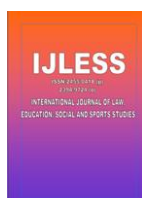## Interdisciplinary, Trans-disciplinary and Multi-disciplinary Approaches in Educational Research as per NEP 2020

Dr Sathyanarayana G.

Principal, Sree Dattha Brindavan Institute of Teacher Education (ITEP), Narayanpet, Palamuru University, Telangana State

E-Mail Id: Satyam.reddy2020@gmail.com

ABSTRACT

Interdisciplinary, transdisciplinary and multidisciplinary, approaches refer to different ways of organizing and integrating knowledge and expertise across various fields. This article is related to the importance of an interdisciplinary, multidisciplinary and transdisciplinary strategy in teaching process. In the globalised world, complex challenges require innovative approaches that transcend disciplinary boundaries. Multidisciplinary approach, which brings together expertise from different academic disciplines, has emerged as a powerful tool to address these challenges. This paper explores the historical context, characteristics, benefits, examples, challenges, and barriers of multidisciplinary approach, and highlights its value in addressing complex global challenges.

The paper begins with a definition of multidisciplinary approach and explains how globalisation has impacted complex global challenges. The importance of addressing these challenges is emphasized in the context of the age of globalisation. The evolution of disciplinary boundaries and the emergence of multidisciplinary approach are discussed, along with early examples of its significance.

The paper also highlights the shifting focus towards interdisciplinary and transdisciplinary research, showing the evolution of multidisciplinary approaches. The key characteristics of multidisciplinary research are explained, and the benefits of such research are discussed, including the comprehensive understanding of complex problems, creative problem-solving and innovation, and practical applications with real-world impact.

The paper provides examples of multidisciplinary research in various fields such as climate change and environmental science, health care, urban planning, artificial intelligence, and conservation biology. Specific examples and impacts of multidisciplinary research in these fields are highlighted, demonstrating its value and potential. Challenges and barriers associated with multidisciplinary research, such as communication barriers, conflicts of

interest, and funding limitations, are discussed. and explores the ways to overcome these challenges and promote effective multidisciplinary research. Finally, the paper summarizes the value of multidisciplinary research in the age of globalisation and emphasizes the importance of promoting and supporting multidisciplinary research.

Keywords: Disciplinary, Interdisciplinary, Trans-disciplinary and multi-disciplinary approaches.

Introduction.

For holistic perception and comprehension of the complexity of the world, science has already had enough purely disciplinary approach, and therefore at the disposal of modern scholars there was knowledge, different in its nature: philosophical, scientific (disciplinary and interdisciplinary). It is worth noting that the complication of disciplinary images of objects and subjects of study, which is a development of cognition natural consequence, has created conditions for interdisciplinary interactions, which are now carried out within the framework of interdisciplinary, multidisciplinary and transdisciplinary approaches.

The terms «multidisciplinary research», «cross-disciplinary research», «interdisciplinary research» and «transdisciplinary research» are very popular in the field of sciences methodology. However, in most cases, they are used as synonyms.

Multidisciplinary research refers to an approach where researchers from diverse disciplines come together to collaboratively investigate complex problems or challenges. It involves integrating knowledge and expertise from different fields, such as natural sciences, social sciences, humanities, and engineering, to gain a more comprehensive understanding of multifaceted issues. Multidisciplinary research recognizes that many real-world problems are interconnected and require an interdisciplinary approach to generate innovative and holistic solutions.

Objectives of the study

It enables the students to understand the power of new ideas which develops a pragmatic attitude by allowing them to decide what subjects they will opt for their possible benefits.

It develops the collaboration among students, teamwork and communication skills. work together to solve multidisciplinary problems, and collaborate effectively to achieve shared goals.

It enables to form a broad and inclusive understanding of various perspectives and can often lead to unique intellectual discoveries.

It develops the connecting knowledge and skills from several academic disciplines for effective teaching and learning.

It enables to Building bridges and Creating connections between disciplines, partnerships, improving decision making in Promoting global problem solutions

Definitions of the terms used in this study

Disciplinary:
Definition: The disciplinary approach focuses on a specific academic discipline or field of study.

Key Features: In this approach, experts move deeply into a single discipline, following its established methods, theories, and principles.

Example: A physicist specializing in quantum mechanics who primarily works within the boundaries of physics.

Interdisciplinary:

Definition: Interdisciplinary approaches involve integrating insights and methods from two or more disciplines to address complex problems or questions.

Key Features: Experts from different disciplines collaborate, bringing their unique perspectives to create a more comprehensive understanding.

Example: A research project that combines insights from biology, chemistry, and engineering to develop new medical technologies.

"**Interdisciplinary**" refers to the integration of the contributions of several disciplines to a problem or issue by bringing interdependent parts of knowledge into harmonious relationships through strategies such as relating part and whole or the particular and the general. Therefore interdisciplinary approaches address the holistic complex of interrelationships. For example, Environmental Psychology can be considered an interdisciplinary field because it draws knowledge from several other fields like architecture, psychology, environmental science, etc. with the aim to encourage combined thinking and sharing of methods towards solutions that cross traditional boundaries between them.

In interdisciplinary thinking and working, you take an extra step: you try to integrate perspectives or insights from different perspectives through interaction, in order to better understand a complex phenomenon. Integration can take place, for instance, at the level of methods, tools, concepts, theories, or insights. In this, you can do more together than alone ('it goes beyond a simple sum of its parts'). So it helps if students in higher education represent different perspectives. An important point of attention here is for lecturers to develop the course with lecturers from other disciplines and specifically to think about training students in integration techniques.

Transdisciplinary:
Definition: Transdisciplinary approaches go beyond interdisciplinary collaboration by blending and transcending disciplinary boundaries, aiming for a holistic and integrated understanding.

Key Features: Experts work together to create a shared framework that incorporates insights from multiple disciplines. The goal is to develop a unified approach to address complex issues.

Example: A transdisciplinary team addressing a public health crisis may include medical professionals, sociologists, policymakers, and community representatives, all contributing to a comprehensive solution.

"**Transdisciplinary**" is concerned with the unity of intellectual frameworks beyond the disciplinary perspectives. My current understanding of transdisciplinarity is that of conceptual frameworks that are adopted as a wider perspective within research and practice. Even though they may have had their origins in one discipline they have grown to be used across multiple others.

Transdisciplinarity involves not only students or academics, but also other (societal) partners in researching a complex question. Think, for example, of co-creation between students and municipalities, companies, or other societal organisations. It is therefore about bringing together knowledge from science and practice, for example to arrive at a certain integrative approach or solution that also has an impact on society.

 Multidisciplinary:

Definition: Multidisciplinary approaches involve individuals from various disciplines working independently on different aspects of a problem or project.

Key Features: Different disciplines contribute separate pieces of expertise without necessarily integrating them deeply.

Example: A project addressing environmental sustainability might involve biologists studying ecosystems, economists analyzing financial implications, and engineers designing eco-friendly technologies.

"**Multidisciplinary**", involves several disciplines, each of which provides a different perspective on a problem or issue. For example, a team of architects working with engineers and interior designers to create a resolved office layout is engaging in multidisciplinary work. As part of this process, different ideas are combined towards a solution to a common problem. Multidisciplinary collaboration is therefore one of the most usual interfaces between disciplinary teams in architecture.

Multidisciplinarity applies to studying a subject from multiple different disciplines at the same time. Perspectives from the different disciplines create a broader understanding of a subject. Consider, for instance, how you could interpret the behaviour of people from the viewpoint of psychology, biology, and economics. You cross the boundaries of the disciplines, but the disciplines keep their own 'voice'. The goal is not to come to an integration of insights. In higher education, for example, you see guest lectures from different disciplines coming to share their knowledge on a particular topic, or groups of students doing literature research on different perspectives on a particular question.

Why is transdisciplinary learning important?

Michael Gruneberg explains in his book "Theoretical Aspects of Memory" that our memory is context-based, meaning that we quickly lose knowledge if it is not connected to anything.

Transdisciplinary learning is important because it helps create these connections by getting the same idea across various subjects and explaining it in a practical way, which is easy to understand. It is so important nowadays that students learn to solve problems creatively. They need to know that there is often more than just one way to solve a problem.

Moreover, various studies show that varying learning methods and materials improves retention and recall of information by students.

The learning pyramid, developed by the U.S. National Training Laboratory, suggests that most students only remember about 10% of what they read from textbooks, but retain nearly 90% of what they learn through teaching others.

Transdisciplinary learning helps our teachers to apply various and the most effective teaching methods, as listed in the pyramid and thus help students remember their lessons.

How does transdisciplinary learning look in a classroom?

Toimplement transdisciplinary learning successfully into the curriculum of the school. The curriculum of the Bilingual School is built around 6 general themes for the year and all the subjects are linked around each theme. By keeping the general themes the same for each grade, teachers can provide consistency and track progression over the years. All the lessons are very interactive, creative and promote teamwork.

Let us use the topic of paper waste as an example. At the beginning of the series of lessons dedicated to paper waste, Students then were asked to count how much paper they used during one week, including notebook pagesand drawing paper. The math teacher used their results to create a chart of paper usage and explain percentages. At the crafts lesson, students learned how paper was made in the past and were able to make their own paper. Students participated in poetry slams during English and other language classes, where they wrote poems to inspire the world to stop wasting paper.
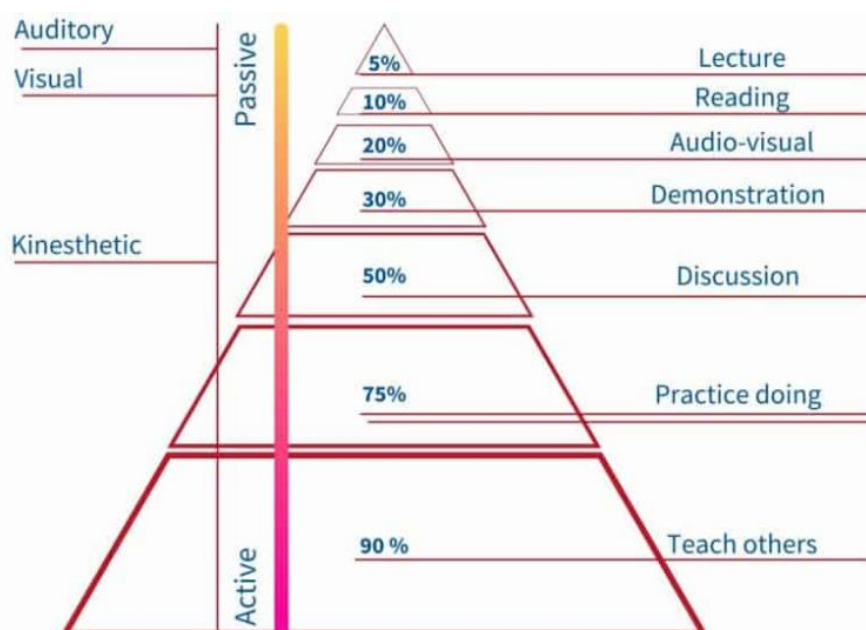
This topic inspired some of students to encourage their parents to switch to recycled paper and take a keen interest in environmental problems.

Advantages of transdisciplinary approach in education

Transdisciplinary learning offers many advantages compared to the traditional approach in education:

• **Students develop divergent thinking and creativity**

The modern education system fosters convergent thinking, which means applying a fixed set of rules to arrive to a single solution to the problem. On the other hand, divergent thinking is a more free-flowing process, leading to several creative solutions to a single problem. Both divergent and convergent thinking are important, but encouraging only the latter can lead to loss of creativity and critical thinking, which are the essential skills in the 21st century.

• **Students see more meaning in what they learn**

Many students learn because they are told so by their school and their parents. The transdisciplinary approach connects one topic to many school subjects, allowing students to understand the topic much deeper, see the connections, and realize why they are learning about it. This system also makes it easier for them to remember what they learned.

• **Students are more motivated**

Connecting a topic to various school subjects requires a certain level of creativity from teachers. It makes the lessons more engaging and, as our experience shows, creates curiosity and motivation in students to discover one topic from different and sometimes even unexpected angles.

• **Students learn a language of a problem**

Transdisciplinary learning encourages students to look at one problem under various angles. They learn the versatile nature of a real-life situation, develop critical thinking and understand, that there is usually more than one way and more than one right solution to a single problem. This kind of thinking is very appreciated and sought after by many headhunters these days.

• **Students build up confidence**

The transdisciplinary approach encourages students to speak up their opinion in class, even though it might be wrong. It helps students build up confidence and talk more easily, without being afraid of punishment with bad grades or peer judgment.

Conclusion

Multidisciplinary research is an approach that brings together researchers from diverse disciplines to collaboratively investigate complex problems or challenges. This paper discusses the importance of multidisciplinary research in addressing complex global challenges in the age of globalisation. It highlights that many real-world problems are interconnected and require an interdisciplinary approach to generate innovative and holistic solutions. The paper traces the historical context of multidisciplinary research, noting that there has been a shift towards collaboration and integration of knowledge from diverse fields, leading to the emergence of multidisciplinary research as a paradigm shift in the way research is conducted. Italso discusses the shift towards interdisciplinary and transdisciplinary research, involving collaboration between researchers from different disciplines and engagement with stakeholders outside academia. The characteristics and benefits of multidisciplinary research are outlined, including the collaboration between researchers from different disciplines, effective communication and collaboration, and the synthesis of knowledge from diverse fields. The benefits of multidisciplinary research are highlighted, including the generation of comprehensive and innovative solutions, expansion of knowledge boundaries, and addressing real-world problems with greater depth and complexity.

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