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Multidisciplinary and Holistic Education in Science Teaching – An Innovative Approach

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Abstract

In a rapidly evolving global landscape, the importance of education cannot be over lasted. The G20 is a forum regarding international innovation that talks about several key areas as such 21st century skills, holistic education, stem education, blended learning, educational technology. The first part deals with what exactly is multidisciplinary education secondly, it deals with the major objectives of multidisciplinary and holistic education in science teaching as well. The third part deals with the strategies of teaching that can be adopted through holistic and multidisciplinary education specifically in science teaching. Henceforth, entire aspects covered are on the basis of NEP2020 documentation with reference to G20.

INTRODUCTION

The G20, one of the major economies that has emphasized the importance of holistic and multidisciplinary education. One key area is their recognition that education should go beyond traditional subjects and focus on developing skills and competencies that prepare individuals for a rapidly changing world. This includes fostering critical thinking, problem-solving, creativity, digital literacy, and global awareness. Additionally, the G20 has stressed the need for inclusive education that addresses the diverse needs of learners, with disabilities and marginalized populations. They have also emphasized the role of technology in expanding access to education and improving its quality. Education is a vital component that comprises of levels of education in the form of the pyramidal structure that is primary, secondary and higher secondary. The concept of imparting holistic education is emerging from time to time specially at the secondary level of education. we usually talk about providing holistic and multidisciplinary education at secondary level this is so

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as the students at this level of education is at adolescence phase who requires better nourishment and nurturing which is only possible through providing them holistic based education. In today's 21st century each youth is motivated towards quality and quantity-based value education and democratic self-learning atmosphere as well. Henceforth, science is such a disciplinary subject that is itself multidisciplinary in the nature, the roots of science concept carry several disciplinary meaning in other subject thereby this understanding of multidisciplinary concept in children leads to holistic outlook in the students. The National education policy (NEP2020) is the base of how holistic and multidisciplinary educational approach in education system can show an everlasting effect. Hence, using this approach we can make education system reliable, authentic, technologically driven, interactive, everlasting, democratic and scientific in many ways. Apart from this the NEP2020 also talks about several key areas such as stem education, concept of mentoring, 21st century skills, blended learning, approach-based learning, model-based learning that are based on imparting the holistic development in the learners.

The NCF2005 also plays an important pivotal role in holistic and multidisciplinary education in science teaching. It clearly focuses on key areas on what shall be the role of teacher and students. The role of teacher as a guide, communicator, collaborator, constructor, facilitator, learner, researcher, innovator simplifies education as a tripolar dynamic process. Similarly, there would be no barrier between teacher and student a friendly interactive technology driven environment for secondary level learners are suited here. Since, the students at this phase undergo an adolescence phase as its learning period where when the child given exposure to overall development then they develop in all the aspects say physically, socially, literary, intellectually, aesthetically, culturally, emotionally, intellectually thereby leading to wholesome of development of holistic values in the personality of individual.

Henceforth, NEP2020 and NCF 2005 serves as a base of educational innovation in G20's education regarding holistic and multidisciplinary education that revolutionary change in preparing individuals for the challenges of the 21st century by focusing on a broad set of skills, promoting inclusivity, and leveraging technology.

Multidisciplinary Education

Multidisciplinary education refers to an educational approach that integrates knowledge, methods, and perspectives from multiple academic disciplines or fields of study. It goes beyond traditional subject boundaries, encouraging students to explore and understand complex issues from various angles. In multidisciplinary education, the goal is to foster a holistic

understanding of topics by drawing on the insights and approaches of different disciplines, thereby promoting critical thinking, problem-solving, and the ability to address real-world challenges that often require interdisciplinary solutions. This approach aims to prepare students for a diverse range of careers and equips them with versatile skills to adapt to evolving professional environments.

However, Multidisciplinary education innovation in science involves integrating various scientific disciplines to provide a holistic and collaborative learning experience.

The objectives of Holistic and multidisciplinary education in science subjects are as follows

1. **Integration of Knowledge:** It seeks to break down traditional silos between scientific disciplines (e.g., biology, chemistry, physics) and encourage students to see the interconnectedness of various scientific concepts. This promotes a deeper understanding of how the natural world works.

2. **Critical Thinking:** Holistic science education emphasizes critical thinking and problem-solving skills. Students are encouraged to analyze complex scientific issues from multiple angles, considering not just the scientific principles but also ethical, social, and environmental implications.

3. **Real-World Applications:** It aims to connect scientific theories to real-world applications. This helps students see the relevance of science in their daily lives and in solving global challenges, such as climate change, healthcare, and sustainability.

4. **Interdisciplinary Collaboration:** Multidisciplinary education encourages collaboration between scientists from different fields. Students learn to work in teams, drawing on the expertise of experts in various scientific domains to tackle complex problems.

5. **Environmental Awareness:** Given the pressing environmental issues facing the world, holistic science education often includes a strong focus on environmental science and sustainability. Students are taught about the impact of human activities on the environment and the importance of sustainable practices.

6. **Ethical Considerations:** Ethical considerations are integrated into the curriculum, ensuring that students understand the ethical dilemmas that can arise in scientific research and applications. This fosters a sense of responsibility in scientific endeavors.

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7. **Global Perspective:** Multidisciplinary science education often takes a global perspective, encouraging students to consider how scientific issues transcend national borders. This global outlook is essential in addressing international scientific challenges.

8. **Lifelong Learning:** The goal is not just to impart knowledge but to instill a love for learning. Holistic science education equips students with the skills and curiosity to continue learning and adapting to new scientific discoveries throughout their lives.

9. **STEM Education:** There is a growing emphasis on Science, Technology, Engineering, and Mathematics (STEM) education to prepare students for careers in technology and innovation-driven industries.

Major teaching strategies of teaching science regarding holistic and multidisciplinary innovation in education are as follows

Teaching science using holistic and multidisciplinary approaches involves a range of strategies to foster a comprehensive understanding of the subject. Some major teaching strategies include:

1. **Project-Based Learning (PBL):** Design projects that integrate concepts from multiple scientific disciplines. Students work on real-world problems, promoting holistic thinking and practical application of knowledge.

2. **Interdisciplinary Units:** Create units or modules that combine content from different science disciplines, demonstrating their interconnectedness.

3. **Inquiry-Based Learning:** Encourage students to ask questions, explore, and investigate topics across various scientific fields. This approach promotes critical thinking and problem-solving skills.

4. **Collaborative Learning:** Foster teamwork and collaboration among students. Multidisciplinary projects often require diverse skills, making collaborative learning essential.

5. **Integration of Technology:** Utilize technology, such as simulations, virtual labs, and multimedia resources, to provide a holistic view of scientific phenomena.

6. **Field Trips and Experiential Learning:** Take students on field trips or provide hands-on experiences to connect classroom learning to the real world.

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7. **Concept Mapping:** Use concept maps to visualize the relationships between concepts from different scientific disciplines, helping students see the big picture.

8. **Socratic Questioning:** Engage students in discussions and ask open-ended questions that prompt them to think critically and make connections between different scientific ideas.

9. **Cross-Curricular Connections:** Collaborate with teachers from other subjects to create cross-curricular connections, emphasizing how science relates to other areas of knowledge.

10. **Problem-Based Learning (PBL):** Present students with complex, real-world problems that require them to draw on knowledge from multiple scientific fields to find solutions.

Some of the upcoming multidisciplinary approach-based teachings are as follows

1. **Cliodynamics:** It is a futuristic a form of trans-multidisciplinary specialty that blends disciplinary subject history and other social sciences with mathematics and statistics to better forecast future trends.

2. **Behavioral Finance or Behavioral Economics:** It influences human behaviour on global and local market patterns, the ups and downs of the stocks and shares. It includes how one can make informed decision in order to maximize the profit by studying psychology in conjunction with Economics, Finance, Accounts and Mathematics. The major occupations in this sector include banking, finances, investment, planning, consultation, research and teaching.

3. **Cognitive sciences:** The study of the mind of the human is called cognitive sciences. Cognitive science combines psychology, computer science, language, philosophy and neurosciences. It opens career opportunities in several sectors as such artificial intelligence, education, psychology, data analysis, product designing, marketing, corporate sectors and research.

Conclusion

With this we can conclude that G20 is one of the global innovations in education that has opened doors towards holistic and multidisciplinary education. This dynamism in holistic and multidisciplinary education is on one hand talking about major developmental strategies in science teaching and on

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the other hand implementing these changes in the education system is itself a challenging in present context. Similarly, India is one of the developing countries and where the pressure on syllabus completion, resources scarcity, mindset of people, financial resources are itself a major challenging part. We are continuously talking about 21st century skills, stem education, Ed-technology environment exposures in learners that are implemented in rapidly. Thus, adopting these changes and innovation in education will widen education rationality in science education.

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