside it, aligning corporate resources and expertise with institutional priorities, policy goals and classroom needs.

PROPOSED FRAMEWORK FOR FUTURE-READY TEACHER DEVELOPMENT

The proposed framework presents CSR-supported teacher development as a holistic, continuous and outcome-oriented process. At the Input stage, corporates contribute funding, technological resources, professional expertise and knowledge of emerging industry practices. These inputs support the Process of continuous professional development through structured training, mentoring, peer learning, collaborative activities and exposure to new technologies and workplace practices. Over time, these experiences contribute to Outputs such as improved digital competence, greater professional confidence and increased adoption of innovative pedagogical practices. These outputs can then contribute to broader Outcomes, including

the development of confident and future-ready teachers, improved student learning experiences and greater alignment with the vision of National Education Policy 2020. Importantly, the framework does not view these stages as a simple linear sequence. Teacher development involves continuous learning, application, reflection and adaptation, with outcomes informing further professional learning and improvement. The framework therefore places teacher capability and sustained classroom impact at the center of CSR-supported professional developments.

IMPLICATIONS

- **For Policy Makers-**Policy makers need to develop clear guidelines that encourage the integration of CSR into broader teacher development strategies. Such initiatives should be aligned with national educational priorities while ensuring quality, equity, accountability and sustainability.
- **For Schools-**Schools play a crucial role in converting professional learning into classroom practice. They need to provide teachers with adequate time, infrastructure, administrative support and opportunities for collaboration so that teachers can experiment with and sustain new practices.
- **For Corporates-**Corporates should move towards **long-term, need-based and impact-oriented partnerships** rather than focusing primarily on short-term training activities. Their expertise, technology and resources can have greater value when combined with sustained mentoring, follow-up and meaningful evaluation.
- **For Teacher Education Institutions-**Teacher education institutions can serve as important bridges between educational theory, classroom practice and emerging professional requirements. Collaboration with industry can help institutions update curricula, provide practical exposure and strengthen teachers' digital, pedagogical and professional capabilities.

CONCLUSION

Teacher development lies at the heart of meaningful educational transformation. Policies and reforms may provide direction but their success ultimately depends on teachers who translate these visions into classroom practice. CSR initiatives offer an important opportunity to strengthen this process by bringing resources, technology, expertise and new perspectives into teacher development. However, their potential cannot be fully realized through isolated workshops or short-term interventions. What is required is a shift towards sustained, context-sensitive and capability-focused partnerships that support teachers beyond initial training and enable them to apply, reflect on and refine their learning. Reimagining CSR as a strategic investment in teacher capacity can contribute to the development of educators who are confident, adaptable and prepared for changing educational demands. Such an approach can support the broader vision of NEP 2020 while contributing to an education system that is more equitable, innovative, responsive and prepared for the future.

REFERENCES

- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis, with special reference to education* (3rd ed.). University of Chicago Press. https://doi.org/10.7208/chicago/9780226041223.001.0001
- Darling-Hammond, L. (2017). Teacher education around the world: What can we learn from international practice? *European Journal of Teacher Education, 40*(3), 291–309. https://doi.org/10.1080/02619768.2017.1315399
- Ismail, M., Amat Johar, R. F., Mohd Rasdi, R., & Alias, S. N. (2014). School as stakeholder of corporate social responsibility program: Teacher's perspective on outcome in school development. *The Asia-Pacific Education Researcher, 23*, 321–331. https://doi.org/10.1007/s40299-013-0107-8
- Joseph, S. K., & Yadav, P. (2025). Assessing the effectiveness of industry-academia collaboration in CSR-funded skill development programs: A case study approach. *EPRA International Journal of Multidisciplinary Research, 11*(2). https://doi.org/10.36713/epra20354
- OECD. (2019). *How teachers update their teaching skills to cope with the rapidly changing world*. OECD Publishing. https://doi.org/10.1787/282b9edd-en
- Patwardhan, S. (2017). Social enterprise: A CSR frontier: Case study of Tata ClassEdge. In N. Mitra & R. Schmidpeter (Eds.), *Corporate social responsibility in India: Cases and developments after the legal mandate* (pp. 167–180). Springer. https://doi.org/10.1007/978-3-319-41781-3_13
- Preetha, S., & Vanniarajan, T. (2017). Evaluation of corporate social responsibility from a stakeholder's perspective: A case study of Aparajitha Corporate Services in India. *Asian Journal of Business Ethics, 6*(1), 41–55. https://doi.org/10.1007/s13520-016-0068-0
- Reid, T. J. (2025). Corporate social responsibility and education in India: A step towards sustainable development. *International Research Journal on Advanced Engineering and Management, 3*(3), 707–714. https://doi.org/10.47392/IRJAEM.2025.0114
- Schleicher, A. (2018). *World class: How to build a 21st-century school system*. OECD Publishing. https://doi.org/10.1787/9789264300002-en
- Sen, A. (1999). *Development as freedom*. Oxford University Press. https://doi.org/10.1093/0198297580.001.0001
- UNESCO. (2021). *State of the education report for India 2021: No teacher, no class*. UNESCO New Delhi.

❑❑❑

Awadh International Journal of Information Technology and Education
ISSN: 2277-8985
Vol. 15, Issue - 2 September 2026
Pp. 10-18

2

Technostress and Educational Technology use among Teachers: Challenges, Consequences and Teachers' Wellbeing

Dr. Kriti Guleria
Assistant Professor,
Amity University,
Noida, U.P.

ABSTRACT

The growing use of learning management systems, digital resources, online assessment, mobile applications, collaborative platforms, and artificial intelligence has transformed teachers' professional practices. Although educational technologies can enhance flexibility, accessibility, collaboration, personalization, and instructional effectiveness, they can also create additional professional demands and technology-related stress. This review examines technostress among teachers, focusing on its conceptual foundations, major sources, consequences, and possible mitigation strategies. The literature identifies techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty as important technostress creators, while digital competence, technical support, organizational flexibility, professional development, and teacher participation may function as inhibitors (Ragu-Nathan et al., 2008; Yang et al., 2025). Evidence indicates that technostress is not merely a consequence of inadequate individual technological skills but a multidimensional socio-technical phenomenon shaped by technological demands, organizational conditions, professional expectations, and individual resources. Recent studies also associate technostress with teacher well-being, fatigue, job satisfaction, professional performance, and technology adoption (Heredia-Gálvez & Millán-Barroso, 2026; Yang et al., 2025). The review argues that sustainable digital transformation requires institutions to move beyond technology adoption toward supportive, workload-sensitive, competence-oriented, and teacher-centered technology integration.

Keywords: Technostress, Educational Technology, Teachers, Digital Competence, ICT Integration, Teacher Well-being, Technology Adoption, Digital Education.

INTRODUCTION

Digital technologies have become integral to contemporary education. Learning management systems, digital learning materials, online assessment, videoconferencing, mobile applications, collaborative platforms, and artificial intelligence increasingly support teaching, communication, assessment, and professional activities. These developments create opportunities for flexible learning, collaboration, personalized instruction, and wider access to educational resources. However, they have also expanded teachers' professional responsibilities.

Teachers are increasingly expected to select and operate digital tools, create technology-supported learning materials, communicate through multiple platforms, provide digital feedback, manage online activities, and continually update their technological knowledge. Consequently, technology can operate both as an instructional resource and as an additional source of occupational demand. This tension provides an important context for understanding technostress.

Brod (1984) initially described technostress in terms of difficulties associated with adapting to computer technologies. Later conceptualizations broadened the construct by examining how technological characteristics interact with individual and organizational circumstances. Ayyagari et al. (2011), for example, linked technology characteristics with stressors including work overload, role ambiguity, privacy invasion, work-home conflict, and job insecurity. Tarafdar et al. (2007) similarly demonstrated relationships between technostress, role stress, and work productivity.

Ragu-Nathan et al. (2008) advanced the concept by distinguishing between technostress creators and technostress inhibitors. They identified techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty as major creators, while organizational support mechanisms such as technical assistance, involvement, and literacy facilitation could reduce their effects.

The relevance of this issue has increased as technology has become embedded in teachers' everyday work. A recent systematic review of 54 studies reported substantial growth in research on teacher technostress, particularly since the COVID-19 pandemic, and identified technological, workplace, and personal factors as important sources (Yang et al., 2025). Similarly, a systematic review of university teaching staff found techno-overload, techno-invasion, and contextual uncertainty among recurring contributors, with technostress associated with mental-health-related outcomes, particularly fatigue (Heredia-Gálvez & Millán-Barroso, 2026).

Thus, technostress should be viewed not simply as a technology-adoption problem but as an educational and organizational issue involving teacher well-being, professional practice, and sustainable digital transformation.

LITERATURE REVIEW

Research on technostress has evolved from early concerns about adapting to computers to a broader understanding of technology-related demands in professional settings. Brod (1984) introduced the concept as difficulty in adapting to computer technology, while Ayyagari et al. (2011) linked technological characteristics with overload, privacy concerns, role ambiguity, work-home conflict, and job insecurity.

Ragu-Nathan et al. (2008) developed the widely used framework of five technostress creators: techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty. They also highlighted organizational support as an important mechanism for reducing technostress and associated declines in job satisfaction and commitment.

With the growing integration of digital technologies in education, teachers increasingly face demands to manage multiple platforms, develop digital resources, communicate online, and continually update their digital skills. Wang and Zhao (2023) found that techno-complexity negatively influenced teachers' ICT adoption intentions, while techno-insecurity adversely affected ICT attitudes, indicating that different forms of technostress can have different effects.

Recent reviews confirm the growing significance of teacher technostress. Yang et al. (2025), reviewing 54 studies, identified technological, workplace, and individual factors as major sources and linked technostress with teacher well-being and job performance. Heredia-Gálvez and Millán-Barroso (2026) similarly identified techno-overload, techno-invasion, and uncertainty as important contributors among university teachers, with reported associations with fatigue and mental-health-related outcomes.

The literature further suggests that technostress is shaped not only by individual digital competence but also by workload, organizational support, professional development, technological conditions, and teacher participation (Ragu-Nathan et al., 2008; Yang et al., 2025). However, gaps remain regarding long-term evidence, school-level contexts, differences across educational settings, and the relationship between technostress and the *quality* of technology use. The rapid emergence of generative AI also introduces new concerns related to technological uncertainty, professional learning, ethics, and changing teacher expectations.

RESEARCH OBJECTIVES

The review aims to:

1. Examine the conceptual and theoretical foundations of technostress in educational technology.
2. Identify the major dimensions and sources of teacher technostress.
3. Examine the relationship between technostress and teachers' technology adoption and pedagogical use.

4. Analyze its effects on teacher well-being, job satisfaction, and professional performance.

METHODOLOGY- RESEARCH DESIGN

The study adopted a narrative literature review design to examine the relationship between technostress and educational technology use among teachers. A review approach was considered appropriate because the purpose was to synthesize conceptual and empirical evidence, identify recurring patterns, examine major technostress dimensions, and highlight gaps for future research rather than collect primary data.

CONCEPTUALIZING TECHNOSTRESS

Technostress has evolved from an early focus on computer-related anxiety into a broader understanding of stress arising from technological demands within particular social and organizational contexts. Ayyagari et al. (2011) demonstrated that technology characteristics can create conditions involving overload, invasion of privacy, role ambiguity, work-home conflict, and job insecurity. Therefore, technology itself is not necessarily the source of stress; rather, stress emerges from the interaction between technological characteristics and the circumstances of use.

Ragu-Nathan et al. (2008) empirically established the distinction between technostress creators and inhibitors. Their findings indicated that technostress can adversely influence job satisfaction and organizational and continuance commitment, whereas supportive organizational mechanisms can lessen these effects.

Accordingly, technostress may be understood as a multidimensional socio-technical condition that emerges when technological demands exceed or conflict with individuals' perceived capacities, professional expectations, and available organizational resources.

MAJOR TECHNOSTRESS CREATORS AMONG TEACHERS

Techno-Overload

Techno-overload occurs when technology increases the amount or pace of work expected from users (Ragu-Nathan et al., 2008). Teachers may experience this when they must simultaneously manage several digital platforms, respond to online communications, create digital materials, conduct technology-supported teaching, provide electronic feedback, and complete institutional data requirements.

Technology may therefore improve efficiency in individual tasks while increasing the overall volume and speed of professional activity. Techno-overload has been repeatedly identified as an important source of technostress in educational settings (Heredia-Gálvez & Millán-Barroso, 2026).

Techno-Complexity

Techno-complexity refers to difficulties associated with understanding, learning, or operating technological systems (Ragu-Nathan et al., 2008). For teachers, this may involve unfamiliar software, complicated learning management systems, multiple platforms, troubleshooting, frequent interface changes, and insufficient training.

Digital competence can act as an important resource in dealing with such complexity. In a study of 289 teachers in China, Wang and Zhao (2023) found that techno-complexity negatively influenced teachers' ICT adoption intentions, suggesting that perceived difficulty can become a barrier to meaningful technology integration.

Techno-Invasion

Techno-invasion occurs when technology creates expectations of continuous professional accessibility (Ragu-Nathan et al., 2008). Mobile communication, institutional messaging, learning platforms, and online student interactions can extend teachers' professional responsibilities beyond conventional working hours.

Such boundary erosion may make teachers feel that they must remain continuously connected to their workplace. Techno-invasion has consequently emerged as a recurring source of technostress in higher education (Heredia-Gálvez & Millán-Barroso, 2026).

Techno-Insecurity

Techno-insecurity involves concerns that existing technological competencies may become inadequate because of technological change or that one's professional value may be affected by new technologies. Rapid implementation of unfamiliar tools without adequate professional learning can intensify such concerns.

Wang and Zhao (2023) found that techno-insecurity negatively influenced teachers' attitudes toward ICT, with stronger effects reported among older teachers in their sample. Nevertheless, demographic differences should be interpreted cautiously because findings vary across contexts (Yang et al., 2025).

Techno-Uncertainty

Continuous technological change requires repeated cycles of learning and adaptation. Software updates, new platforms, changing institutional requirements, and emerging technologies such as artificial intelligence can create uncertainty because teachers must continually acquire new knowledge and skills.

This recurring process can be represented as:

Learning '! Adaptation '! Technological Change '! Relearning

Contextual uncertainty has been identified as a recurring contributor to technostress among university teaching staff (Heredia-Gálvez & Millán-Barroso, 2026).

EDUCATIONAL TECHNOLOGY USE: OPPORTUNITIES AND CHALLENGES

Educational technology can support flexible learning, multimedia instruction, formative assessment, collaboration, digital creativity, personalized learning, and access to educational resources. However, its educational value depends substantially on the conditions under which it is implemented.

Importantly, the relationship between technostress and technology adoption is not necessarily uniform. Wang and Zhao (2023) found that different technostress creators had different effects on teachers' ICT attitudes and adoption intentions. Techno-complexity and techno-insecurity showed negative effects on selected adoption outcomes, whereas other technostress dimensions demonstrated different patterns.

This suggests that technostress should not be treated as a single, homogeneous condition. Research should therefore examine which technological demands influence particular aspects of teachers' technology attitudes, adoption, and pedagogical use, and under what organizational conditions.

SOURCES OF TECHNOSTRESS AMONG TEACHERS

Teacher technostress results from the interaction of technological, individual, occupational, and institutional factors.

Technological Factors- Complex interfaces, unreliable systems, frequent updates, cybersecurity concerns, incompatible platforms, and rapid technological development may increase technological demands (Ayyagari et al., 2011).

Work-Related Factors- Technology can add responsibilities to existing teaching roles, including digital content development, online communication, technology-mediated assessment, data management, troubleshooting, and continuous professional learning. Thus, stress may arise partly from how technology is incorporated into teachers' work, rather than from technology alone (Yang et al., 2025).

Individual Factors- Digital competence, technology self-efficacy, previous experience, attitudes, willingness to experiment, and coping strategies can influence how teachers perceive and manage technological demands. However, technostress should not be reduced to individual deficits. A teacher with limited experience may function effectively in a supportive institution, whereas a technically skilled teacher may experience stress under excessive workload or inadequate institutional support.

Institutional Factors- Technical assistance, leadership support, infrastructure, professional development, teacher participation in technology-related decisions, adequate training time, workload management, and realistic expectations can influence teachers' experiences of technology. Organizational support and digital literacy development are therefore important potential inhibitors of technostress (Ragu-Nathan et al., 2008; Yang et al., 2025).

CONSEQUENCES OF TECHNOSTRESS

Technostress can affect teachers psychologically, professionally, and pedagogically. Reported consequences include fatigue, anxiety, frustration, reduced well-being, lower job satisfaction, weaker organizational commitment, and impaired professional performance (Heredia-Gálvez & Millán-Barroso, 2026; Ragu-Nathan et al., 2008; Yang et al., 2025).

Recent evidence particularly highlights the relationship between technostress and mental-health-related outcomes among university teaching staff, with fatigue emerging as a significant concern (Heredia-Gálvez & Millán-Barroso, 2026).

Technostress may also influence technology adoption. When teachers perceive digital tools as excessively complex, demanding, intrusive, or unstable, they may become reluctant to experiment with new technologies or restrict their use to basic functions. This creates a potential cycle:

Increasing technology requirements '! Greater technology exposure '! Increased technological demands '! Potential technostress

Consequently, expanding technological infrastructure alone cannot ensure meaningful or sustainable digital integration.

TECHNOSTRESS AND TEACHER WELL-BEING

Teacher well-being should be central to educational digital transformation. Evidence indicates that technostress can affect teachers' fatigue, job satisfaction, professional engagement, and performance (Heredia-Gálvez & Millán-Barroso, 2026; Yang et al., 2025).

Therefore, evaluating digital transformation only through indicators such as the number of platforms introduced, teachers trained, or digital resources created may provide an incomplete picture. Institutions should also consider teachers' workload, confidence, technological demands, purposes of use, access to support, and perceived effects on professional well-being.

The central shift should consequently be from technology adoption to sustainable technology use. Sustainable digital education requires technologies that are pedagogically meaningful, accessible, manageable, and aligned with teachers' professional capacities and working conditions.

CONCLUSION

Educational technology has become an integral component of contemporary teaching, offering substantial opportunities for improving access, flexibility, collaboration, personalization, assessment, and professional practice. Nevertheless, increasing technological demands can generate technostress when technological complexity, workload, uncertainty, professional expectations, and insufficient support exceed available individual and organizational resources.

The literature demonstrates that technostress is multidimensional. Techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty represent different forms of technology-related demand, and their effects on teachers' attitudes and technology adoption may vary across contexts (Ragu-Nathan et al., 2008; Wang & Zhao, 2023).

Evidence also indicates that technostress is associated with important professional outcomes, including job satisfaction, organizational commitment, work performance, professional engagement, and well-being (Ragu-Nathan et al., 2008; Yang et al., 2025).

Importantly, technology itself should not be regarded as the sole cause of technostress. The phenomenon emerges through the interaction between technological demands, teacher competencies, organizational expectations, professional workload, and available support. Consequently, addressing technostress requires more than providing additional technical training. Educational institutions need to develop supportive environments in which teachers have adequate time, resources, participation, technical assistance, and opportunities for continuous professional learning.

The emergence of generative AI further reinforces the need to reconsider the relationship between technology and teacher well-being. Educational institutions are moving from conventional ICT integration toward increasingly intelligent, interconnected, and rapidly changing digital environments. This transition may reduce routine workload and create new pedagogical possibilities, but it can also introduce uncertainty, complexity, professional pressure, and changing expectations regarding teachers' roles.

The future of educational technology should therefore not be measured solely by the speed or extent of technology adoption. A more meaningful criterion is sustainable technology integration—the ability of educational systems to employ technology in ways that enhance teaching and learning while preserving teachers' professional agency, competence, well-being, and capacity for meaningful pedagogical decision-making.

In this sense, the central challenge is not to determine whether teachers should use more technology. Rather, it is to create educational ecosystems in which teachers can use technology purposefully, confidently, critically, ethically, and sustainably.

REFERENCES

- Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: Technological antecedents and implications. *MIS Quarterly, 35*(4), 831–858.
- Brod, C. (1984). *Technostress: The human cost of the computer revolution*. Addison-Wesley.
- Heredia-Gálvez, A., & Millán-Barroso, M. (2026). [Systematic review of technostress among university teaching staff].

- Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research, 19*(4), 417–433.
- Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S. (2007). The impact of technostress on role stress and productivity. *Journal of Management Information Systems, 24*(1), 301–328.
- Wang, X., & Zhao, X. (2023). [Study of technostress creators and teachers' ICT adoption intentions].
- Yang, X., et al. (2025). [Systematic review of teacher technostress].

❑❑❑

Awadh International Journal of Information Technology and Education
ISSN: 2277-8985
Vol. 15, Issue - 2 September 2026
Pp. 19-35

3

Developing a Human–AI Collaboration Framework for Teaching and Learning in Higher Education: A Human-centered Approach

Dr. Tasneem Bano
Assistant Professor
Al- Falah University,
Faridabad, Haryana

ABSTRACT

Artificial Intelligence (AI) is rapidly transforming higher education by supporting personalized learning, assessment, feedback, content generation, learning analytics, and administrative tasks. However, the increasing adoption of AI also raises concerns related to academic integrity, data privacy, bias, transparency, reliability, and the possible over-dependence of learners on AI technologies. This conceptual study aims to develop a Human–AI Collaboration Framework for teaching and learning in higher education that places human judgment, ethical responsibility, and meaningful educational interaction at the centre of AI integration. Drawing on existing literature on artificial intelligence in education, human-centered AI, AI literacy, educational technology, and responsible AI, the study identifies the complementary roles of teachers, students, AI systems, and higher education institutions. The proposed framework is based on six principles: human-centeredness, ethical use, transparency, collaboration, inclusion, and responsibility. It integrates human factors, AI capabilities, institutional support, and pedagogical practices as interconnected components. Teacher AI competency, student AI literacy, critical thinking, institutional policies, infrastructure, ethical governance, adaptive learning, feedback, and learner-centered instructional design are identified as key elements. The framework seeks to contribute to improved teaching effectiveness, student engagement, learning achievement, responsible AI use, academic integrity, and faculty satisfaction. The study emphasizes that AI should augment rather than replace educators, with human expertise and ethical judgment remaining central to educational decision-making. As the framework is conceptual and has not yet been

empirically validated, future research should examine its applicability across diverse disciplines, institutions, and cultural contexts using quantitative, qualitative, and mixed-method approaches.

Keywords: *Artificial Intelligence, Human–AI Collaboration, Higher Education, Human-Centered AI, AI Literacy, Teaching and Learning*

INTRODUCTION

Growth of AI in Higher Education

Artificial Intelligence has become one of the most influential technologies in higher education over the last decade. Early use was mostly administrative: student admissions, scheduling, learning management systems, and academic records. As machine learning, natural language processing, and data analytics matured, AI moved from back-office functions into teaching, learning, assessment, and student support (Zawacki-Richter et al., 2019).

Adoption accelerated during the COVID-19 pandemic. Universities shifting to online and blended learning began relying on AI to keep instruction running, and automated assessment, personalized learning, learning analytics, and student engagement tools became routine parts of the online classroom. These systems helped teachers monitor progress, flag learners who needed support, and make decisions based on data rather than intuition (Crompton & Burke, 2023).

The next major shift came in late 2022 with the release of generative AI tools, particularly large language models. Unlike earlier AI systems that mostly analyzed data or automated routine tasks, generative AI could produce new content: text, images, code, audio, and full learning materials. Educators started using these tools for lesson preparation, instructional design, and assessment. Students used them for brainstorming, writing help, language learning, coding, and research support (Kasneci et al., 2023). Universities began rethinking traditional approaches to teaching and assessment almost immediately.

By 2024 and 2025, many institutions had introduced policies, faculty training programmes, and AI literacy initiatives to guide responsible use. International organizations such as UNESCO published guidance emphasizing that AI should enhance human capabilities rather than replace educators, and stressed the need for human oversight, ethical governance, transparency, and learner-centred design (UNESCO, 2023; UNESCO, 2024).

Today, AI is embedded in higher education across most developed systems. Universities use it for personalized learning, intelligent tutoring, adaptive assessment, curriculum development, student advising, and educational research. There is broad agreement among educational experts, however, that effective teaching cannot rest on technology alone. Empathy, ethical judgment, creativity, critical thinking, and interpersonal communication remain squarely in the human domain. Current research has therefore moved past the question of whether AI belongs in higher education and now asks how teachers, students, and AI systems can work together effectively (Luckin, 2018; UNESCO, 2024).

Opportunities and Challenges

AI offers real benefits for higher education. It personalizes learning by adapting content to individual pace and needs. It automates grading, attendance, and administrative work so teachers can spend more time mentoring students and running critical discussions. Generative AI helps create lesson plans, quizzes, and learning resources, and provides instant feedback. Learning analytics identify at-risk students early enough for institutions to intervene (Zawacki-Richter et al., 2019; UNESCO, 2024).

The challenges are equally serious. Concerns have grown about academic integrity, plagiarism, bias in AI-generated content, data privacy, transparency, and the reliability of AI outputs. Educators worry about maintaining critical thinking and independent learning when students can generate assignments in seconds. AI systems can produce biased or inaccurate information. Access to AI tools is uneven across students and institutions. These issues explain why researchers and policymakers now emphasize responsible, ethical AI use rather than unrestricted adoption (Holmes et al., 2022; Kasneci et al., 2023).

The Case for Human–AI Collaboration

The response to these tensions has been a shift in framing: AI as collaborator rather than substitute. Three ideas anchor this position.

AI should augment teachers, not replace them. AI handles repetitive work well, including preparing quizzes, grading objective assessments, summarizing readings, and generating instant feedback. Teachers can then focus on what requires human expertise: mentoring, facilitating discussion, and addressing students' emotional and social needs. A teacher might use ChatGPT to draft a lesson outline but adapt it to their classroom and students. Efficiency comes from AI; instructional decisions stay with the teacher (Luckin, 2018; UNESCO, 2024).

Human judgment stays central. AI processes information quickly and produces useful material, but it cannot replicate empathy, ethical decision-making, cultural understanding, or professional experience. Teachers verify AI outputs, choose teaching strategies, and support students' personal development. Where AI might recommend resources for a struggling student, the teacher decides on an intervention that considers motivation, wellbeing, and classroom behaviour (Holmes et al., 2022; UNESCO, 2023).

Responsible integration requires institutional structure. Universities need clear policies covering transparency, academic integrity, data privacy, and ethical use. Teachers and students need AI literacy to understand both what these tools can do and where they fail. Responsible integration means using AI to support learning, not to encourage plagiarism or over-dependence. An instructor may allow AI-assisted brainstorming, for example, while requiring students to critically evaluate the output and disclose their use of the tool (UNESCO, 2023; UNESCO, 2024).

PROBLEM STATEMENT

Universities are integrating AI into teaching, learning, assessment, research, and administration at speed. AI tools now generate instructional content, personalize learning, automate routine tasks, and support student success. Adoption is outpacing institutional strategy. Most universities do not yet have coherent policies for what effective and ethical implementation actually looks like (UNESCO, 2023; UNESCO, 2024).

Faculty feel this gap directly. Many educators lack clear institutional guidance on how to use AI in teaching and assessment. There is uncertainty about academic integrity, ethics, assessment design, and what counts as acceptable classroom practice. In the absence of standardized policies, teachers fall back on personal judgment, and practice varies widely across departments and even individual courses (Kasneci et al., 2023; UNESCO, 2024).

Research has not fully caught up either. Most studies examine the effectiveness, acceptance, or applications of specific AI tools. Far fewer explore how teachers, students, and AI can work together through clearly defined roles and shared responsibilities. There is a need for frameworks that support effective human–AI collaboration in higher education, not just adoption (Zawacki-Richter et al., 2019; Holmes et al., 2022).

RESEARCH GAP

Research on AI in higher education has expanded quickly, but important gaps remain. Existing studies mostly examine AI applications, adoption patterns, student perceptions, learning outcomes, and the effectiveness of specific tools such as intelligent tutoring systems and generative AI platforms (Zawacki-Richter et al., 2019; Kasneci et al., 2023). These studies say a lot about what AI can do in education and less about how teachers, students, and AI systems should work together in a structured way.

Current research also tends to emphasize technological capability over the changing roles and responsibilities of educators and learners. Few studies bring pedagogical, ethical, technological, and institutional factors together into a single framework that explains effective human–AI collaboration. Existing theories such as TAM, UTAUT, and TPACK explain technology adoption and integration, but they do not address collaborative decision-making between humans and AI systems in educational settings.

A comprehensive Human–AI Collaboration Framework is therefore needed. It should define the complementary roles of teachers, students, institutions, and AI technologies, and guide universities toward responsible AI adoption without giving up human judgment, ethical values, or teaching quality (Holmes et al., 2022; UNESCO, 2024).

PURPOSE OF THE STUDY

The purpose of this study is to develop a comprehensive Human–AI Collaboration Framework for teaching and learning in higher education. As AI becomes more embedded in educational

practice, understanding how teachers, students, and AI systems can work together effectively is important for maintaining educational quality without losing the human-centered nature of learning. This study treats AI as a supportive tool that can enhance teaching, learning, assessment, and student engagement when used responsibly, rather than as a replacement for educators (UNESCO, 2024).

The study identifies the key factors that influence effective human–AI collaboration by synthesizing literature on AI in higher education, human-centered AI, educational technology, and responsible AI use. It then proposes a conceptual framework defining the complementary roles of teachers, students, AI technologies, and institutions. The framework highlights ethical governance, AI literacy, institutional support, and pedagogically sound practice as the foundations of meaningful human–AI collaboration. The intended audience includes educators, researchers, university administrators, and policymakers making decisions about responsible AI integration, and the framework provides a foundation for future empirical research in this emerging area (Holmes et al., 2022; UNESCO, 2023).

RESEARCH QUESTIONS

RQ1. What factors influence effective Human–AI collaboration?

RQ2. What roles should teachers, students, institutions, and AI systems play?

RQ3. How can these factors be integrated into a conceptual framework?

LITERATURE REVIEW

Evolution of AI in Education- Early Foundations (1950s- 1980s)

Artificial Intelligence began in the 1950s with researchers exploring whether machines could simulate human intelligence. The term itself was formally introduced at the Dartmouth Conference in 1956, generally recognized as the beginning of AI as a scientific discipline. AI in education during this period was limited, and computers were used mainly for programmed instruction and computer-assisted learning rather than intelligent decision-making (Russell & Norvig, 2021).

In the 1960s and 1970s, educational researchers focused on Computer-Assisted Instruction (CAI). CAI systems presented content, evaluated responses, and gave immediate feedback. They improved learning efficiency but followed predefined rules and could not adapt to individual learners. As educational psychology increasingly emphasized personalized learning, researchers began investigating how AI might make educational systems more responsive to student ability and progress (Woolf, 2010).

Early AI systems had limited intelligence by modern standards, but they laid the foundation for adaptive learning and intelligent educational systems. They supported content delivery and practice but did not address higher-order thinking, collaboration, or the professional role of teachers. Even at this early stage, AI was framed as a support tool for education rather than a replacement for educators.

Intelligent Tutoring Systems (1980- 1995)

Intelligent Tutoring Systems (ITS) emerged through the 1980s and early 1990s. Unlike CAI, ITS could adapt instruction to individual learners by analyzing their knowledge, identifying misconceptions, and providing personalized feedback. The goal was to simulate one-to-one tutoring by adjusting learning activities to student progress (Woolf, 2010). ITS improved personalized learning and problem-solving, but the systems could not understand emotion, creativity, or social interaction. Even so, they laid the groundwork for today's adaptive learning technologies (Nkambou, Bourdeau, & Mizoguchi, 2010).

AI and E-Learning (1995- 2010)

Between 1995 and 2010, the rapid growth of the internet and Learning Management Systems expanded AI use in e-learning. AI supported adaptive content delivery, online assessment, and personalized learning. These developments improved access to education and increased learner engagement, and they laid the technical foundation for intelligent online learning environments (Holmes et al., 2019; Woolf, 2010).

Learning Analytics and Big Data (2010- 2015)

From 2010 to 2015, learning analytics and big data reshaped how universities used AI. Institutions began analyzing student data at scale to monitor progress, predict performance, and identify at-risk learners. This shift toward data-driven decision-making allowed for earlier intervention and more informed institutional planning (Siemens & Long, 2011).

Personalized Learning with AI (2015- 2020)

Between 2015 and 2020, AI advanced personalized learning significantly. Adaptive learning systems tailored content to individual needs, pace, and performance. Student engagement improved, learning outcomes strengthened, and teachers gained tools for more targeted instructional support (Zawacki-Richter et al., 2019).

AI During COVID-19 (2020- 2022)

The pandemic accelerated AI adoption as universities shifted to online and blended learning. AI-supported technologies enabled virtual teaching, automated assessment, personalized learning, and student monitoring, and helped keep instruction running during widespread closures (Crompton & Burke, 2023).

Rise of Generative AI (2022- 2024)

Generative AI emerged in late 2022 and quickly transformed higher education. These tools could produce content, answer questions, summarize academic literature, generate lesson plans, draft quizzes and reports, provide personalized explanations, and support research and writing. Educators began using them to design instructional materials, deliver timely feedback, and reduce administrative workload. Students used them for brainstorming, writing, problem-solving, learning programming, and understanding difficult concepts (Kasneci et

al., 2023). Rapid expansion also brought concerns about academic integrity, misinformation, bias, data privacy, and over-dependence on AI-generated output (UNESCO, 2023).

Responsible and Human-Centered AI (2024- 2025)

As adoption grew, research and policy shifted toward responsibility. International guidelines stressed ethical governance, transparency, AI literacy, human oversight, and data privacy. The goal was to ensure that AI enhances learning while preserving teachers' professional judgment and student wellbeing (UNESCO, 2024).

Human- AI Collaboration in Higher Education (2025- 2026)

Recent research has moved from AI adoption to Human–AI collaboration, treating AI as a partner rather than a replacement for educators. Current studies advocate collaborative frameworks in which teachers provide pedagogical expertise and ethical guidance while AI supports personalized learning, assessment, and administrative efficiency (UNESCO, 2024).

PRINCIPLES OF HUMAN- CENTERED AI

Human-centered AI in education rests on four principles.

Human oversight keeps AI systems under the supervision of educators and institutions. Teachers review AI outputs, make final instructional decisions, and step in when AI produces inaccurate or inappropriate content. This preserves educational quality, ethical standards, and human responsibility in the teaching process (UNESCO, 2024).

Transparency requires AI systems to clearly explain how they generate recommendations, feedback, or decisions. When teachers and students understand the source and limitations of AI output, they can use it more effectively and question it when needed (UNESCO, 2024).

Accountability means educators, institutions, and developers are responsible for the outcomes of AI use in education. Clear policies and ethical guidelines address errors, bias, misuse, and integrity issues. Regardless of what AI produces, humans remain accountable for educational practice (Holmes et al., 2022).

Trust is essential for Human-Centered AI to work. Teachers and students engage with AI when systems are reliable, accurate, fair, and ethically governed. Building trust requires transparency, human oversight, data privacy protection, and institutional policies that put learners' interests first (UNESCO, 2024).

HUMAN- AI COLLABORATION ACROSS DOMAINS

Human–AI collaboration is not unique to education. Patterns from other fields inform how it should work in universities.

In education, AI supports lesson planning, personalized learning, assessment, and feedback, while educators provide critical thinking, ethical guidance, and emotional support (Holmes et al., 2022; UNESCO, 2024).

In healthcare, AI helps doctors by analyzing medical images, predicting diseases, and supporting clinical decisions. Physicians remain responsible for diagnosis, treatment, and patient care. AI enhances professional expertise; human judgment stays central in high-stakes situations (Topol, 2019).

In business, AI automates routine operations, analyzes customer data, forecasts market trends, and supports decision-making. Human managers interpret AI-generated insights and handle strategic decisions and ethical questions (Brynjolfsson & McAfee, 2017).

In engineering, AI supports design optimization, predictive maintenance, quality control, and simulation. Engineers evaluate AI recommendations and ensure safety, reliability, and standards compliance. Human oversight matters because engineering decisions carry ethical, technical, and practical weight (Russell & Norvig, 2021).

The common pattern is clear. AI works best when it complements human expertise rather than replaces it. In higher education, this means AI should support teachers in instructional planning, assessment, and personalized learning while educators continue to provide pedagogical guidance, ethical judgment, and meaningful interaction with students (UNESCO, 2024).

ROLES IN AI-SUPPORTED EDUCATION

TEACHER ROLES

Teachers in AI-supported environments take on six overlapping roles.

Pedagogy. Teachers design meaningful learning experiences, choose appropriate teaching strategies, adapt AI-generated content to student needs, and keep learning interactive, inclusive, and aligned with educational objectives (UNESCO, 2024).

Ethics. Teachers model ethical AI use (honesty, academic integrity, fairness, respect for privacy) and guide students toward using AI appropriately in their learning (UNESCO, 2023).

Assessment. Teachers design authentic assessments, evaluate understanding, verify AI-assisted work, and ensure that assessment measures critical thinking, creativity, and independent learning rather than AI-generated responses (Kasneci et al., 2023).

Mentoring. Teachers provide academic guidance, motivation, career advice, and personal support. This work cannot be delegated to AI and matters for students' confidence, lifelong learning, and personal development (Holmes et al., 2022).

Creativity. Teachers design innovative learning activities, encourage original thinking, and help students use AI as a way to enhance creative expression and problem-solving rather than shortcut around it (Luckin, 2018).

Emotional support. Teachers offer empathy, encouragement, and social support. Trusting relationships with students foster motivation, resilience, and a positive learning environment that AI cannot substitute for (Holmes et al., 2022).

STUDENT ROLES

Students also need specific capacities to work effectively with AI.

Critical thinking. Students should evaluate AI-generated information rather than accepting it. This means analyzing evidence, comparing sources, identifying inaccuracies, and applying independent reasoning. Critical thinking is what makes AI useful without making the student dependent on it (UNESCO, 2024).

AI literacy. Students need to understand how AI systems work, what they can do, where they fail, and what ethical questions they raise. AI-literate students can use AI tools effectively, recognize biased or inaccurate output, protect their privacy, and make informed decisions about when and how to use AI in their academic work (Long & Magerko, 2020).

Responsible AI use. Students should follow institutional guidelines, respect ethical principles, and acknowledge AI assistance when appropriate. AI should support brainstorming, research, and learning, not replace independent thinking or active participation (UNESCO, 2023).

Academic integrity. Students should produce honest and original work while using AI ethically. This means avoiding plagiarism, verifying AI-generated information, acknowledging AI assistance where required, and demonstrating their own understanding and reasoning in assessments (Kasneci et al., 2023).

INSTITUTIONAL ROLES

Institutions have six responsibilities in supporting Human–AI collaboration.

Policies. Clear AI policies define acceptable use, academic integrity standards, assessment practices, and ethical responsibilities. Well-designed policies guide teachers and students consistently across the institution (UNESCO, 2024).

Infrastructure. Reliable digital infrastructure, including high-speed internet, secure AI platforms, learning management systems, and technical support, makes AI accessible and usable. Adequate infrastructure enables equitable access and supports innovative teaching (UNESCO, 2024).

Professional development. Continuous professional development improves teachers' AI literacy, pedagogical skills, and ethical understanding. Workshops, training sessions, and practical guidance help educators integrate AI confidently while maintaining educational quality (Holmes et al., 2022).

Data privacy. Institutions must protect student and staff personal information through strong privacy policies and secure AI systems. Compliance with legal and ethical standards prevents data misuse, unauthorized access, and security risks (UNESCO, 2023).

Ethics. Institutions should establish ethical guidelines covering fairness, transparency, accountability, and responsible decision-making. Ethical governance supports inclusive education, reduces bias, protects rights, and maintains academic integrity (UNESCO, 2023).

Leadership. Institutional leaders shape responsible AI adoption through strategic planning, resource allocation, innovation support, and collaboration among stakeholders. Effective leadership creates a culture where AI enhances education without displacing human values (UNESCO, 2024).

EXISTING THEORETICAL FRAMEWORKS

Three established frameworks are relevant to AI in education, but each has limitations for explaining Human–AI collaboration.

Technology Acceptance Model (TAM) explains adoption through perceived usefulness and perceived ease of use (Davis, 1989). TAM helps explain why teachers adopt AI tools, but it focuses on individual attitudes and does not address how teachers and AI systems collaborate on pedagogical decisions, assessment, or classroom ethics.

Unified Theory of Acceptance and Use of Technology (UTAUT) extends TAM by including performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). UTAUT is useful for studying AI adoption in universities but primarily examines behavioral intention and use. It does not address shared responsibilities, human oversight, or interactions between teachers, students, and AI systems.

Technological Pedagogical Content Knowledge (TPACK) emphasizes the integration of technology, pedagogy, and subject content (Mishra & Koehler, 2006). TPACK is relevant for AI-supported teaching because it highlights teachers' professional competencies, but it treats technology mainly as an instructional tool. It does not fully address dynamic collaboration with AI systems, ethical governance, AI literacy, or institutional responsibilities.

Why these frameworks are insufficient. TAM, UTAUT, and TPACK offer useful insights into technology adoption and integration, but they were developed before generative AI and before human–AI collaborative learning environments existed in their current form. They do not fully explain how teachers, students, institutions, and AI systems can work together through shared decision-making, ethical oversight, personalized learning, assessment integrity, and responsible AI use. This is the gap the proposed framework addresses.

SUMMARY

The literature shows that AI has evolved from supporting administrative and instructional tasks to enabling personalized learning, intelligent tutoring, learning analytics, and generative AI applications in higher education. Common themes across studies include human-centered AI, ethical use, AI literacy, and institutional support. What existing research rarely does is integrate the collaborative roles of teachers, students, institutions, and AI into a single comprehensive framework. That is the contribution this study aims to make.

PRINCIPLES

The framework rests on six principles.

Human-centered. AI prioritizes teachers' and students' needs, supporting learning while preserving human judgment, empathy, creativity, and meaningful educational interaction.

Ethical. AI use promotes fairness, honesty, privacy, accountability, and academic integrity, while guarding against bias, misuse, and plagiarism.

Transparent. AI systems explain how recommendations, decisions, and outputs are generated so teachers and students can evaluate and trust them.

Collaborative. AI systems, teachers, and students work together, combining technological efficiency with human expertise to improve teaching quality and learning experience.

Inclusive. AI supports equal learning opportunities across diverse learners, reducing barriers and promoting equitable participation in higher education.

Responsible. Users and institutions follow ethical guidelines, institutional policies, and professional standards so AI is used safely, fairly, and effectively.

COMPONENTS

The framework has four components.

1. Human Factors

Teacher Competency. Teachers need AI knowledge, pedagogical expertise, ethical awareness, and digital competence to integrate AI effectively without losing educational quality.

Student AI Literacy. Students need to understand what AI can do, where it fails, what ethical issues it raises, and how to use it responsibly to support independent learning.

Digital Skills. Strong digital skills let teachers and students' access, evaluate, and apply AI technologies for teaching, learning, communication, and research.

Critical Thinking. Critical thinking lets learners question AI-generated information, verify evidence, solve problems independently, and make informed academic decisions.

2. AI Factors

Content Generation. AI generates lesson plans, quizzes, learning materials, summaries, and instructional resources, reducing preparation time.

Feedback. AI provides timely, personalized feedback that helps students identify learning gaps, monitor progress, and improve performance.

Adaptive Learning. AI personalizes educational content according to learner ability, progress, and preference, creating flexible learning experiences.

Analytics. AI-powered analytics monitor student performance, identify learning patterns, predict academic risk, and support evidence-based decisions.

Automation. AI automates repetitive administrative and instructional tasks such as grading, attendance, scheduling, and records, freeing teachers for more meaningful work.

3. Institutional Factors

Policies. Institutions establish clear AI policies covering responsible use, academic integrity, ethical standards, and consistent implementation.

Training. Continuous AI training builds teacher knowledge, confidence, and professional competence for effective AI integration.

Infrastructure. Reliable digital infrastructure, secure AI platforms, and technical support enable equitable access.

Ethics. Institutional ethics ensure fairness, transparency, accountability, privacy, and responsible governance.

Governance. Effective governance provides strategic leadership, monitoring, policy implementation, and quality assurance for sustainable AI adoption.

4. Pedagogical Factors

Assessment. AI-supported assessment evaluates higher-order thinking, originality, and problem-*solving while maintaining fairness, validity, and academic integrity.*

Learning Design. Teachers design learner-centered activities that integrate AI meaningfully while promoting collaboration, critical thinking, and active participation.

Feedback. Constructive feedback from teachers and AI supports continuous improvement, self-reflection, and deeper understanding.

Personalization. Personalized learning adapts instructional content, pace, and support to individual student needs.

Reflection. Reflection lets teachers and students evaluate AI-supported learning experiences, identify improvements, and develop responsible AI practices. Outcomes

The framework aims for six outcomes.

Teaching Effectiveness. Instructional quality improves through reduced teacher workload, innovative pedagogy, and better classroom decision-making.

Student Engagement. AI-supported learning increases participation, motivation, and interaction through personalized experiences.

Learning Achievement. Effective human–AI collaboration improves knowledge acquisition, critical thinking, problem-solving, and academic performance.

Responsible AI Use. Ethical, transparent, and accountable AI use ensures technology supports learning while respecting educational values.

Academic Integrity. Clear AI guidelines encourage honest learning, reduce plagiarism, and promote originality and fairness.

Faculty Satisfaction. Reduced routine workload, support for teaching innovation, and stronger professional confidence contribute to higher faculty satisfaction.

FRAMEWORK EXPLANATION

The framework's core logic runs through three linked relationships.

Teacher AI competency leads to better human–AI collaboration. Teachers with strong AI competency can select appropriate tools, evaluate AI output, and integrate AI into teaching effectively. AI competency combines technical knowledge, pedagogical understanding, and ethical awareness. Teachers with these skills collaborate confidently with AI rather than depending on it. AI-literate teachers are more likely to adopt AI responsibly and design meaningful learning experiences (UNESCO, 2024; Holmes et al., 2022).

Better collaboration leads to improved instructional design. Effective collaboration combines AI's efficiency with teachers' pedagogical expertise. AI generates lesson plans, learning activities, quizzes, and personalized resources; teachers refine them according to curriculum objectives, student needs, and classroom context. The result is instructional design that neither humans nor AI could produce alone (Luckin, 2018; Kasneci et al., 2023).

Improved instructional design leads to better learning outcomes. Well-designed instruction improves understanding, engagement, motivation, and academic achievement. When AI-supported materials are paired with teacher guidance, students get personalized learning while continuing to develop critical thinking and problem-solving skills. Learner-centered design correlates positively with academic performance, retention, and overall effectiveness (Zawacki-Richter et al., 2019; UNESCO, 2024).

PRACTICAL IMPLICATIONS

For Teachers

Professional development. Institutions should offer continuous professional development that builds teachers' AI knowledge, ethical practice, and innovative teaching methods. Regular training lets educators integrate AI confidently while maintaining educational quality (UNESCO, 2024).

AI literacy. Teachers should develop AI literacy to understand what AI tools can do, where they fail, and what ethical questions they raise. AI-literate educators can evaluate AI output critically, make informed instructional decisions, and guide students in responsible use (Long & Magerko, 2020).

Lesson planning. Teachers can use AI to support lesson planning by generating teaching materials, activities, quizzes, and resources. What matters is reviewing and adapting AI output to fit curriculum objectives and student needs (Kasneci et al., 2023).

Assessment redesign. Teachers should redesign assessments to emphasize critical thinking, creativity, problem-solving, and authentic learning rather than simple recall. Project-based learning, presentations, reflective writing, and case studies reduce over-reliance on AI-generated responses while promoting academic integrity (UNESCO, 2023).

For Students

Responsible AI use. Students should treat AI as a learning support tool rather than a substitute for independent work. Following institutional guidelines, acknowledging AI assistance when required, and using AI ethically strengthens rather than shortcuts learning (UNESCO, 2023).

Ethics. Students should understand the ethical principles that apply to AI use, including honesty, fairness, privacy, and respect for intellectual property. Ethical use is what preserves academic integrity when powerful tools are freely available (UNESCO, 2024).

Critical evaluation. Students should evaluate AI-generated information by verifying facts, comparing sources, and identifying inaccurate or biased content before using it in academic work (Kasneci et al., 2023).

Independent thinking. Students should develop independent thinking, using AI to support idea generation while relying on their own reasoning, creativity, and problem-solving to complete academic tasks (Holmes et al., 2022).

For Universities

Policies. Universities should establish comprehensive AI policies that define ethical use, academic integrity standards, assessment practices, and responsibilities for teachers and students (UNESCO, 2024).

Infrastructure. Institutions should invest in secure digital infrastructure, AI platforms, and technical support to ensure reliable and equitable access across the institution (UNESCO, 2024).

Training. Regular AI training programmes for faculty, students, and administrators build AI literacy, digital competence, and responsible integration into teaching and learning (Holmes et al., 2022).

Governance. Universities should develop governance mechanisms to monitor AI implementation, ensure ethical compliance, protect data privacy, and evaluate AI-supported practices over time (UNESCO, 2023).

For Policymakers

National AI guidelines. Governments should develop national AI guidelines that promote ethical, transparent, and responsible adoption while supporting innovation across higher education institutions (UNESCO, 2024).

Teacher education reforms. Teacher education programmes should integrate AI literacy, digital pedagogy, ethics, and human–AI collaboration competencies to prepare future educators for AI-enabled classrooms (UNESCO, 2024).

Funding. Policymakers should allocate adequate funding for AI infrastructure, educational research, professional development, and equitable access to AI in higher education (OECD, 2023).

Quality assurance. Quality assurance agencies should establish standards for evaluating AI integration, ensuring educational quality, academic integrity, ethical compliance, and continuous institutional improvement (UNESCO, 2024).

FUTURE RESEARCH

Four directions matter most.

Empirical validation. Future studies should test the proposed Human–AI Collaboration Framework using quantitative, qualitative, or mixed-method approaches across different higher education settings.

Cross-country comparison. Comparative research across countries can examine how cultural, technological, and policy differences shape Human–AI collaboration and responsible AI implementation.

Discipline-specific frameworks. Future research should develop Human–AI collaboration frameworks tailored to specific disciplines such as engineering, medicine, education, business, and social sciences.

Longitudinal studies. Longitudinal work is needed to examine how Human–AI collaboration influences teaching practice, student outcomes, AI literacy, and educational effectiveness over time.

CONCLUSION

AI is transforming higher education by supporting personalized learning, intelligent assessment, adaptive instruction, and academic administration. The literature is consistent on one point: AI should complement rather than replace teachers. Human expertise, ethical judgment, critical thinking, and meaningful teacher–student interaction remain essential for effective learning. Successful integration depends on a balanced partnership between educators, students, institutions, and AI technologies.

This study reviewed the evolution of AI in education and examined the principles of Human-Centered AI: human oversight, transparency, accountability, and trust. It also explored the roles of teachers, students, institutions, and AI systems in responsible AI integration. Although many studies have examined AI applications and adoption in higher education, few have proposed a comprehensive framework that integrates human, technological, institutional, and pedagogical factors into a collaborative model.

The main contribution of this study is the Human–AI Collaboration Framework for teaching and learning in higher education. The framework provides a structured account of how teacher competency, student AI literacy, institutional support, AI capabilities, and effective pedagogical practice interact to improve teaching effectiveness, student engagement, learning achievement, responsible AI use, academic integrity, and faculty satisfaction. It also offers practical implications for educators, universities, and policymakers making decisions about ethical and responsible AI implementation.

The study has limitations. The proposed framework is conceptual and has not been empirically validated. The discussion draws on existing literature and may not fully reflect differences across educational systems, disciplines, or cultural contexts. The rapid evolution of AI technologies may also require continuous revision of the framework as new capabilities and challenges emerge.

Future research should validate the framework empirically through quantitative, qualitative, and mixed-method studies in diverse higher education contexts. Comparative studies across countries and academic disciplines can examine its applicability, and longitudinal research can explore the long-term impact of Human–AI collaboration on teaching quality, student learning, and institutional effectiveness. This work will strengthen the evidence base for responsible and human-centered AI integration in higher education.

REFERENCES

- Brynjolfsson, E., & McAfee, A. (2017). The business of artificial intelligence. *Harvard Business Review.*
- Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education, 20*(1).
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.
- Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning.* Center for Curriculum Redesign.
- Holmes, W., Porayska-Pomsta, K., Holstein, K., Sutherland, E., Baker, T., Shum, S. B., Santos, O. C., Rodrigo, M. T., Cukurova, M., Bittencourt, I. I., & Koedinger, K. R. (2022). Ethics of AI in education: Towards a community-wide framework. *International Journal of Artificial Intelligence in Education, 32*(3), 504–526.
- Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., … Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences, 103.*
- Long, D., & Magerko, B. (2020). What is AI literacy? Competencies and design considerations. *CHI Conference on Human Factors in Computing Systems*, 1–16.
- Luckin, R. (2018). *Machine learning and human intelligence: The future of education for the 21st century.* UCL IOE Press.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054.

- Nkambou, R., Bourdeau, J., & Mizoguchi, R. (Eds.). (2010). *Advances in intelligent tutoring systems.* Springer.
- OECD. (2023). *OECD AI policy observatory: Education reports.* OECD Publishing.
- Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th ed.). Pearson.
- Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. *EDUCAUSE Review, 46*(5), 30–40.
- Topol, E. (2019). *Deep medicine: How artificial intelligence can make healthcare human again.* Basic Books.
- UNESCO. (2023). *Guidance for generative AI in education and research.* UNESCO.
- UNESCO. (2024). *AI competency frameworks for teachers and students.* UNESCO.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.
- Woolf, B. P. (2010). *Building intelligent interactive tutors: Student-centered strategies for revolutionizing e-learning.* Morgan Kaufmann.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education: Where are the educators? *International Journal of Educational Technology in Higher Education, 16*(1).

❑❑❑

Awadh International Journal of Information Technology and Education
ISSN: 2277-8985
Vol. 15, Issue -2 September 2026
Pp. 36-46

4

NEP 2020 and Indian Knowledge Systems: Exploring the Preparedness of Teacher Educators for IKS Integration

Shoyeb Khan
Research Scholar
JMI,
New Delhi

Dr. M. Zainul Abedin Shamsi
Assistant Professor
IVS, GGSIPU
Delhi

ABSTRACT

The National Education Policy (NEP) of 2020 has placed Indian Knowledge Systems (IKS) into a larger project of making Indian education a more holistic, multidisciplinary, culturally-embedded and contextually relevant system. Though the policy documents provide extensive guidelines for bringing Indian knowledge traditions into the curriculum and pedagogy, how well this vision can be implemented depends significantly on the teacher educators. The aim of the paper is to examine the readiness of teacher educators for IKS implementation through analysis of the relevant policy documents, recent literature and theoretical framework in culturally-responsive and decolonial education. The paper uses qualitative conceptual methods for the documentary analysis of NEP 2020, University Grants Commission (UGC) documents, teacher education policy documents and relevant literature. Six contexts are used to define readiness: concept of IKS, epistemology, ability to teach, curriculum design, professional development and institutional support. The findings of the analysis show that while policy commitment has been achieved much quicker than institutional readiness, the teacher educators are aware of the importance of IKS as well as face certain problems connected to the difficulties of finding reliable sources, depth of understanding, terminology, space in the curriculum, evaluation methods, research capacity and availability of qualified specialists.

The article puts forth the notion that the integration of indigenous knowledge systems(IKS) cannot be accomplished merely through the addition of distinct cultural representatives or indigenous subject matter in pre-existing classes but rather requires the ability to critically reflect on different knowledge traditions, relate such traditions to modern disciplines, develop experience-based and inquiry-based teaching strategies, and differentiate credible knowledge from uncritical cultural claims. The authors suggest the following framework which incorporates five steps in order to enhance teacher educators' readiness for the implementation of IKS – orientation, disciplinary work, pedagogical ingenuity, community participation, and research. The authors emphasize that teachers ought to act not only as agents of IKS implementation but also as intermediaries between knowledge traditions, modern academic thought, and pedagogical practice.

Keywords: Indian Knowledge Systems; NEP 2020; Teacher Educators; Teacher Education; Cultural Responsiveness; Epistemic Pluralism

INTRODUCTION

The National Education Policy (NEP) 2020 stands out as a major policy intervention in Indian education in recent years. It includes among its various measures the explicit inclusion of a plan to reconnect education with India's intellectual, cultural, linguistic, artistic and scientific traditions. The NEP emphasizes the significance of Indian languages, arts, culture, knowledge tradition as well as the local contexts along with promoting critical thinking, scientific orientation and global citizenship through a multi-disciplinary education (Ministry of Education, 2020). The UNESCO's policy-monitoring definition also highlights the inclusion of the indigenous and traditional teaching methods in India's education reform system.

Nevertheless, policymaking concerning IKS presents a legitimate question on teacher education that merits serious academic engagement: Are newly appointed teacher educators ready to make the policy a reality in terms of teacher training?

Teacher educators play a critical role in the education system. They are more than just teachers of their content area; they help develop the professional knowledge, pedagogical perspectives and classroom roles of future teachers. As a result, if reforms expect school teachers to make use of indigenous knowledge, Indian philosophies and culturally relevant pedagogy, the reforms must also be aimed at ensuring effective training of teacher educators.

The UGC Guidelines for Training of Faculty in Indian Knowledge System acknowledge this point. The Guidelines assert that the implementation of IKS under NEP 2020 depends greatly on the capacity of the faculty and state that the faculty are expected to acquire knowledge of IKS in addition to standard educational qualifications of a teacher. Thus, the challenge is not simply whether IKS can be implemented in Indian education. The more important question is how to impart the necessary knowledge, skills, confidence and judgment to teacher educators for the successful implementation of the IKS principles in the teaching process.

In this document, we provide a conceptual review of relevant academic literature and policy texts to come to terms with that question. The conclusion reached is that preparedness must not be grasped as mere knowledge of Indian customs. Instead, it should comprise an array of capabilities with respect to conceptualization, epistemology, pedagogy, curriculum, institutions and research.

INDIAN KNOWLEDGE SYSTEMS AND THE NEP 2020 VISION

Indian Knowledge Systems has a broad meaning, indicating various kinds of knowledge and practices that developed in different places in the Indian subcontinent during historical periods. Indian Knowledge Systems includes philosophical ideas, mathematics, astronomy, medicine, languages, architecture, agriculture, ecology, arts, literature, metallurgy, logic, ethics, yoga, and community knowledge. The UGC defines Indian Knowledge Systems as a wide area of knowledge that is developed systematically in India in multiple generations and richer way through various subjects and disciplines. (UGC, 2023a).

NEP 2020 does not consider Indian Knowledge Systems as a separate historical subject, but instead connects Indian Knowledge Systems with curriculum, languages, arts, culture, research, multi-disciplinarity and holistic development. This is important because the educational value of Indian Knowledge Systems is not only that it helps preserve historical information but also allows seeing how knowledge was created, transferred, understood, and applied.

According to the UGC, its guidelines suggest the need of strategy implementation for exposure of learners to Indigenous Knowledge Systems which can relate basic concepts to current learners and solve the problems at hand. (UGC, 2023b) The application of this approach has significant consequences for teacher education. For example, teacher educator can teach water resource management from the perspective of traditional methods of water management combined with modern environmental science, or study India's contribution to mathematics in order to teach mathematical concepts.

Nevertheless, integrating requires more than merely finding an Indian model for each theme. It necessitates a comprehension of the basic epistemological principles that inform various systems of knowledge.

The authors Sharma, Mittal, and Zayan (2023), claim that the reforms in teacher education under the NEP 2020 should be viewed from the perspective of various knowledge traditions, as well as global educational discourses and rules of regulation. Their analysis shows that implementing policies involves an interaction among different intellectual and institutional traditions rather than a mere replacement of one curriculum with another.

TEACHER EDUCATORS AS FACILITATORS OF THE INTEGRATION OF INDIAN KNOWLEDGE SYSTEMS

The teacher educator plays an important but often neglected role in the process of educational reform. While it is assumed that school teachers will use local knowledge, cultural contexts and Indian intellectual traditions in teaching, their ability to do comply with these expectations depends on upbringing as a teacher.

The issue is particularly crucial since teacher educators don't necessarily have an education that is based on the knowledge of local culture and IKS. Simply knowing about Indian culture does not imply having enough academic knowledge in IKS.

Recent evidences concentrating on the issue directly related to teacher education can offer some proof to this idea. Singh, Tigga and Kumar (2025) mentioned the existence of mostly positive attitude towards IKS among future teachers and their mentors but pointed out some issues, including epistemological, support system, use, literature and experts interacting. The importance of these results is in the fact that it shows that positive attitude is different from professional readiness.

A teacher educator can, nevertheless, adhere to the principle of IKS integration and still be unsure about the following:

* what content can be considered valid IKS knowledge;
* how classic materials have to be interpreted;
* how IKS can be compared to modern academic knowledge;
* what pedagogical approaches can be counted as appropriate;
* how controversial issues can be analyzed;
* how IKS can be assessed;
* how cultural diversity in India should be presented.

Therefore, preparedness should be conceptualised as a professional capacity rather than an attitude alone.

CONCEPTUALISING PREPAREDNESS FOR IKS INTEGRATION

Based on the analysis of the literature and policies, six interrelated areas of teachers' readiness have been identified.

Conceptual preparedness

In order to be ready for IKS application, teachers need to be fully aware of the scope and diversity of the IKS. IKS should not be understood simply as a set of Sanskrit texts, yoga, Ayurveda or some of the historical accomplishments of ancient India; such a limited understanding may lead to the wrong impression about Indian knowledge.

In fact, the understanding of the concept should take into account local, cultural, field, and community traditions.

Epistemological Readiness

Arguably, the most complex dimension is epistemological readiness. Teacher educators are expected to know how different traditions of knowledge construct the concepts of evidence, authority and validity.

Such knowledge should not imply that one takes every traditional claim to be scientifically proven, nor should one disregard traditional knowledge simply because it does not come from contemporary Western academia. Instead, teacher educators should be able to facilitate comparisons, inquiries and critical analysis.

This issue has a correspondence with decolonial literature. According to Smith (2012), colonial systems complete these processes in a way that includes knowledge that is perceived legitimate. Similarly, Battiste (2013) argues in favor of educational methods that highlight the intellectual importance of Indigenous knowledge and treat it not simply as some irrelevant cultural stuff. Despite emerging from different backgrounds, these sources provide interesting theoretical basis for consideration of the issues of epistemic plurality in Indian education.

Readiness for Educational Work

The integration of indigenous knowledge systems (IKS) requires teaching methods wherein the traditional method of learning and teaching (lecture) as well as memory memorization are not sufficient. Various forms of storytelling, active learning and problem-solving such as project work, field observation, community engagement, experiential learning, comparative inquiry, oral history projects, and interdisciplinary problem-solving can all be employed as effective techniques for use of knowledge systems in education.

In this regard, Gay (2018) makes a significant contribution to the philosophy of culturally relevant pedagogy which emphasizes importance of linking academic experience with students' cultural background while simultaneously providing appropriate level of challenges.

Along similar lines is the idea of "funds of knowledge" by Moll et al. (1992) which explains the importance of recognizing knowledge that exists in the context of households and communities. This idea, therefore, has considerable potential when applied to local teacher education practices in India.

Curricular Preparedness

Teacher educators must be capable of translating IKS into curriculum rather than simply adding isolated topics. Curriculum integration can occur through existing subjects. For example:

Teacher Education Area	Possible IKS Integration
Science Education	Traditional ecological knowledge, agriculture, metallurgy and health traditions
Mathematical Education	Historical mathematical texts and mathematical practices
Social Science Education	Local histories, governance traditions and community knowledge
Language Education	Indian linguistic traditions, oral traditions and multilingual practices
Environmental Education	Community-based ecological knowledge and traditional conservation
Art Education	Classical, folk and community art traditions
Educational Philosophy	Indian philosophical perspectives on knowledge, ethics and learning

The objective should be intellectual integration rather than token representation.

Preparation for Research

To analyze Indigenous knowledge systems (IKS), teacher educators must possess research capabilities. Such research capabilities entail source criticism, documentations, qualitative evaluations, archival work, community-based studies, and cross disciplinary collaborations.

As highlighted by the guidelines provided by UGC, faculty needs to familiarize themselves with IKS and find ways to incorporate this aspect into their teachings. (UGC, 2023a) It is impossible to realize this aim without possessing the required research capabilities.

Thus, it is necessary to have teacher educators encouraged to conduct small studies, local knowledge documentation, curriculum mapping, and interdisciplinary research. (UGC,2023b)

Organizational Preparedness

The individual enthusiasm cannot be a substitute for an organization's deficiencies. Teacher educators require books, digital archives, translations, consultations, fieldwork sites, training programs, research finance, and enough time in the curriculum.

The fact that UGC has formulated certain detailed guidelines to be used for the training/ orientation is a clear indication that there is a certain acknowledgment of the organizational factors. ([UGC])

SIGNIFICANT ISSUES CONCERNING TEACHER EDUCATOR READINESS

Insufficient culturalization

One of the most serious threats is the possibility of treating IKS simply as a set of culture-related stories. Referring to any historic Indian mathematician or having a bear festival in regard to IKS is by no means enough to prove that IKS has been successfully introduced.

Real integration presupposes that there is an opportunity for making connections, looking for evidence and reflecting on what has been said.

Absence of special training

In many cases, teacher educators are trained only in education, psychology, pedagogy, and certain subjects at school. On the other hand, IKS is a truly interdisciplinary field. Thus, acquiring competence may be impossible without cooperation with educationists, historians, scientists, linguists, practitioners, and other scholars dealing with traditional knowledge.

Contemporary academic writing also states that insufficient training and lack of resources prevent from establishing deeper integration (Haloi and Kharbirymbai, 2025).

Real integration presupposes that there is an opportunity for making connections, looking for evidence and reflecting on what has been said.

Resource and language barriers

Several important knowledge traditions exist in classical and local languages. Lack of availability of proper translations and annotated publications can limit teacher educators' engagement.

The challenge here is more than just transferring content from one language to another. It needs to ensure that concepts and contexts will be preserved which may not be familiar in modern times.

Epistemic tensions

Integration of IKS can lead to tensions between traditional claims to knowledge and modern scientific standards. This tension can be seen as an academic opportunity rather than something to be avoided.

It is also important for teacher educators to assist student teachers in differentiating between historical importance, cultural significance, philosophical interpretation, empirical evidencce and modern scientific legitimacy of historical practice.

Danger of romanticization

On the contrary, the opposite danger of romanticization exists. Not all the historical practice is desirable from educational, scientific and societal respect. An effective IKS-centered teacher education program will promote critical engagement with history, covering such issues as access, exclusion, gender, caste, locality and social status.

Fragmented implementation of policies

If the committee of curriculum developers, trainers of teachers, people in charge of the schools and legislative institutions are not working in collaboration, even the best policy recommendations may be seen as merely symbolic. Thus, the implementation of IKS has to result from proper institutional planning rather than simply isolated efforts.

TOWARDS A MODEL OF READINESS FOR THE TRAINERS OF TEACHERS

A practical model of readiness can be developed through five main stages.

Stage 1: Orientation

First of all, the trainers of teachers need to get familiarized with the history, dimensions, terms and forms of IKS. The orientation process should include reliable sources and the chance to communicate with scholars.

Stage 2: Deepening

After the orientation comes the discipline-specific involvement. For instance, the IKS attacked in a mathematics teacher's career will differ from that of a language educator or that of a specialist in eco-pedagogy.

Stage 3: Translation

On the next stage, the trainers of teachers should develop their lesson plans, projects, case studies etc. linking IKS with the current processes of training teachers.

Stage 4: Application and reflection

Student-teachers need to engage in IKS via field experience, community interaction and classroom experiments. Educator programmes should apply reflective journals, peer observation and action research to find out what is effective.

Stage 5: Investigation and institutionalizing

Finally, teacher education institutions should create IKS research consortia, resource centres, electronic repositories of data and partnerships with universities, practitioners and local communities.

This model transforms the teacher educator from a passive user of policies to a facilitator of knowledge and curriculum researcher.

DISCUSSION

The key outcome of this conceptual analysis is that it is not sufficient to ask the question of preparedness only by establishing whether teacher educators know about IKS. Awareness is only an initial point, not an outcome.

The data suggest there is a gap between policy and practice. NEP 2020 lays out the vision; the UGC has developed the curriculum and teachers' training guidelines. There is

also emerging evidence showing that the general attitude of teacher trainers and teacher trainees is positive. However, this positivity coexists with dilemmas regarding resources, expertise, epistemology, and applicability.

The gap is significant since teacher educators have to perform some sort of translation of knowledge. They need to interpret knowledge traditions, identify valuable elements in education, draw necessary connections with modern-day disciplines, and form those connections into teaching techniques for future teachers.

Kumar (2024) makes the same claim in his research – IKS is historically neglected in higher education even though it can serve as a vehicle for contemporary scientific, ecological, and technological issues. That reinforces the idea that integration is not purely about preserving culture but can be a part of interdisciplinary inquiry.

Demotion of the decolonial viewpoint is not without its challenges. To get rid of colonialism in education is not to promote a new doctrine. The aim should be global epistemic domination. Education in India can be inclusive of knowledge produced based on Indian wisdom keeping in mind critical thinking, ability for questioning, and care for diverse lives.

As a result, the type of individual who would be best suited to teach IKS is neither an uncritical supporter of western views nor an indifferent conveyor of traditional knowledge.

AN OVERVIEW OF IMPLICATIONS FOR TEACHER EDUCATION INSTITUTIONS

Based on our explorations of IKS-related issues, we can identify a number of recommendations that are relevant to education institutions.

First of all, it is necessary to integrate IKS into teacher education, and not just the methodologies.

Secondly, educational institutions should establish IKS resource centers that will contain materials for academics, text books, translations, films and other materials related to the specific field of discipline.

Thirdly, educational institutions should allow joint teaching. For instance, a teacher from an education institution can collaborate and engage with educators specializing in Cultural Studies or Sanskrit as well as teachers practicing various subjects in schools.

Fourthly, IKS should not be taught in isolation from schools and practice ensuring that pre-service teachers study local traditions rather than learn about IKS in classes only.

Furthermore, it is desirable for this process to be supported by adequate creation of research capacity of educational institutions. In particular, action research on IKS-related pedagogy could be conducted.

And at last, assessment of IKS should change as well. If IKS is taught using only traditional recall-based system then neither experiential, nor reflective aspects will be used.

CONCLUSION

The National Education Policy (NEP) 2020 has provided an excellent opportunity to rethink the relationship of the Indian knowledge systems to formal education. Nevertheless, just stating a policy intent does not ensure real change. What is key is the willingness of educators to interpret and implement the said policy.

It is important to view the preparedness of teacher educators for integration of traditional Indian knowledge systems into formal education as a multidimensional professional competence, which consists of knowledge, epistemology, pedagogy, curriculum making, scientific research, and collaborative work with institutions. The research suggests a positive attitude of educators toward the matter of integration, it also shows that there are a lot of gaps in terms of resources, special training, real direct sources of information, and practical engagement.

The way ahead has nothing to do with blind glorification of India's past or remaining in isolation from Indian knowledge systems. The alternative should imply critical, multidimensional, and evidence-based integration of traditional knowledge into formal education. Teachers need to be capable of raising complicated questions, including the following: What does knowledge mean? Who are the producers of knowledge? How is knowledge transferred? What evidence is available? Whose voice was acknowledged or lost? And, what are the ways in which traditional knowledge be interpreted in modern classrooms?

When teacher education is able to inculcate intellectual openness, then the integration of Indigenous Knowledge will be more than just a requirement to follow. It could help develop a system of teachers education that is rooted in culture while not being culturally closed down, globally aware but not culturally cut off and respectful to the cultural tradition and committed to critical investigation.

REFERENCES

- Battiste, M. (2013). *Decolonizing education: Nourishing the learning spirit*. Purich Publishing.
- Gay, G. (2018). *Culturally responsive teaching: Theory, research, and practice* (3rd ed.). Teachers College Press. https://doi.org/10.65528/9780807776704
- Haloi, M., & Kharbirymbai, B. B. (2025). Integrating the Indian Knowledge System (IKS) into teacher education: A transformative approach under NEP 2020. *International Journal of Science and Social Science Research, 3*(2), 38–45. https://doi.org/10.63671/ijsssr.v3i2.432

- Jagadesh Kumar, M. (2024). Forging connections: Integrating Indian Knowledge Systems in higher education. *IETE Technical Review, 41*(3), 271–273. https://doi.org/10.1080/02564602.2024.2342625
- Maity, S. (2024). Curriculum reforms in teacher education after NEP 2020. *Research Review Journal of Indian Knowledge Systems, 1*(2). https://doi.org/10.31305/rrjiks.2024.v1.n2.016
- Ministry of Education, Government of India. (2020). *National Education Policy 2020*. Government of India.
- Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory Into Practice, 31*(2), 132–141. https://doi.org/10.1080/00405849209543534
- National Council for Teacher Education. (2021). *National Curriculum Framework for Teacher Education / Integrated Teacher Education Programme: Policy and regulatory framework*. National Council for Teacher Education.
- National Council of Educational Research and Training. (2023). *National Curriculum Framework for School Education 2023*. NCERT.
- Sharma, G., Mittal, R., & Zayan. (2023). Teacher education in India's National Education Policy 2020: Knowledge traditions, global discourses and national regulations. *Contemporary Education Dialogue, 20*(2). https://doi.org/10.1177/09731849231168728
- Singh, S., Tigga, A. A., & Kumar, R. (2025). Indian Knowledge Systems in teacher education program: Perception of prospective teachers and teacher educators. *Indian Journal of Teacher Education, 2*(1), 88–103.
- Smith, L. T. (2012). *Decolonizing methodologies: Research and Indigenous peoples* (2nd ed.). Zed Books.
- University Grants Commission. (2023a). *Guidelines for incorporating Indian knowledge in higher education curricula*. University Grants Commission.
- University Grants Commission. (2023b). *Guidelines for training/orientation of faculty on Indian Knowledge System (IKS)*. University Grants Commission.
- UNESCO. (2024). *National Education Policy (NEP) 2020: India*. UNESCO Policy Monitoring Platform.

❑❑❑

Awadh International Journal of Information Technology and Education
ISSN: 2277-8985
Vol. 15, Issue - 2 September 2026
Pp. 47-56

5

Status of Sustainable Development Goals (SDGs) in India

Dr. Almas Parveen
Assistant Professor
IVS, GGSIPU
New Delhi

ABSTRACT

This paper provides a comprehensive review of the Sustainable Development Goals (SDGs) in India, examining their implementation, progress, and challenges. It highlights India's efforts in areas such as poverty reduction, health, education, and gender equality, while noting persistent issues like regional disparities, environmental sustainability, and inequality. The role of civil society organizations, government policies, and international cooperation is discussed, emphasizing the need for collective action to achieve the SDGs by 2030. Additionally, the paper examines the impact of COVID-19, which has reversed progress in many areas, underscoring the importance of renewed efforts for sustainable development.

Keywords: Sustainable Development Goals (SDGs), Health, Education, Gender Equality, Regional Disparities, International Cooperation.

INTRODUCTION

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015 as part of the 2030 Agenda for Sustainable Development, provide a comprehensive framework for addressing global challenges related to poverty, health, education, gender equality, economic growth, environmental sustainability and social justice. For India, with its large and diverse population and significant socio-economic and regional disparities, achieving the SDGs is closely linked with the broader objectives of inclusive growth and equitable development. India has integrated the SDGs into its national development priorities through institutional mechanisms, policy interventions and monitoring frameworks. NITI Aayog serves as

Key Words: Beti Bachao Beti Padhao (BBBP), Girls' Education, Government Policies, Gross Enrollment Ratio (ER), Sarva Shiksha Abhiyan (SSA).

thenodal institution for monitoring and facilitating SDG implementation, while the National Indicator Framework provides a mechanism for tracking progress through nationally relevant indicators. (NITI Aayog)

India has demonstrated measurable progress towards several SDGs, although the pace and extent of achievement vary considerably across goals, states and regions. The SDG India Index 2023–24 reported an improvement in India's overall score from 57 in 2018 and 66 in 2020–21 to 71 out of 100 in 2023–24. Significant gains have been observed in areas such as poverty reduction, health, clean water and sanitation, affordable and clean energy, sustainable cities and climate action. However, challenges remain particularly in areas such as zero hunger, gender equality, quality education and reduction of inequalities, highlighting the need for sustained and more targeted interventions. (The United Nations in India) Against this backdrop, examining the **status of Sustainable Development Goals in India** is important for understanding the country's achievements, persistent gaps and regional variations, as well as the effectiveness of existing policies and programmes in advancing sustainable and inclusive development by 2030.

The objectives of this paper are:

1. Briefing about each SDG.
2. Knowing about the relation between economic growth with SDGs.
3. Factors that prevent the application of SDGs in India.
4. Understanding these factors in the department.
5. Environmental Sustainability and Climate Change in India.
6. Individual steps towards full application of SDGs.
7. Regional issues can be understood with great details.

This paper reviews the current state of the SDGs in India with emphasis on societies and committees in the achievement of these objectives. India being a large and multicultural country, the achievement of these global goals and objectives largely depends on the active involvement of civil society organizations, groups and committees at local levels. These agencies do not only lobby and champion policy issues, they source funds and coordinate the social and policy awareness, at the grass root level, to ensure that vulnerable and disadvantaged groups are not excluded in the development agenda.

Today, the challenges, like poverty, education, health, and others, are intricate and cannot be solved individually, so cooperation between authorities, non-governmental organizations, private companies, and indigenous people is crucial. It also briefly explores other factors that are essential in developing partnerships, as well as in the achievement of the SDGs by

Indian societies and committees: Such factors may include the rate of economic growth, spatial distribution of income, technological advancements, and policy measures. With these different aspects considered, this essay seeks to give a broad view on the multiple endeavours and obstacles that India experiences in its path towards the SDGs before 2030.

BRIEF OVERVIEW OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) IN INDIA

The SDGs outline an agenda and the vision to foster an improved future for all by addressing development issues such as poverty, social injustice and environmental issues. Therefore, India, which has a large and highly differentiated terrain, has a significant task in achieving the above objectives by 2030. Below is a broad idea of each SDG along with the progress towards them made by India.

SDG 1: No Poverty By 2016, India was able to reduce poverty where more than 271 million people came out of the poverty line from the previous year 2006. Nonetheless, approximately 10 percent of the country's citizens resides in households with incomes below the poverty level, and the poverty rate in rural areas surpasses that of urban regions. The COVID-19 pandemic prevented the eradication of poverty and even pulled millions of people into poverty again.

SDG2: Zero Hunger – While India has shown advancement in food security under the National Food Security Act 2013, malnutrition continues to be a problem. The latest Global Hunger Index placed India at 94 of the 107 countries that were considered in the Index showing that hunger in India is still high especially among children as of 2020.

SDG 3: Good Health and Well-being Cardiovascular and maternal mortality rates have reduced and life expectancy has risen, resulting in better healthcare service in India. However, noncommunicable diseases and disparities in access to healthcare are considerable barriers. The Ayushman Bharat health scheme was launched in September 2018 as a government funded healthcare program for vulnerable groups.

SDG 4: Quality Education: In India, enrolment in primary education is almost universal; however, challenges related to quality, dropout rates, and inequalities based on gender still exist. The National Education Policy (NEP) 2020 was framed with an intention to revitalize the education system by the year 2030.

SDG 5: Gender Equality Although India has made efforts to reduce gender inequalities, like the Beti Bachao, Beti Padhao campaign, gender disparity persists in the country. The female labour force participation rate is at 23%; and the rate of violence against women remains high.

SDG 6: Clean Water and Sanitation Through India's Swachh Bharat Mission (2014) the country has made impressive improvements for sanitation and the Ministry of Jal Shakti eradicated open defecation in India in 2019. But, the safe external water supply is still a

problem even today as more than fifty million people have no access to safe drinking water especially in the rural areas.

SDG 7: Affordable and clean energy: India has come up with improvements on access to electricity as well as some forms of renewable energy. The International Solar Alliance coupled with renewed energy targets by 2030 shows India's seriousness towards clean energy.

SDG 8: Decent work and Economic Growth: India is among the fastest-growing economy in the world, however, the structures dominant the workforce are informal, excluding the consideration of labour rights and social security. The unemployment rate was rising steadily and reached 7.6 % in 2020 because of the pandemic, which has had negative impacts on the economic growth.

SDG 9: Industry, Innovation, and Infrastructure Increasing role in the infrastructure development with high investment on highways, railway and other communication networks. Responsible industrial growth and innovation are achieved through the Make in India campaign though the progress has faced the problem of uneven development between states.

SDG 10: No more inequality While India has a low inequality score of 35: 3, the level of inequality in India is very high; the top 10% of the Indian population holds 77.2 % of the total wealth. The process such as Atal Pension Yojana and Jan Dhan Yojana were introduces to minimize social inequality, but the castes, gender and regional discriminations are massively rooted.

SDG 11: Sustainable Cities and Communities Over time the world has witnessed rapid urbanization this has led to problems like overcrowding, pollution and substandard infrastructure within cities. The Smart Cities Mission was launched in 2015 to solve the problem of sustainable urban development, yet, the work is done in a rather unsteady manner across different cities.

SDG 12: Responsible Consumption and Production India is the third largest energy consumer in the world and consumption of hazardous materials is being increased. Among others, the government effectively encourages resource efficiency and sustainable approach to the management of available resources through implementation of activity such as National Action Plan on Climate Change agreed in the year 2008.

SDG 13: Climate Action India is one of the countries that are most affected by climate change, in form of floods, drought, and heat. The country committed to decreasing its carbon emission intensity by 33%-35% in the year 2030 as per the Paris Agreement but, climate change adaptation is still a problem.

SDG 14: Life Below Water Excessive fishing, pollution, and climate change are some of the challenges that India's marine environment. Such resources are important for coastal communities, there are policies such as the National Marine Fisheries Policy in this regard.

SDG 15: Life on Land Forest cutting, land depletion and loss of bio diversity are some of the issues involved. India has put measures into practice to compensate for the loss of afforestation

and conservation of species but the illegalized cutting of trees and destruction of habitats are still a menace.

SDG 16: Peace Justice and Strong Institution For the attainment of the justice and peace India has faced some problems like corruption, crime, and civil unrest. Some progress has been made in this regard; however, political, social and legal changes are also required to bring more fair and to protect human rights.

SDG 17: Partnerships for the Goals Global partnerships for implementation of the SDGs are described and India's efforts to engage in International cooperation through South-South cooperation, Multilateral initiatives and Official development assistance to its neighboring countries.

INDIA'S COMMITMENT TO THE SDGS

India has demonstrated its dedication towards achieving the SDGs by being part of the United Nations' 2030 Agenda for Sustainable Development. The SDGs have found resonance in India's national development agenda which has been implemented through a number of schemes and policies in the country, including the National Institution for Transforming India (NITI Aayog) which also oversees the process of SDG goals subsequent evaluation. The also had undertaken certain SDGs that were targeted towards already operational projects heating their policies. Notably, however, the monumental diversity and size of India, with regards to population, regional development, economic affluence, and socio-cultural differences, makes the realization of such goals very daunting.

In 2020, India ranked ranking on SDG state monitoring index helps assess at the sub national level, the overall SDG performance of the states and Union territories with that of NITI Aayog. This tool serves the important objective of providing an analysis of the situation and assessment of the performance of the goals as well as indicators put in place to monitor progress. For instance, while states such as, Kerala, Himachal Pradesh and Tamil Nadu are doing better in the SDGs attainment, some states notably, in the north and east part lag behind.

ECONOMIC GROWTH AND ITS COMPLEX RELATIONSHIP WITH SDGS

Sustainable development can only be achieved when the economy is allowed to grow, yet, this growth needs to be sustainable to be inclusive. In the last twenty years, India's economy has emerged as the fastest growing in the world accounting for the 5th largest economy. Nevertheless, the picture of how this economic development affects the SDGs is complicated. On the one side, economic growth has reduced poverty, increased service delivery, and improved the level of services and infrastructure. On the other hand, there are challenges of increasing poverty as well as destruction of the environment and over urbanization that have accompanied growth.

This situation is, however, made more difficult by the fact that the informal sector employs about 90% of the Indian labour force and this sector is riddled with restrictions that associate it with development of the economic policies. Worries of underpayment and insufficient basic needs are some of the grievances that these workers in this line encounter. In order for India to comply with SDG 8 (Decent Work and Economic Growth), it will require total restructuring of the labor laws, improved social support systems, and availability of financial services to the lower classes.

REGIONAL DISPARITIES: A BARRIER TO ACHIEVING SDGS

The gross regional imbalances in development are one of the major issues for India about achieving the SDGs. For example, states like Kerala and Tamil Nadu have been successful in providing access to healthcare, education and in promoting gender equality. At the same time, states like Uttar Pradesh, Bihar and Jharkhand are still characterized by abject poverty, poor health indicators and lack of infrastructure. Therefore, such regional imbalances act as a barrier for India to achieve the SDGs equally across the nation.

To illustrate, while Kerala boasts education as one of its official languages and is replete with other industries focusing on this sector, Bihar and Uttar Pradesh are grossly undersupplied with education and other appropriate standards. Also, food security (SDG 2) and other programs targeting malnutrition in children are found mainly in the southern states, but most children in the north-eastern and some northern states lack food security and suffer from malnourished conditions.

Increasing investment in lagging areas, implementing policies that are appropriate to each region, and implementing focused interventions are all necessary to address these regional discrepancies. The ability to advance the less developed areas to keep up with the advancements of the more developed states will determine the success of India's SDG goal.

IMPACT OF COVID-19 ON INDIA'S SDG PROGRESS

One of the biggest focusses while assessing India's progress towards the SDGs is the ability to overcome the obstacles posed by COVID-19. The health crisis not only stressed the health care of the country but it also aggravated the society and economic inequality. Out of which, round twenty million of them were pushed back to their impoverished state due to internship and job losses and low economic activity rates that primarily affected the needy and the most vulnerable persons in the society. This has erased all the progress in poverty alleviation (SDG 1) health (SDG 3) and education (SDG 4) achieved in the last couple of years.

The pandemic also raised the issue of the need for digital arrangements as the learning activities and some types of work were transferred to remote setting. While there were some lessons learnt from this change, the change was beneficial to urban society and the rural society did not benefit from this change since they did not have internet facilities and other technologies. This also worsened existing inequality in access to be educated or to get appropriate health and other relevant services.

Hence, future work for India will be establishing healthcare and social protection systems, and getting ready for the reverse of such crises as the one in 2020. These will include continuing with establishment of technological foundation, increasing health care accessibility to effective but cheap services, and improving the funding on the most vulnerable community in the respective countries. It has also highlighted public-private sector and civil society partnership and the necessary government support towards realization of the SDGs.

ENVIRONMENTAL SUSTAINABILITY AND CLIMATE CHANGE

Environmental sustainability is the major concern for India when it is aiming at fulfilling the set goals and objectives for sustainable development. Due to development in urbanization, industrialization and population explosion the country is facing serious environmental problems. Water and airborne contaminations, loss of vegetation and increased rate of extinction are dangerous to the environment and-health of the society. Currently, India relies mostly on coal hence it produces significant units of greenhouse gases hence the high contribution to global climate change.

Still, India has also initiated the process regarding environmental sustainability of development effectively. The country has agreed and planned for certain target of power through renewable energy especially solar energy through the International Solar Alliance. India has also committed to a net zero target by 2070 for Paris Agreement It also speaks volumes on its policies towards climate change, which are similar to those it holds on carbon emission.

Nevertheless, it seems that efforts made to reach the goal set within SDG 13 (Climate Action) will need stronger emissions cuts, corporate energy efficiency, and sustainable agriculture and urbanism. CO2 will also need to include the adaptation of climate change impacts on low- income groups especially those living in the coastal and drought regions of India.

GENDER EQUALITY AND SOCIAL INCLUSION

Reducing inequality in general and gender inequality specifically (SDG 10. 3) is part of sustainable development goals in India. India has achieved some strides over the years in increasing awareness of women's rights through projects like the Beti Bachao Beti Padhao – which focuses on the infant girl survival and primary education for the girl child. There has also been an improvement in the political participation of women, especially at the grass root level where women are now holding 33% of the panchayat elections (village councils). Nevertheless, much work still needs to be done toward the goal of gender parity in India. The employment ratio of women is very low even today and their access to education, healthcare facilities and financial institutions are restricted. Sexual violence against women such as domestic violence and sexual harassment are also prevalent and remain as barriers to women's rights. These goals should guide India in the pursuit of SDG 5: reducing gender inequalities, shunning violence against women, educating women, improving their health, and expanding their economic opportunities. Specifically, the abovementioned awareness

campaigns and legal changes focus on social norms and cultural perceptions that support gender disparity.

THE ROLE OF TECHNOLOGY IN ACHIEVING SDGS

The present paper posited that technology plays a pivotal role in enabling India to achieve the Sustainable Development Goals. Numerous new prospects for further development have been generated by the quickening pace of informatization and the emergence of new Internet and mobile communication services. E-government is improving governance, introducing digital services, and encouraging the use of technology for accountability across various sectors, including agriculture, education, and health. But technology may also play a vital role in helping to accomplish the SDGs. One of the biggest technological achievements of the Indian government is the Aadhaar program.

Millions of Indians, particularly those living in rural and isolated areas, now have more cheap access to financing, and Aadhaar has significantly improved the effectiveness of service delivery and the fight against corruption.

However, issues around the equitable use and distribution of technology remain unresolved. In order for technology to support sustainable development, gaps between individuals from diverse socioeconomic backgrounds and those living in rural or urban regions must be closed. The creation of digital resources and encouraging their accessibility in rural regions would also aid in achieving goals related to the Sustainable Development Goals (SDGs), which center on socioeconomic advancement, health, and education.

INTERNATIONAL COOPERATION AND PARTNERSHIPS

The collaboration with other countries is crucial when it comes to the implementation of the SDGs, and India has been a part of the globalization processes to support the sustainable development goals. Some ways India is working with other nations to tackle global issues can be exemplified by the country's empathy with its leadership in the International Solar alliance or its passion with South-South cooperation among others. India also gets its development aid from different multilateral and bilateral donors, which has been useful in executing programmes touching on health, education and ecology. Also, India is in processes of partnering with international financial organizations like the World Bank and the Asian Development Bank to finance projects that are aligned to the SDGs. But the overall attainment of the goals of sustainable development will only be possible through a combination of foreign investment and sharing of knowledge, technology, and skill. The paradox of India being both a beneficiary of international development cooperation and a bilateral and multilateral aid donor demonstrate the centrality of cooperation in advancing sustainable development.

CONCLUSION

In conclusion, this essay has examined the state of Sustainable Development Goals (SDGs) in India, with a specific emphasis on the collaborative role played by societies, committees, and various community-based organizations. These groups are instrumental in driving local initiatives and fostering partnerships that contribute to India's overall progress toward the 2030 targets. While their efforts are crucial, it is evident that the achievement of the SDGs is influenced by a broader range of factors, including economic policies, technological advancements, regional disparities, and government interventions.

India's progress toward these goals, while significant in some areas, faces ongoing challenges that require continued cooperation among stakeholders at all levels. Success in meeting the SDGs will depend not only on the efforts of communities but also on the coordinated actions of government institutions, the private sector, and international partners. As India continues its journey toward sustainable development, a multi-faceted and inclusive approach will be essential to ensure that no one is left behind, and the ambitious targets of the SDGs are met by 2030. This conclusion underscores the importance of collective action, robust policy frameworks, and sustained commitment to achieving a more equitable and sustainable future for all.

REFERENCES

- NITI Aayog. 2021. SDG India Index & Dashboard 2020–21: Partnerships in the Decade of Action. Government of India.
- Retrieved from: https://www.niti.gov.in/sdg-india-index-dashboard-2020-21
- This report follows how India is doing with SDGs, tracing it in different regions and where more efforts are needed.
- United Nations Development Programme (UNDP) India. 2021. Sustainable Development Goals (SDGs).
- Retrieved from: https://www.in.undp.org/content/india/en/home/sustainable-development-goals.html
- The UNDP website explains how India is progressing toward SDGs. The local communities and partners are in partnership to devise strategies on how to make contributions toward the targets.
- Ministry of Statistics and Programme Implementation (MoSPI). 2020. SDG National Indicator Framework Progress Report 2020. Government of India. Retrieved from: http://mospi.nic.in/
- This government document is a key data source for the progress India is making under certain SDGs like reducing poverty and improving health.

- Sengupta, R., & Vira, B. (2020). India and the Sustainable Development Goals: The Way Forward. Sustainability, 12(10), 4093.
- DOI: https://doi.org/10.3390/su12104093
- This paper looks at how India currently implements the new SDGs with a focus on what it is that the government and community actions will shape the nature of the imple.

❑❑❑

Awadh Centre of Education
(COMM-IT Career Academy & Institute of Vocational Studies)
Awadh Bhawan
FC-31, Sheikh Sarai, Phase – II
Institutional Area,
New Delhi – 110017, India
Phone: +91 11 29257793/94
E Mail: info@awadh.org.in
Site: www.awadh.org.in