


Chapter 13

Integrating STEM Education With Sustainable Development Goals: A Framework for Innovation and Inclusive Learning in India

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ABSTRACT

The research explores the integration of STEAM (science, technology, engineering, arts and mathematics) education with the United Nation's Sustainable Development Goals (SDGs) to create a dynamic educational framework that fosters innovation, critical thinking, and problem-solving skills. Focusing on the Indian educational context, the study highlights case studies and initiatives, including Curiosity Gym's Innovation Hub and the Atal Tinkering Labs, which illustrate the potential and challenges of this approach. India's traditional education model often emphasizes remote learning, limiting students' creativity and entrepreneurial abilities. By aligning STEAM education with SDGs, the research advocates for experiential, hands-on learning that equips students with real-world skills to tackle socio-economic and environmental challenges. The study also delves into creative scientific cognition, integrating findings from neuroscience and psychology to enhance students' creative

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potential in STEAM. Despite promising outcomes, cultural and social barriers remain challenges to implementation, requiring further empirical research and adaptation to diverse learning contexts.

INTRODUCTION

The integration of STEAM (Science, Technology, Engineering, Arts, and Mathematics) education with the Sustainable Development Goals (SDGs) offers a transformative approach to addressing some of the most pressing challenges in modern education. This research explores the potential of such integration within the Indian educational context, where traditional education methods have often emphasized theoretical knowledge over practical skills, limiting students' capacity for innovation, critical thinking, and problem-solving.

India produces nearly 1.5 million engineers annually, the highest in the world, yet a significant gap exists between their theoretical knowledge and the practical skills required in the global workforce. According to a report by Aspiring Minds (2019), over 80% of Indian engineering graduates are unemployable due to a lack of practical skills and problem-solving capabilities. This is indicative of an education system that has historically prioritized rote learning and examination performance over creativity and hands-on learning, stifling the development of essential skills necessary for real-world applications.

In response to this challenge, initiatives such as 'Make in India' and the Atal Innovation Mission have been launched to foster a culture of innovation and entrepreneurship from a young age. The Atal Tinkering Labs (ATLs), part of the Atal Innovation Mission, are designed to cultivate curiosity, creativity, and imagination among school students by providing them with the tools and resources to engage in STEAM-related projects. These initiatives aim to bridge the gap between theoretical knowledge and practical application, promoting a learning environment that encourages students to think critically and innovate solutions to real-world problems. Aligning STEAM education with the SDGs provides an ideal framework for designing curricula that not only enhance students' academic skills but also instill a sense of global citizenship and responsibility. The SDGs offer a context for educators to address complex socio-economic and environmental challenges through interdisciplinary learning. For example, by integrating SDG 13 (Climate Action) into a STEAM curriculum, students can explore the science behind climate change, develop renewable energy solutions, and evaluate strategies for reducing carbon footprints. This approach not only enhances STEAM literacy but also encourages students to engage with global issues in a meaningful way.

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