REDEFINING BOUNDARIES IN HIGHER EDUCATION: EXAMINING THE BENEFITS AND PROBLEMS OF INTERDISCIPLINARY AND MULTIDISCIPLINARY EDUCATION

DR. AGNES HUMTSOE

Assistant Professor,
Department of Education,
Mizoram University, Aizawl

DR. RITU SARKAR

Assistant Professor,
Department of Education,
Assam Don Bosco University, Guwahati

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I. Introduction:

With an intense emphasis on interdisciplinary and transdisciplinary learning, the National Education Policy (NEP) 2020 represents a revolutionary change in the current landscape of the Indian education system. Higher education must change to educate students for a world which is now characterized by rapid technology breakthroughs, shifting societal needs, and complex global concerns like pandemics, climate change, and the advent of artificial intelligence. This necessity is acknowledged by the NEP 2020, which promotes an educational framework that negates the compartmentalization of education and encourages the integration of knowledge across several fields. India has long supported a multidisciplinary, holistic approach to education. The rich curricula of ancient schools of the Indian system such as Takshashila and Nalanda were well known for incorporating not just the study of sciences but also the arts, humanities, and vocational skills. The tenets of interdisciplinary and multidisciplinary education that are being promoted today are consistent with this old Indian understanding of education, which acknowledges the interconnection of all forms of knowledge. Through the creation of an educational environment that fosters creativity, encourages students to explore a variety of disciplines, and helps them develop critical thinking abilities that go beyond the scope of specific subjects, NEP 2020 aims to revive this inclusive tradition.

To handle complicated problems within a particular topic, an interdisciplinary approach blends ideas, methods, and analytical frameworks from two or more disciplines. A new field of study focused on complex problems is created by combining related disciplines. In bioinformatics, for example, computer science and molecular biology are combined, while in

educational psychology, psychology and education are combined to employ psychological theories and techniques to study and address educational problems. Several practical and functional fields of research have emerged as a result of this methodology. Interdisciplinary methods, as opposed to approaches centred on common themes, emphasize interdisciplinary collaboration to tackle shared challenges and create a synergistic ecology for creativity.

The multidisciplinary approach preserves the unique boundaries of each discipline while using their concepts and methodologies to provide a broader picture of the issue at hand, in contrast to the interdisciplinary approach, which combines disciplines to establish new fields of study. This method keeps disciplines apart rather than integrating them into a new topic, allowing each to contribute its unique knowledge and ideas. This makes it possible to examine the issue from a variety of perspectives without having to combine social, scientific, economic, or cultural ones into a single framework, resulting in a fuller analysis. To tackle a public health concern such as obesity, for instance, viewpoints from the fields of medicine, nutrition, sociology, and economics may be included, each discipline offers unique but complementary insights. A multidisciplinary approach's strength is its capacity to assist people in approaching challenges from multiple angles, improving understanding without necessarily attempting to combine or unite the numerous disciplines involved. Therefore, a multidisciplinary approach entails looking at a problem or scenario from the viewpoints of several disciplines to arrive at a more thorough understanding of the circumstances. By incorporating information from several disciplines, it promotes a comprehensive examination but falls short of creating a brand-new, cohesive body of knowledge. (Krishnaveni & Purusotham, 2023).

The NEP 2020 envisions an educational system that gives students the skills they need to manage a globalized society. It promotes interdisciplinary and multidisciplinary education, seeking to develop adaptable individuals capable of applying knowledge across various fields to tackle complex issues. Addressing real-world problems now requires the integration of disciplines, whether it is at the interface of environmental science and engineering or data science and the humanities.

With its focus on experiential learning, flexible curricula, and critical thinking, the NEP 2020 lays the groundwork for an education system that is free from inflexible routes and promotes interdisciplinary investigation and synthesis. This approach aligns with modern educational theories like constructivism, systems theory, and Bloom's Taxonomy, which emphasize integrated, experiential, and reflective learning. In this approach, the policy not only reshapes the landscape of higher education in India but also equips students with the skills

necessary to succeed in a complex and dynamic environment where interdisciplinary thinking, creativity, and adaptability are essential. Also, this shift towards interdisciplinary and multidisciplinary education is supported by several educational theories such as constructivism which encourages students to actively create knowledge through interactions and experiences, improving comprehension and critical thinking. Secondly, systems theory encourages students to analyze connections and interactions between various components (disciplines), fostering a more analytical mindset. Lastly, Bloom's taxonomy emphasizes cognitive frameworks such as higher-order thinking abilities like assessment, synthesis, and analysis. These abilities are essential for handling the intricate and multidimensional issues that multidisciplinary education attempts to address. Further, by fostering a broader, more holistic educational model, NEP 2020 aims to build a generation of learners who are not only specialists but also generalists individuals equipped with the knowledge and skills to address the grand challenges of the 21st century. Interdisciplinary and multidisciplinary education represents a shift towards a more integrated and holistic approach to learning. By embracing this model, higher education institutions can better prepare students for the challenges of the modern world, fostering versatile thinkers who can address complex global issues with creativity and adaptability.

II. Basic Questions

1. What are the key benefits of interdisciplinary and multidisciplinary education in higher education?

2. What are the problems obstructing the effective implementation of interdisciplinary and multidisciplinary education in higher learning?

3. What are the suggestions to address the problems of implementing interdisciplinary and multidisciplinary education in higher learning and preparing the students for the future?

III. Key Benefits of Interdisciplinary and Multidisciplinary Education in Higher Education

- Enhanced innovation and creativity: Interdisciplinary education helps learners to be creative since it introduces them to a variety of viewpoints. Students are encouraged to draw links between seemingly unrelated topics when they engage with a variety of subjects, from the arts to the sciences. Such an exchange of ideas can come up with innovative solutions that wouldn't occur in a specialized field. For instance, engaging two distinct fields of knowledge, such as engineering and biology, can lead to the

creation of new branches of knowledge, such as biotechnology, as well as technology and art can foster the emergence of creative industries like digital media or animation.

- Reinforced critical and higher-order thinking: Learning across multiple disciplines fosters critical and higher-order thinking abilities like assessment, synthesis, and analysis enabling students to approach problems from diverse perspectives, evaluate information critically, and combine ideas for comprehensive answers. A physics and philosophy student for example would understand how to do empirical research and excel at abstract thinking making him or her a critical thinker in both fields.

- Enhanced problem-solving capabilities: Students in a multidisciplinary setting face challenging issues that call for the integration of information from many disciplines. Students who are exposed to many approaches and frameworks from fields like mathematics, the humanities, and the social sciences are better equipped to solve problems in a variety of ways. They are more equipped to handle problems in the actual world because they have access to a greater variety of tactics and answers. For example, a student of social science who also studies computer science might use data analytic methods to address societal problems like inequality or poverty.

- Improved teamwork and communication skills: Interdisciplinary education fosters cooperation between professionals from different fields and students, which improves teamwork and communication skills. Pupils are taught how to explain difficult concepts in a way that is accessible to individuals from a variety of backgrounds. This is especially crucial in today's employment, as team-based initiatives frequently need input from people with a variety of specialities. Collaborating on interdisciplinary projects fosters in students the soft skills of cooperation, negotiation, and debate all of which are critical in any line of work.

- In-depth learning and mastery across fields: Incorporating different subjects into education allows students to gain a deeper understanding of the subject matter. By making links across different fields, students can promote mastery. For instance, studying literature and history together can reveal the historical and cultural backgrounds of literary works. Using an interdisciplinary approach leads to a more thorough educational experience.

- Acquisition of 21st-century skills: Multidisciplinary education is essential for preparing learners for the 21st century, focusing on critical thinking, creativity, flexibility, and digital literacy. With the world being more interconnected and complex, students need

to be able to move across different domains with ease. This comprehensive approach, encompassing professional and vocational courses in humanities, arts, and STEM sectors, equips students with a well-rounded skill set, enabling them to adapt to rapidly changing society and work markets.

- Enhanced social and moral awareness: The growth of social and moral awareness is heavily stressed in a comprehensive, multidisciplinary education. Courses like environmental science, ethics, and global citizenship education push students to think about how their actions affect the environment and society. Civic duty, empathy, sustainability, and other values are fostered by this education, which also instils a sense of responsibility and social participation. Students can work on sustainability projects or community service projects, for example, to apply what they've learned in practical ways that benefit society as a whole.

- Opportunities for lifelong learning: Multidisciplinary education promotes lifelong learning through curriculum design flexibility, offering multiple entry and exit points for students to customize their education to meet their career and personal objectives. Credit-based systems encourage students to continue education at different times of their lives, allowing them to accumulate knowledge over time. This adaptability is useful in today's rapidly evolving technology and economy, where upskilling and continual learning are essential.

- Research and innovation: A thriving research culture is also fostered by interdisciplinary and multidisciplinary education. When academics from many disciplines work with students, they produce new concepts and creative research methods. Addressing modern global issues like pandemics, socioeconomic inequality, and climate change calls for this in particular. Knowledge from several disciplines is frequently needed for research in cutting-edge fields including biotechnology, social innovation, and artificial intelligence. Multidisciplinary education stimulates innovative discoveries and breakthroughs in academia, business, and government, valuing experimentation and collaboration.

IV. **Problems Associated with the Implementation of Interdisciplinary and Multidisciplinary Education in Higher Learning**

- Institutional rigidity: It might be challenging to adopt interdisciplinary techniques in traditional higher education institutions because of their frequent disciplinary boundary

structures. The flexibility required to enable students to effectively connect with numerous disciplines may be limited by the way departments typically operate in silos and the way curricula are created with particular fields in mind. This intransigence can hinder the development of truly multidisciplinary programs and impede reforms, making it impossible to offer students a diverse range of educational opportunities.

- Faculty training and resistance: Faculty members may resist interdisciplinary education due to their specialized training in specific areas, lack of expertise to teach several subjects, and insufficient professional development courses, training faculty in integrative teaching techniques. This could result in a lack of funding for multidisciplinary programs and a shortage of trained teachers capable of delivering successful instruction in multiple subjects.

- Resource limitation: Multidisciplinary program implementation requires significant institutional and financial resources, including creating new courses, hiring interdisciplinary educators and making infrastructural investments to facilitate teamwork. Insufficient funds or resource distribution can hinder these endeavours, especially for smaller or less well-funded institutions, making it difficult to successfully execute multidisciplinary education.

- Challenges in curricular integration: It is a difficult effort to incorporate various disciplines into a relevant and cogent curriculum. Developing a curriculum that harmoniously integrates the various techniques, terminologies, and epistemologies of several fields can be challenging. It might be difficult to strike a balance between multidisciplinary breadth and depth of expertise. A broad approach can lead to confusion for students, while weak interdisciplinary approaches may result in superficial learning without a deep understanding of any given area of study.

- Assessment difficulties: It might be difficult to evaluate students' performance in multidisciplinary programs. Interdisciplinary learning objectives like creativity, critical thinking, and problem-solving can be challenging to quantify using traditional tests since they are frequently created for certain academic disciplines. It may be difficult for educators to fairly assess students' progress in multidisciplinary programs without the right assessment tools, which can affect program growth as well as student achievement.

- Lack of institutional support and incentives: A lot of universities lack the funding sources or administrative support necessary to encourage interdisciplinary research.

Since funding and faculty promotions are often tied to traditional academic research and teaching, participation in interdisciplinary ventures may be discouraged. Scholars may give precedence to conventional research over interdisciplinary instruction, which could lead to a deficiency of involvement and interaction with innovative multidisciplinary initiatives.

- Problems with student adaptation: If a student is used to traditional, discipline-focused instruction, they may find it difficult to adjust to the demands of interdisciplinary education. Some students may struggle with the transition between different subjects of study and assimilate different perspectives. Without adequate preparation or support, these students may experience confusion, disengagement, and decreased academic performance due to the complexity of multidisciplinary learning.

- Inconsistent standards across fields: Academic expectations, grading schemes, and standards vary widely throughout fields. Students may experience uncertainty and trouble satisfying varied academic requirements when they come across standards that are inconsistent when they work on multidisciplinary projects. It can be challenging to ensure equality and coherence in multidisciplinary programs when there is inconsistency, as it can lead to unfair or uneven academic experiences for students.

- Collaboration challenges: Faculty members from various domains must coordinate, communicate, and cooperate extensively in order to carry out collaborative teaching and research across disciplines. It might be challenging for faculty to coordinate their research goals, timetables, or teaching philosophies, which can make multidisciplinary collaboration difficult. Difficulties in collaborating can result in students' learning experiences being fragmented, multidisciplinary programs being less effective, and faculty members becoming frustrated.

- Lack of knowledge or interest: It's possible that multidisciplinary education is unknown to or uninteresting to both teachers and students. The advantages of studying multiple disciplines may not always be apparent to students, particularly if those subjects are focused on professional or vocational outcomes. Additionally, educators might be reluctant to venture outside of their areas of expertise. Disinterest in multidisciplinary programs may contribute to low enrolment, underutilization of resources, and ultimately the failure of these programs

- Time and workload management: Since interdisciplinary education frequently necessitates that instructors and students balance several subject areas, it can result in

heavier workloads and difficulties managing time. This may result in more coursework for students, while faculty members may need to juggle their regular research and service obligations with instructing students from other fields. The quality of teaching and research output may suffer as a result of educators' and students' burnout brought on by this increasing burden.

- Challenges with accreditation and regulation: Traditional disciplines provide the foundation for the relevant standards that regulatory and accreditation agencies frequently enforce. Institutions trying to get their multidisciplinary programs authorized or recognized by authorities may find it difficult to apply these regulations to their programs. The growth and acceptance of multidisciplinary programs may be constrained by challenges in achieving accreditation requirements, which may have an impact on the programs' legitimacy and the credentials they provide to students.

V. Suggestions for Addressing the Problems of Implementing Interdisciplinary and Multidisciplinary Education in Higher Learning and Preparing the Students for the Future

- Institutional reform and flexibility: Institutions should reform to allow for more adaptable program designs and to dismantle rigid discipline-based frameworks. This could involve setting up interdisciplinary committees or departments to supervise the creation of cross-disciplinary courses, encourage cooperation, and further the integration of many fields. Universities can set up central organizations whose job it is to facilitate interdisciplinary programs and make sure departments work together. They may design cooperative degree programs, shared courses, or thematic clusters for students to register for courses from different disciplines.

- Faculty training and development: Providing faculty members with chances for professional development so they can advance their understanding of and proficiency with interdisciplinary teaching techniques. It should be encouraged for academics to work together across disciplines and seek new ways to implement content from various fields into their classroom. Universities ought to encourage faculty members to work across disciplines by offering them grants for collaborative research, seminars, and workshops. Multidisciplinary teaching should be considered while determining tenure and promotion, and institutional funding or awards should be used to encourage cooperation.

- Support and allocation of resources: Assisting interdisciplinary programs by allocating certain financial, administrative, and infrastructure resources. This involves setting up specific facilities or labs for multidisciplinary teaching and research. Universities should consider establishing Integrated Research Institute or innovation hubs, wherein staff members and students from many disciplines work together on cooperative projects. Sufficient funds should be allocated for the creation of curricula, technology, and support personnel who assist in multidisciplinary projects.

- Design and integration of the curriculum: By making sure that multidisciplinary curricula are carefully created to offer both depth and breadth. In order to ensure that students acquire significant information from several subjects without sacrificing the rigour of their selected majors, it has to be very well-coordinated. Educational establishments should create multidisciplinary curricula that integrate concepts and approaches from several fields. Representatives from several departments can sit on curriculum committees to ensure that the courses offered meet general and specialized learning needs and are well-balanced.

- Creative assessment techniques: New approaches for evaluating multidisciplinary education which are different from conventional tests and assignments should be initiated. Tests should be made to determine the potential of the learners to think critically; to be innovative; to solve problems and to synthesize knowledge from various fields of study. Employ group projects, portfolios, and project-based learning to make students apply ideas from several academic fields. Assessment should be based on students' capacity to synthesize and apply knowledge.

- Institutional support and incentives: Faculties must be provided with incentives to promote interdisciplinary teaching and research. Institutions must encourage and reward interdisciplinary work with financing, opportunities for advancement, and recognition. Research funds, faculty evaluations, and promotion procedures must be created with the recognition of multidisciplinary contributions in mind. Institutions have the right to create grants or prizes for the academic staff members who collaborate on Interdisciplinary projects or teaching activities.

- Student preparation and adaptation support: Fundamental courses can be integrated which emphasize creativity, critical thinking, and adaptability to prepare students for interdisciplinary education. Provide students with academic guidance and mentoring to assist them in navigating diverse pathways. Provide introductory courses in interdisciplinary subjects to educate students in the integration of knowledge from many

fields. Deliver academic consultancies with an emphasis on supporting students in managing their workloads, balancing interdisciplinary learning with specialization, and customizing their educational routes.

- Standardization of multidisciplinary programs: To guarantee uniformity in academic quality and expectations across programs, establish precise norms and standards for multidisciplinary education. Institutions should come up with general guidelines for assessing multidisciplinary work using standards that are common to all fields. Institutions and accrediting agencies should collaborate to develop uniform standards for multidisciplinary programs that take academic quality and learning objectives into account. Such requirements should be flexible enough to accommodate different disciplines of study while at the same ensuring that learners are given holistic education.

- Faculty collaboration and communication: By providing chances for interdisciplinary research and teaching teams, institutions can encourage a collaborative culture among faculty members from many disciplines. The requisite of such cooperation may be achieved through conducting joint research activities, workshops and frequent meetings. Establish faculty fellowships or multidisciplinary task teams to collaborate on research projects, curricula, and teaching resources with educators from several disciplines. Organize frequent multidisciplinary meetings where academic staff members would be able to discuss ideas, work on projects together, and discuss issues related to their best practices.

- Increase interest and knowledge of multidisciplinary education: Institutions should raise faculty and student's understanding of the benefits of multidisciplinary education, stress the relevance for the job market of the twenty-first century and demonstrate how it can be applied to solve complex problems of the world. This should involve organizing seminars, open houses, or even awareness campaigns that highlight successful interdisciplinary projects or alumni who have benefited from this type of education. Stress on the practical applications of multidisciplinary education in addressing issues such as social justice, technology, healthcare, and climate change among other areas.

- Workload management and flexible scheduling: Institutes should offer options for flexible scheduling that help teachers and students handle the growing responsibilities of multidisciplinary education. Make sure there is enough time for pupils to participate in several subjects without feeling overburdened by their assignments. Allow students to concentrate on interdisciplinary projects without being distracted by the rigours of their main study by offering modular courses or shorter-term intense workshops. To reduce the

strain, encourage teachers to collaborate on team-taught courses or modify their teaching load.

- Reforming policy and accreditation: Consult with legislators and accreditation authorities to develop more flexible standards that take into account multidisciplinary education. Institutions should support legislative changes that acknowledge the benefits of multidisciplinary education and guarantee that these courses are appropriately authorized. Universities and accrediting agencies should communicate to develop adaptable accreditation procedures that consider multidisciplinary results. The promotion of policy reforms that permit innovative multidisciplinary education by governments and education ministries is recommended, along with the provision of finance and infrastructure to foster its expansion.

- Creating real-world connections: Encourage interdisciplinary programs to incorporate community service, internships, and collaborations with businesses, governmental organizations, and non-profits to emphasize real-world applications. This way, the students can receive core academic knowledge together with practical real-life problem-solving experience. Engage with neighbouring firms, governmental institutions, and community welfare organisations to provide students with opportunities for projects that require an understanding of different disciplines.

Implementing these suggestions at higher education institutions may help overcome the challenges associated with interdisciplinary and multidisciplinary education and prepare students for the complexity of the 21st-century world. Fostering a flexible, creative, and supportive environment is essential for promoting teamwork, practical problem-solving, and lifelong learning.

VI. Conclusion

To conclude, higher education is shifting towards interdisciplinary and multidisciplinary instruction in today's context to address complex global issues like environmental catastrophes and technological advancements. Despite barriers like faculty reluctance, institutional conservatism, and resource constraints, institutions can create a conducive environment for multidisciplinary collaboration by implementing targeted reforms, investing in faculty development, and redesigning courses. The National Education Policy (NEP) 2020 provides a strong framework for this change, promoting an integrative and flexible learning approach that equips students for the twenty-first century. This strategy aims to produce graduates who are not only experts in their subjects but also prepared to tackle real-world problems. To remain

relevant in a dynamic world, higher education institutions must adopt this multidisciplinary approach, raising a generation of students who can successfully navigate complex issues.

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