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**Transitional Renaissance in the Educational spectrum: A theoretical investigation into the Evolvement from Conventional approach-STEM-STEAM in the Indian Context***Neha Kushwaha<sup>1</sup>; Dr. Alka Rani<sup>2</sup>*DOI: <http://doi.org/10.5281/zenodo.21110889>**Review: 05/06/2026****Acceptance: 09/06/2026****Publication: 01/07/2026**

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**Abstract**

The dynamic interplay of tradition of India, and contemporary modernity has shaped the intellectual and cultural landscapes of India. Since the historical exchange of knowledge and legacies through ancient knowledge system, trade, colonial and scholarly interaction to the current cooperative endeavours in sustainability and education, this paper explores the educational transformational influences that have spread through both continuity and innovation. India has been maintaining strategic corroboration in education including training program, scholarship initiative and degree program which will surely impact the transition from conventional approach to STEM and further to STEAM. This study explores how art, culture, and values have been swapping between areas historically and currently, with focus on how dynamic educational paradigms specifically, STEM and STEAM approaches, have influenced these changes. Also, the track of reforming education and its execution from traditional-STEM-STEAM. The study explores how interdisciplinary approaches have reshaped traditional artistic expressions, philosophical ideologies, and environmental consciousness. It emphasizes the significance of striking a balance between ethical, aesthetic, and environmental factors while preserving cultural heritage and incorporating modern scientific methodologies.

**Keywords:** Conventional approach, STEM, STEAM, transforming education, interdisciplinary approach, theoretical framework.

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**Introduction**

Education is an influential driver of development and one of the convincing instruments for mitigating poverty and improvising health, gender equality, peace, and stability (Okoliko & Adebayo, 2025). Education is the foundation of a prosperous life because it equips people with the moral values, knowledge, abilities, and self-assurance they need to advance society. By supporting this process, teachers help people understand who they are and take care of themselves. (Sudarsana, 2016). The educational landscape in India, deeply rooted in ancient knowledge systems such as the Gurukul tradition and Vedic scholarship, has long emphasized holistic learning that integrates moral, intellectual, and practical skills for societal well-being (Rajguru, 2024). However, colonial influences and post-independence policies shifted focus toward rote memorization and compartmentalized disciplines, prioritizing bookish knowledge over experiential application as a conventional approach that, while foundational, often stifled creativity, critical thinking, and real-world relevance. This paradigm, characterized by rigid curricula, teacher-centred interactions, and siloed subjects, has increasingly proven inadequate in addressing the demands of the 21<sup>st</sup> century, where globalization, technological advancements, and sustainable development necessitate interdisciplinary competencies. As articulated in the National Education Policy (NEP, 2020), education must evolve to foster vocational skills, innovation, and integration across streams, echoing the need for

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a “transitional renaissance” that bridges tradition with modernity. Conventionally, education transpires in a well-organized abode with the primary objective to impart knowledge by teaching. Ordinarily, all schools are outlined in a set of curriculums, models, classrooms, pupil-teacher interactions, assessment, and several educational activities (Ghosh, 2025).

### **Review of Literature**

India's educational evolution from rote-based conventional systems to interdisciplinary STEM (Science, Technology, Engineering, Mathematics) and STEAM (adding Arts) frameworks reflects a blend of ancient holistic traditions and modern imperatives. Ancient Gurukul systems emphasized integrated moral, intellectual, and practical skills (Rajguru, 2024; Sharma & Sharma, 2021), yet colonial legacies shifted toward memorization and siloed disciplines, prioritizing clerks and professionals over artisans, as critiqued by Tagore (Palmer, 2001). Study concluded that scenarios during pandemic 2020 forced to investigate the education, its meaning and purposes from socio-historical perspective, to answer how equity and justice can be interplay into curricula and pedagogic practices, rooted in Indian constitution. Article also encompasses the role of the curriculum playing in the connected world sanctioning ecologically and socially (Batra, 2020; Okoliko & Adebayo, 2025). Studies explored the role of cross-curricular teaching framework in encouraging student outcomes through mixed-method design across ten diverse school. The findings of the study claims that students involved in cross-curricular modules revealed greater academic gains with enhanced critical thinking and engagement in learning (Ghosh, 2025). STEM integration, driven by global competitiveness, enhances teachers' perceptions of problem-solving and collaboration (Margot & Kettler, 2019).

However, limitations in overlooking humanistic elements led to STEAM, incorporating arts for creativity, empathy, and transdisciplinary learning (Liao, 2016; Colucci-Gray et al., 2017; Bertrand & Namukas, 2020). Studies demonstrate STEAM's benefits in boosting student creativity and teacher training outcomes (Kim & Park, 2012; Kang et al., 2012). Barriers persist, including teacher readiness and infrastructural gaps (Park et al., 2017; Sardana et al., 2024; Verma & Singh, 2024). Theoretical frameworks elucidate these: Rogers' (2003) diffusion of innovations explains slow adoption due to complexity and incompatibility; Mishra and Koehler's (2006) TPACK stresses integrating technological, pedagogical, and content knowledge; Ajzen (2004) performed research dealing with numerous aspects of the theory of planned behavior, the research intended to perform behaviour of different kinds which can be predicted with high accuracy from three crucial point of view i.e., attitudes toward the behavior, subjective norms, and perceived behavioral control. Evaluations of NEP 2020 underscore promises like equity alongside pitfalls such as implementation lags (Kulal et al., 2024).

Review of literature give a valuable insight to look over the involvement in STEM and STEAM at school and higher education that help the researchers to fill out the lacuna in the Indian context for sustainable futures for the interdisciplinary approaches.

### **Rationale of the study**

This theoretical study explores the evolution of conventional education to STEM approaches and STEAM in India, focusing on the need for reforms in teaching methods and the impact of advancements in information and communication technology on community, society, nation, and world (Sanders, 2009; Margot & Kettler, 2019). As per reported by National Research Council (NRC, 2007), the strength of the nation is resulting in huge

part from the point of view of production of skilled human beings and the stream of scientific, artistic and technical innovation the develop. Yet, focus of STEM on ‘hard’ scientific and mathematical skills has been critiqued for overlooking artistic and humanistic dimensions, leading to the incorporation of the “A” for Arts in STEAM. STEAM infuses art and design principles into STEM, creating a multidisciplinary space that nurtures creativity, empathy, and cultural expression alongside technical proficiency (Liao, 2016). STEAM is an integrated learning approach rather than conventional sense of siloed disciplines that merges the arts with STEM subjects beautifully for the purpose of improving students’ engagement, their creativity, innovation, problem solving skills and other cognitive benefits and to improve employability skills necessary for career and economic advancement (Colucci-Gray et al., 2017).

STEAM brings the five disciplines together in intertwined manner to create an inclusive learning environment that encourages learners to participate in learning holistically via understanding of interrelationship among science, technology and other disciplines with society and its issues that will add to the breadth of students’ learning leading to ‘Knowledge of worth’ (NCFSE, 2023; Fensham, 2007). From the above existing context, which majorly emphasizes on the theoretical exploration of India’s educational transition from conventional approaches to STEM and STEAM, focusing historical-modern interplay, cultural exchanges, interdisciplinary re-moulding, heritage conservation challenges and balancing ethical-aesthetic-environmental factors with advance technological advancement for sustainable education, here are the two research questions best suited to guide the exploration aligning with the objectives of the topic,

Q.1 How has the integration of STEM and STEAM approaches in education evolved from conventional education in India, balancing tradition and modernity?

Q.2 What theoretical frameworks best explain the challenges and barriers of transitioning from rote-based conventional to STEAM based educational approach in Indian context?

## **Research Methodology**

The research design of this study incorporated content analysis based on Krippendorff’s content analysis framework which used secondary data, including government policies, documents, scholarly articles, and government websites explored using keywords like NEP 2020, NCFSE 2023, STEAM and STEM education, traditional education system, and implementation challenges etc. The NEP 2020 and NCFSE 2023 were given particular focus to identify the key dimensions of integrated-interdisciplinary teaching-learning approach such as STEAM and STEM, while the research article offers comprehensive insights of the present scenario of STEAM and STEM and subtle framework at global and national level.

## **Unravelling of STEM and STEAM integration in backdrop of global perspective: Balancing tradition and modernity in Indian education**

Educational landscape of India has undergone a profound transformation, evolving from conventional learning to integrated STEM (Science, Technology, Engineering, and Mathematics) and know to STEAM (Science, Technology, Engineering, Arts and Mathematics) including ARTS in the approach. This shift, driven by globalization and technological advancements, seeks to balance ancient traditions like the holistic Gurukul system with modern demands for innovation and employability. Conventional education in India, extremely influenced

by colonial policies, emphasized memorization and compartmentalized subjects, often stifling creativity and practical skills (Rajguru, 2024). STEAM approach is a new concept but its philosophy is old and rooted in ancient Indian education where focus is on skill generation to foster prosperity and livelihood. This approach is deteriorated through British colonial education, mainly focused on rote memorization and emphasizing on bookish knowledge to input information and facts. In the words of Tagore, “in every nation, education is intimately associated only to turning out clerks, lawyers, doctors, magistrate and policeman..... This education has not reached the farmer, the oil grinder nor the potter. No other educated society has been struck with such disaster If ever a truly Indian university established it must from very beginning implement India’s own knowledge of economics, agriculture, health, medicine and of all other everyday science from the surrounding village. The alone can the school and university becomes the centre of the country’s way of living” (Palmer, 2001).

Post-independence, this paradigm persisted, prioritizing theoretical knowledge over experiential learning, as critiqued in the National Curriculum Framework (NCF, 2005), which called for a move toward child-centred education. However, the 21<sup>st</sup> century’s focus on interdisciplinary competencies necessitated reforms, leading to the integration of STEM and its evolution into STEAM. The inception of STEM in India can be traced to initiatives aimed at addressing skill gaps in technical fields. STEM education emerged as a response to global competitiveness, focusing on problem-solving, collaboration, and real-world applications, originating from U.S. models but adapted locally (Sanders, 2009; Margot & Kettler, 2019).

In India, the ATAL tinkering labs (ATL), launched by NITI Aayog in 2016 under the Atal Innovation Mission, marked a pivotal step. ATL establishes innovation labs in schools to foster STEM skills through hands-on activities like robotics and 3D printing, reaching over 10,000 schools and impacting millions of students by 2025 (NITI Aayog, 2023). Central Board of Secondary Education (CBSE) has further propelled STEM integration through teacher training programs. Since 2019, CBSE has conducted workshop on STEM education including recent schedule for training to in-service teachers in STEM education in session 2025-26 (CBSE, 2025). Since the NEP 2020 focuses on the overall development of the learner, so can the curriculum separate the importance of art discipline from it this leads to the importance and integration of Arts in present curriculum which can be effectively implemented via introducing STEAM approach.

The transition to STEAM represents a more holistic evolution, incorporating arts to nurture creativity and cultural expression alongside technical proficiency. Critiques of STEM for overlooking humanistic dimensions led to STEAM’s adoption, as it infuses design principles and empathy into scientific inquiry (Liao, 2016; Colucci-Gray et al., 2017). In India NEP 2020 explicitly advocated for this by eliminating silos between arts and sciences, promoting art-integrated pedagogy to enhance cognitive benefits and employability. NCFSE, 2023 outlines stages where students in grade 6-8 engage in vocational crafts like pottery, integrated with STEM concepts like material science, echoing ancient Vedic holistic learning while addressing modern sustainability goals. Balancing tradition and modernity are central to this evolution. NEP 2020 emphasizes incorporating Indian Knowledge Systems, including tribal wisdom and Vedic scholarship, into STEAM frameworks to preserve cultural heritage amid technological progress (Ministry of Education, 2020).

### **Theories shedding light for educational evolution and hurdles from rote routines to STEM and STEAM synergy**

The shift from STEM to STEAM, emphasized in policies like the National Education Policy (2020), aims to foster interdisciplinary learning, creativity, and 21<sup>st</sup> century skills but encounters resistance due to entrenched pedagogical norms, resource constraints, and systematic inertia (Ministry of Education, 2020). Theoretical frameworks provide valuable lenses to understand the multifaceted challenges and barriers in transitioning from conventional rote-based education to experiential learning approach such as STEAM approaches in India. Key frameworks such as the diffusion of innovations theory, technological pedagogical content knowledge (TPACK), and the theory of planned behaviour illuminate these issues, while initiatives taken by Indian government such as ATAL tinkering labs (ATL) and Central Board of Secondary Education (CBSE) training programs highlight and emphasizes practical barriers.

The theory of diffusion of innovation demonstrates the slow and progressive adoption of new innovation and advancement such as STEAM as an innovation in the education system of India (Roger, 2003). Rote learning, rooted in colonial practices and legacies, represents the current running status, where relative advantages of STEAM approach like enhanced critical-creative thinking, problem-solving and employability in real world are overshadowed by compatibility issues with the existing curricula (Batra, 2020). In rural India, where 70% of schools does not meet the parameter of adequate infrastructure, the perceived complexity of STEAM integration hinders adoption (Verma & Singh, 2024). National Education Policy advocates for multidisciplinary inclusive curricula to bridge the gap, yet implementation lags, with only 20% of schools fully aligning by 2024. Also, National Curriculum Framework for School Education promoting this by advocating experiential learning but illuminating the barriers like siloed subjects and assessment reforms (NCFSE, 2023). TPACK framework emphasizes teacher readiness as a central barrier, focusing on the convergence of technological, pedagogical, and content knowledge.

The theory of Planned Behaviour further elucidates attitudinal and normative hinderance, where intentions and perceptions of teachers to adopt STEAM are influenced by perceived behavioural control and subjective norms (Ajzen,1991). In Indian context, teachers also trained in rote methods often lack the pedagogical shifts needed for STEAM's hand-on, arts-integrated activities (Verma & Singh, 2024). Research indicates that 68.8% of educators report insufficient STEM/STEAM skills, exacerbating challenges in integrating arts with technical subjects (Park et al., 2017). A study on conducted on mathematics teachers' willingness revealed that only 25% expressing high intent to integrate STEAM (Kim & Park, 2012). Initiatives taken by CBSE, such as the 3030 Eklavya STEM online series in partnership with IIT Gandhinagar, mandate 50 hours of annual training based on STEM for 2025, yet coverage remains uneven, with only 40% of teachers completing it due to time constraints and digital divides.

This framework explains why ATL, introduced to enhance innovation in 10,000 schools, faces utilization rates below 50% in rural areas, specifically due to untrained facilitators and maintenance issues (AIM, 2022). NEP 2020 pushes the integration of arts to nurture empathy and cultural expression clashes with norms, as evidenced by NCFSE advocating for balancing tradition with modernity, yet schools report resistance from parents prioritizing rote for competitive exams. In the Indian context, cultural emphasis on exam-oriented rote learning created normative pressures against creative, failure tolerant STEAM pedagogies (Sharma & Sharma, 2021). Additional barriers include inequities of resources and gaps in policy execution. Overcoming these requires integrated approaches, as NEP 2020 envisions, blending government initiatives with community involvement for sustainable transitions.

Discussion

This theoretical investigation leads to examine the intricate interplay of theoretical framework, policy initiatives, and practical challenges that orient the trajectory of STEM and STEAM education in India. It explores how the diffusion of innovation theory, coupled with an understanding of Technological Pedagogical Content Knowledge and the theory of planned behaviour, provides a comprehensive lens through which the adoption, implementation, and sustainability of STEAM and STEM initiatives, within the diverse Indian educational landscape (Bertrand & Namukasa, 2020) can be analysed. This discussion further delves into how these theoretical underpinnings inform the futuristic successes and shortcoming of initiatives like the National Educational Policy and the ATAL tinkering labs, highlighting the critical need for contextually relevant strategies to foster a robust STEAM and STEM ecosystem (Kulal et al., 2024). In addition to this, the investigation also upholds the novel steps taken for teacher training in STEM and STEAM education through government and non-government initiatives such as CBSE.

Here, researchers tried to illustrate the findings of research questions through a graphical flowchart expressing the evolution of educational approaches from conventional to STEM and STEAM, cyclical feedback loops, branching for challenges and opportunities for constructive additional reforms, set against a subtle Indian educational background.

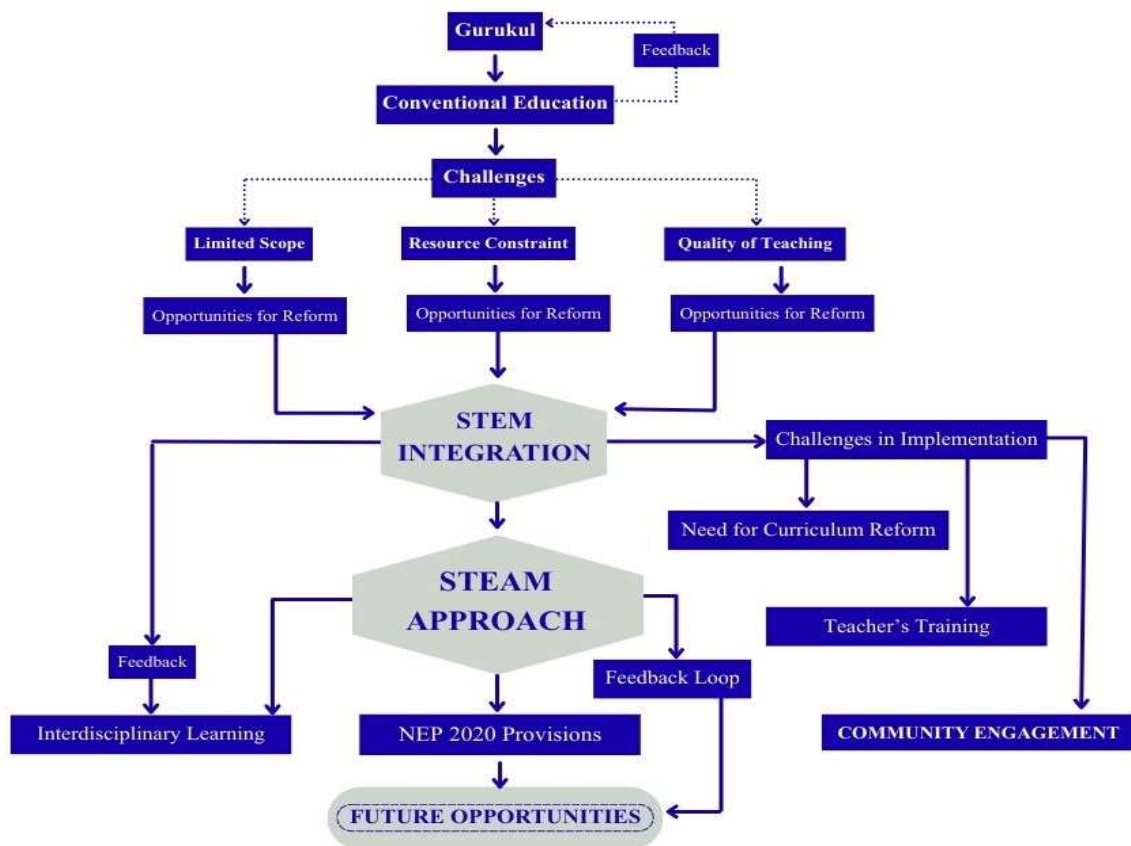


Figure 1.0

## **Educational Implication**

This study acknowledges the noteworthy implication for policymakers and educators to emphasize interdisciplinary reforms in schooling system of India. As outlined in NEP 2020 and NCFSE 2023 the importance of integrated curriculum to foster experiential learning, inculcating ancient holistic traditions with modern STEM and STEAM innovations enhancing creativity, critical thinking and cultural sensitivity. Initiatives such as in-service STEM workshop by CBSE and establishment of ATAL labs, must be expanded to address TPACK deficiencies, ensuring equitable access in urban-rural areas to obliterate infrastructure barriers. Stakeholders should uphold diffusion of innovation theory to increase phased adoption enhancing TPACK parameters to mitigate the teaching-learning through community engagement and attitudinal shift. Henceforth, this renaissance ensures enhanced employability, sustainable development and 21<sup>st</sup> century skills, enriching India's heritage while assembling students for contemporary global needs.

## **Conclusion**

India's educational renaissance from rote-based conventional systems to STEM and STEAM paradigm embodies a harmonious blend of ancient holistic traditions such as the gurukul, with modern imperatives of innovation and interdisciplinary skills. This section synthesizes the findings of research questions offering an interpretation of their implications within the broader landscape. As delineated via policy initiatives of NEP 2020, NCFSE 2023, ATL labs, and CBSE, these evolutions acknowledge skill gaps, enhance creativity through integration of arts and increase employability while maintaining cultural heritage. In addition to this, the theoretical frameworks- diffusion of innovation, TPACK, and theory of planned behaviour, revealing persistent barriers encompassing teachers' readiness, infrastructural deficits, local inequalities, and attitudinal resistance of stakeholders, with lagging implementation at 20% alignment and its utilization less than 50% in remote areas. Ultimately, this transitional synergy promises equitable and inclusive education via integrating reforms blending government efforts and community engagement.

## **References**

- Ajzen, I. (2004). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Atal Innovation Mission (AIM). (2022). *Assessment of Atal Tinkering Labs*. <https://www.aim.gov.in/pdf/Assessment-Report-of-Atal-tinkering-Labs.pdf>
- Athena Infonomics India Private Ltd. (2023). *Assessment of Atal Tinkering Labs*. Atal Innovation Mission, NITI Aayog. <https://aim.gov.in/pdf/Assessment-Report-of-Atal-tinkering-Labs.pdf>
- Batra, P. (2020). Re-imagining curriculum in India: Charting a path beyond the pandemic. *National Library of Medicine, Springer Nature*, 51(1-3), 407–424. <https://doi.org/10.1007/s11125-020-09518-6>
- Bertrand, M. G., & Namukas, I. K. (2020). STEAM education: student learning and transferable skills. *Journal of Research in Innovative Teaching & Learning* 24 June 2020; 13 (1): 43–56. <https://doi.org/10.1108/JRIT-01-2020-0003>

- Central Board of Secondary Education (CBSE). (2025a). *PRESS RELEASE: CBSE announces Mandatory Training Framework and Annual Training Theme 'STEM Education'*.  
[https://www.cbse.gov.in/cbsenew/documents/PRESS\\_RELEASE\\_STEM\\_17042025.pdf](https://www.cbse.gov.in/cbsenew/documents/PRESS_RELEASE_STEM_17042025.pdf)
- Central Board of Secondary Education (CBSE). (2025b). *"STEM Education" as Theme for Teachers' Training for the Session 2025-26*.  
[https://www.cbse.gov.in/cbsenew/documents/STEMEducation\\_2025\\_01042025.pdf](https://www.cbse.gov.in/cbsenew/documents/STEMEducation_2025_01042025.pdf)
- Colucci-Gray, L., Trowsdale, J., Cooke, C. F., Davies, R., Burnard, P., & Gray, D. S. (2017). Reviewing the potential and challenges of developing STEAM education through creative pedagogies for 21st learning. *British Educational Research Association*. <https://www.bera.ac.uk/publication/reviewing-the-potential-and-challenges-of-developing-steam-education-through-creative-pedagogies-for-21-learning>
- Fensham, P. J. (1988). Approaches to the teaching of STS in science education. *International journal of science education*, 10(4), 346-356.
- Ghosh, S. S. (2025). Evaluating cross-curricular teaching frameworks: insights for the future of national curricula. *Education 3-13*, 1–15. <https://doi.org/10.1080/03004279.2025.2511182>
- Kang, M., Park, Y., Kim, J., & Kim, Y. (2012). Learning outcomes of the teacher training program for STEAM education.
- Kim, Y., & Park, N. (2012). The effect of STEAM education on elementary school student's creativity improvement. In *Communications in Computer and Information Science* (pp. 115–121). Springer. [https://doi.org/10.1007/978-3-642-35264-5\\_16](https://doi.org/10.1007/978-3-642-35264-5_16)
- Kulal, A., N., A., Dinesh, S., Bhat, D. C., & Girish, A. (2024). Evaluating the Promise and Pitfalls of India's National Education Policy 2020: Insights from the Perspectives of Students, Teachers, and Experts. *SAGE Open*, 14(4). <https://doi.org/10.1177/21582440241279367>
- Liao, C. (2016). From interdisciplinary to transdisciplinary: An arts-integrated approach to STEAM education. *Art Education*, 69(6), 44-49. <https://doi.org/10.1080/00043125.2016.1228059>
- Margot, K. C., & Kettler, T. (2019). Teachers' perception of STEM integration and education: A systematic literature review. *International Journal of STEM Education*, 6, Article 2. <https://doi.org/10.1186/s40594-019-0151-2>
- Ministry of Education. (2020). *National Education Policy 2020*. Government of India.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- National Art Education Association. (2014). Position statement on STEAM education.  
<https://www.arteducators.org/advocacy/articles/143-position-statement-on-steam-education>
-

- National Council for Teacher Education. (2009). National curriculum framework for teacher education. [https://ncte.gov.in/Website/PDF/NCFTE\\_2009.pdf](https://ncte.gov.in/Website/PDF/NCFTE_2009.pdf)
- National Council of Educational Research and Training (NCERT). (2023). *National Curriculum Framework for School Education 2023*. [https://dse1.education.gov.in/sites/default/files/guidelines/ncf\\_2023.pdf](https://dse1.education.gov.in/sites/default/files/guidelines/ncf_2023.pdf)
- National Council of Educational Research and Training. (2005). National curriculum framework 2005. <https://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf>
- National Research Council. (2007). *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. The National Academies Press. <https://doi.org/10.17226/11463>
- Okoliko, M.G., & Adebayo, A. (2025). Education Policy and its Impact on Socioeconomic Outcomes in Northern Nigeria: A Sustainable Development Perspective. *Mediterranean Journal of Social Sciences*. vol 16 No 1. <https://doi.org/10.36941/mjss-2025-0007>
- Palmer, J. A. (Ed.). (2001). *Fifty major thinkers on education: From Confucius to Dewey*. Routledge.
- Park, M.-H., Dimitrov, D. M., Patterson, L. G., & Park, D.-Y. (2017). Early childhood teachers' beliefs about readiness for teaching science, technology, engineering, and mathematics. *Journal of Early Childhood Research*, 15(3), 275-291. <https://doi.org/10.1177/1476718X15614040>
- Rajguru, N. (2024). The Gurukul System: Ancient Pedagogical Practices and Their Role in Shaping Indian Knowledge Traditions. *International Journal for Multidisciplinary Research*. Vol 6.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Sanders, M. (2012). Integrative STEM education as “best practice.” In *Explorations of Best Practice in Technology, Design & Engineering Education: Proceedings of the 7th Biennial International Conference on Technology Education Research: Volume Two (TERC 2012): Proceedings of the 7th Biennial International Conference on Technology Education Research: Volume Two (TERC 2012)*. Griffith Institute for Educational Research. <https://search.informit.org/doi/10.3316/informit.717121496785000>
- Sardana, S., Muddgal, A., & Gupta, K.K. (2024). STEM Teacher Training in India-The Challenges and Way Forward. 13. 2-11.
- Sharma, R., & Sharma, S. (2021). Revisiting the Gurukul system: A historical perspective on holistic education in India. *Journal of Indian Education*, 47(2), 23–38.
- UNICEF. (2025). *From rote learning to innovation*. <https://www.unicef.org/india/stories/rote-learning-innovation>
- Verma, R., & Singh, P. (2024). A review paper on challenges and opportunities for university teachers in delivering effective STEM education. *National Journal of Education*, XXII(1), 252-260.