

Multidisciplinarity and Disciplinary Fusion: A Critical Analysis in the Context of NEP 2020

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ABSTRACT:

As educational landscapes evolve, classrooms increasingly mirror the complexity and diversity of the societies they serve. Within this shifting terrain, traditional teaching-learning practices reveal their limitations in responding to varied learner needs, calling for a renewed vision of education. This article presents a critical analysis of multidisciplinarity and disciplinary fusion in the context of the National Education Policy (NEP) 2020. It examines their conceptual foundations, major approaches, and policy alignment, while highlighting the challenges associated with institutional structures, teacher preparedness, and assessment practices. The article also discusses strategies for preparing future teachers to implement disciplinary fusion effectively. Overall, it explains the potential of integrative learning approaches to foster holistic development, critical thinking, and adaptability, thereby contributing to the preparation of future-ready educators and learners in a rapidly evolving educational landscape.

Keywords: Multidisciplinarity, Interdisciplinary, Disciplinary fusion, NEP 2020.

INTRODUCTION

The 21st-century educational landscape is experiencing a profound transformation shaped by rapid technological advancement, global interconnectedness, and the growing complexity of social, economic, and knowledge systems. These developments have challenged traditional discipline-bound structures of education and exposed the limitations of fragmented, subject-centric approaches to learning. As contemporary problems increasingly cut across disciplinary boundaries, education systems are compelled to rethink how knowledge is organized, taught, and applied (Tytler et al., 2019). Conventional curricular models, historically structured around isolated disciplines, often restrict learners' ability to integrate knowledge, apply learning to real-world contexts, and develop higher-order thinking skills required in a dynamic global society (Hardman, 2019).

In response, multidisciplinarity and disciplinary fusion have emerged as significant pedagogical and curricular approaches that seek to address complexity while retaining disciplinary depth. Multidisciplinarity allows multiple disciplines to contribute to a shared

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Published: 24 February 2026

DOI: <https://doi.org/10.70558/SPIJSH.2026.v3.i2.45552>

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theme without necessarily integrating their epistemologies, whereas disciplinary fusion advances deeper integration by blending concepts, methods, and perspectives across disciplines. These approaches align closely with the vision of the National Education Policy (NEP) 2020, which emphasizes holistic, experiential, and interdisciplinary learning to foster critical thinking, creativity, problem-solving, and innovation across all levels of education.

Against this backdrop, the present article offers a critical analysis of multidisciplinary and disciplinary fusion in the context of NEP 2020. It examines their conceptual foundations, curricular implications, and pedagogical possibilities, while also critically reflecting on the challenges, tensions, and institutional constraints associated with their implementation. By situating these approaches within broader 21st-century educational discourses, the article highlights their potential role in reimagining education for developing adaptable, reflective, and future-ready learners across disciplines.

UNDERSTANDING DISCIPLINARY FUSION

Disciplinary fusion refers to an integrative educational approach in which knowledge, methods, and perspectives from multiple disciplines are purposefully combined to address complex, real-world problems. Unlike traditional discipline-based learning that treats subjects as isolated silos, disciplinary fusion emphasizes connected thinking, contextual understanding, and holistic problem-solving. It enables learners to synthesize ideas across domains such as science, technology, social sciences, and the arts, thereby fostering higher-order skills like critical thinking, creativity, and adaptability. In contemporary education, disciplinary fusion is seen as essential for responding to socio-scientific challenges and preparing learners for an interconnected world (Tytler et al., 2019; Hardman, 2019; Sanchez Milara & Cortes Orduna, 2024).

There are Several approaches in disciplinary fusion:

1. **Disciplinary / Intra-disciplinary Approach:** Disciplinary/ Intra-Disciplinary approach involves learning within a single scientific discipline at a time. For example, when students study physics only, they learn topics like mechanics, heat, and light. They do not use ideas from chemistry or biology. The main aim is to understand one subject deeply without mixing it with other subjects.
2. **Multi-disciplinary Approach:** In multi-disciplinary approach, it draws idea from multiple disciplines while maintaining their distinct identities or we can tell that many subjects are used, but they are kept separate. For instance, a project on climate change may include separate contributions from physics (energy), chemistry (greenhouse gases), and geography (climate patterns), without integrating concepts across disciplines. Here each subject works on its own, and ideas are not mixed together.
3. **Inter-disciplinary Approach:** Inter-disciplinary approach integrates concepts, methods, and perspectives from two or more disciplines to understand a problem. For example, environmental studies combine biology, chemistry, earth science, and ethics to study climate change. Here in this approach Subjects work together, not separately and at last it draws a conclusion on wholesome including all the disciplines that are involved for the particular issue.

4. **Cross-disciplinary Approach:** In Cross-disciplinary approach, one subject helps another subject. It occurs when tools or methods from one discipline are applied to another discipline. For example, math is used in biology to count populations, or statistics are used in environmental studies. Here normally one subject is applied to support learning in another subject.
5. **Trans-disciplinary Approach:** Transdisciplinary approach integrates different subjects, like mathematics, science, and social studies, into one cohesive learning framework. Unlike interdisciplinary or multidisciplinary approaches, which integrate multiple subjects but still treat them as separate entities, Transdisciplinary approach breaks down the walls between disciplines and focus on themes or concepts that apply across various fields. This method encourages students to see connections between subjects and understand that knowledge is not isolated to specific disciplines.

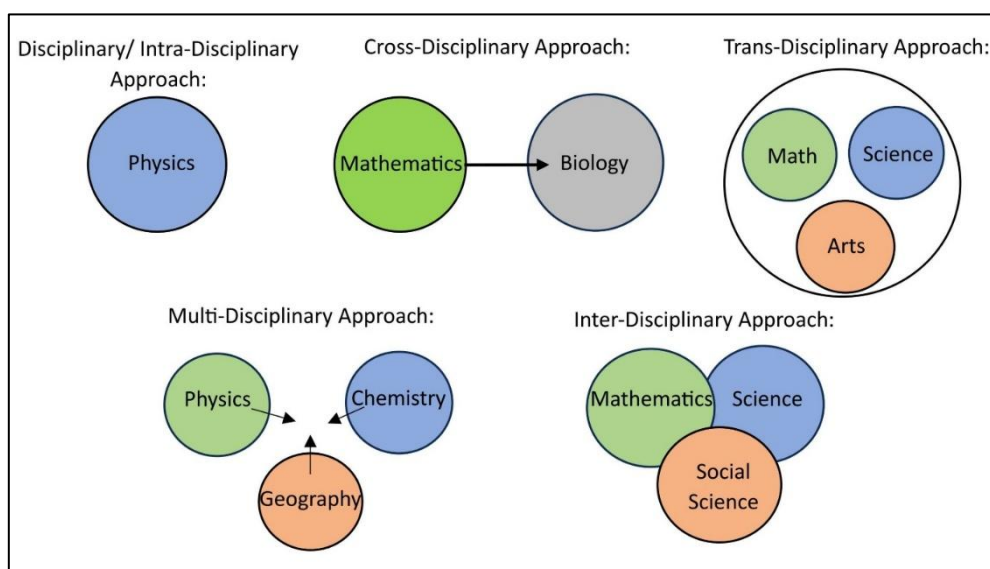


Fig-1: Different approaches of Disciplinary Fusion

ROLE OF NEP-2020 IN PROMOTING DISCIPLINARY FUSION

NEP 2020 strongly supports interdisciplinarity, Multidisciplinary and Disciplinary fusion by promoting flexible curricula, removing rigid subject boundaries, and encouraging holistic learning. By encouraging collaboration across fields and embedding real-world relevance into learning, NEP 2020 aims to develop critical thinking, creativity, and adaptability. This fusion equips future educators to design inclusive, innovative, and learner-centered teaching practices suited to 21st century classrooms.

The following Points from the NEP-2020 illustrates, how the policy actively supports and promotes disciplinary fusion:

- **Vision for Multidisciplinary Universities**

“The main thrust of this policy regarding higher education is to end the fragmentation of higher education by transforming higher education institutions into large multidisciplinary universities, colleges, and HEI clusters/Knowledge Hubs...”(Para 10.1)

NEP 2020 envisions breaking the old concepts in higher education by encouraging institutions to become multidisciplinary. This structural change is fundamental for fostering Disciplinary fusion.

- **Flexible Curricula and Creative Combinations**

“Imaginative and flexible curricular structures will enable creative combinations of disciplines for study, and would offer multiple entry and exit points...”(Para 11.5)

This promotes Disciplinary fusion by allowing students to mix subjects from different domains and learn at their own pace.

- **Multidisciplinary Education at All Levels**

“A holistic and multidisciplinary education would aim to develop all capacities of human beings-intellectual, aesthetic, social, physical, emotional, and moral in an integrated manner.” (Para 11.3)

This signals a shift from narrow specialization to a comprehensive educational experience covering various human dimensions through Disciplinary fusion.

- **Pedagogical Innovations**

“Pedagogy will have an increased emphasis on communication, discussion, debate, research, and opportunities for cross-disciplinary and interdisciplinary thinking.”(Para 11.6)

Beyond content, even the method of delivery is set to be more interdisciplinary, fostering inquiry and collaboration across subjects.

- **Model Institutions for Interdisciplinary Learning**

“Model public universities for holistic and multidisciplinary education, at par with IITs, IIMs, etc., called MERUs (Multidisciplinary Education and Research Universities) will be set up.” (Para 11.11)

MERUs will exemplify best practices in Disciplinary fusion and research, setting standards across the country.

- **‘No Hard Separation’ Between Streams**

“There will be no hard separation among ‘curricular’, ‘extracurricular’, or ‘co-curricular’, among ‘arts’, ‘humanities’, and ‘sciences’, or between ‘vocational’ or ‘academic’ streams.” (Para 4.9)

This is a revolutionary step at the school level, aiming to provide early exposure to Disciplinary fusion and breaking the rigid subject boundaries.

- **Disciplinary Flexibility in Professional Education**

“Professional education should not take place in the isolation of one's specialty... it must centrally involve critical and interdisciplinary thinking...”(Para 20.1)

Even in professional streams like law, agriculture, and health sciences, NEP mandates Disciplinary fusion, ending academic isolation.

CHALLENGES IN IMPLEMENTING DISCIPLINARY FUSION

While the vision of disciplinary fusion is promising and forward looking, its implementation faces several practical challenges. Let's discuss some common challenges that are faced by Teachers:

1. Institutional resistance and rigid curriculum structures

One of the foremost obstacles is institutional resistance and rigid curriculum structures. Many institutions continue to follow traditional, subject specific frameworks that are compartmentalized and inflexible. These structures hinder the blending of disciplines and often fail to provide space for collaborative, integrative practices. Lack of administrative support and unwillingness to revise existing course structures pose significant barriers to innovation.

2. Lack of interdisciplinary expertise among teachers

Another challenge is the lack of interdisciplinary expertise among teachers. Most teachers have been trained within single disciplinary concept, which limits their ability to design and deliver fused content. Without adequate exposure to other disciplines or interdisciplinary pedagogical training, they may struggle to facilitate learning experiences that draw from multiple knowledge systems. This gap requires targeted faculty development programs and collaborative teaching models that promote Disciplinary fusion.

3. Assessment dilemmas in fused learning environments

In fused learning environments, assessment becomes a complex task. Traditional evaluation methods usually focus on individual subjects separately and may not effectively capture the integrative learning, creativity, and critical thinking skills fostered through disciplinary fusion. Developing flexible, and multidimensional assessment strategies that align with interdisciplinary objectives remains a significant challenge for institutions.

STRATEGIES TO PREPARE FUTURE TEACHERS FOR DISCIPLINARY FUSION

In the context of evolving educational needs, reimagining and reconstructing education has become essential to prepare future ready educators. Here some of the key strategies has been given, which can transform conventional teacher training into an interdisciplinary, dynamic, and inclusive system aligned with 21st century learning demands:

1. **Integrating Interdisciplinary Courses:** Teacher education programmes should include interdisciplinary and multidisciplinary courses that help future teachers understand how different disciplines connect, overlap, and complement one another.
2. **Strengthening Conceptual Clarity:** Prospective teachers must be trained to clearly distinguish between multidisciplinary, interdisciplinarity, and disciplinary fusion to avoid superficial or mechanical integration of subjects.

3. **Collaborative Teaching Experiences:** Opportunities for team teaching, co-planning lessons, and cross-departmental collaboration should be provided so that future teachers learn to work beyond disciplinary boundaries.
4. **Curriculum Design Skills:** Future teachers should be guided in designing integrated curricula, learning outcomes, and lesson plans that reflect disciplinary fusion while maintaining academic rigor.
5. **Assessment Literacy for Integrated Learning:** Teacher preparation should include training on alternative and authentic assessment methods to evaluate interdisciplinary learning, critical thinking, and collaboration.

VISION FOR THE FUTURE: TEACHER TRAINED WITH DISCIPLINARY FUSION

In the disciplinary fusion era, the teacher is envisioned as a versatile, reflective, and learner-centered professional. Beyond subject expertise, they integrate pedagogical, psychological, and philosophical insights to address diverse classroom needs. Such teachers foster critical thinking, creativity, and empathy, while designing Disciplinary fusion learning experiences. They are committed to lifelong learning, continuously upgrading their skills through research, collaboration, and technology. Rooted in inclusive values, they act as facilitators who connect knowledge with real life contexts. This future ready teacher is not just an educator, but a guide, innovator, and change maker who equipped to nurture learners in a complex, interconnected educational landscape.

CONCLUSION

Multidisciplinarity and disciplinary fusion represent a critical shift in reimagining education for the complexities of the 21st century. As knowledge systems become increasingly interconnected, moving beyond rigid disciplinary silos is no longer optional but essential. This chapter has highlighted how disciplinary fusion, supported strongly by NEP 2020, promotes holistic learning, curricular flexibility, and pedagogical innovation across educational levels. While significant challenges such as institutional rigidity, limited teacher preparedness, and assessment constraints persist, strategic reforms in teacher education and curriculum design can address these barriers. Ultimately, disciplinary fusion holds transformative potential to develop reflective, adaptable, and future-ready educators and learners capable of responding meaningfully to real-world challenges in an evolving global knowledge society.

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