



Interdisciplinary Perspectives On Science Technology Society (Sts) Approach In The Present Scenario

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Abstract

The historical development of the Science Technology Society (STS) approach remains relevant in the present scenario as it provides a critical and interdisciplinary perspective on the complex relationship between Science, Technology and Society. This thematic paper gives views on the conceptual understanding, theoretical framework of STS approach to explore its potential to foster critical thinking, interdisciplinary understanding, and civic engagement. It also highlights the importance of STS approach for the active construction of knowledge in multidisciplinary perspectives of the learners. By engaging with real-world social issues, learners can develop an in-depth understanding of the complex and compound relationship between Science, Technology, and Society. Specifically, STS focuses on integrating social issues in to science education domain to bring out resolution through technologically driven strategies. Hence the learners from various disciplines would be benefited from this holistic approach and preparing the learners for current and future citizenship roles. By understanding the theoretical framework, key components and benefits of STS education, educators can effectively integrate this approach into their teaching practices to promote critical thinking, interdisciplinary understanding, and civic engagement among the learners. Hence it provides a foundation for further exploration and implementation of STS approaches in educational settings.

Key words: Science Technology Society (STS), Science, Teaching-Learning

Introduction

The evolution of science curriculum in Kerala has been a journey marked by significant milestones, influenced by both internal and external factors. From its traditional roots in Ayurveda and astrology to its modern scientific formulations, the state has witnessed a gradual shift in its approach to science education. Kerala's early education system was deeply rooted in traditional knowledge systems, particularly Ayurveda and astrology. These disciplines were passed down through generations, primarily within families and temple institutions. The arrival of Christian missionaries in the 19th century brought a significant change. They established schools based on European educational models, introducing Western scientific concepts and methodologies. The Church Mission Society and the Catholic Church played pivotal roles in this transformation. During British colonial rule, the education system in Kerala was standardized based on the British model. This included the introduction of English as the medium of instruction and the establishment of formal schools with structured curricula. Science subjects like physics, chemistry, and biology were incorporated into the curriculum, emphasizing empirical observation and experimentation.

After India gained independence, the education system was nationalized, leading to a more uniform approach across the country. Kerala's science curriculum aligned with the national standards. The focus shifted towards modernizing the curriculum, incorporating advancements in scientific knowledge and research. New textbooks were developed, and laboratory facilities were improved. The report of National Academy of Sciences, National Academy of Engineering, & Institute of Medicine (2007) provides an insight into how students learn science and offers recommendations for improving science education. Contemporary science education in Kerala emphasizes practical learning through experiments, demonstrations, and projects. This approach aims to make science more engaging and relevant to students. There is a growing focus on innovation in science education. Initiatives like STEM (Science, Technology, Engineering, and Mathematics) education and robotics are being promoted to encourage creativity and problem-solving skills. The influential document of National Research Council (1996) emphasized the use of technology to enhance science learning and provide students with authentic experiences. It also emphasized the importance of interdisciplinary approaches to science education, recognizing the interconnectedness of different scientific disciplines. Bybee (1995) argued for the benefits of integrating science with other subjects, such as mathematics, language arts, and social studies. Kerala has undergone several curriculum reforms to keep pace with the changing landscape of science education. These reforms aim to make the curriculum more relevant to the needs of the 21st century. The current focus on practical learning, innovation, and relevance to the 21st century ensures that Kerala's science curriculum remains at the forefront of educational development. The evolution of science curriculum has been a dynamic process shaped by various factors, including societal needs, technological advancements, and pedagogical approaches. National Education Policy (NEP 2020) also highlights the significance of wide range of pedagogical approaches that supports interdisciplinary perspective

on science education. Over time, the focus of science education has shifted from rote memorization to critical thinking, problem-solving, and inquiry-based learning.

Technology has revolutionized the way we conduct scientific research, opening up new frontiers of discovery and accelerating the pace of innovation. As technology continues to advance, we can expect to see even more groundbreaking discoveries and innovations in the years to come. Technology-driven science is shaping our world in profound ways, and its potential is limitless. By incorporating society-based and field-based teaching strategies into science instruction, educators can create engaging, meaningful, and relevant learning experiences for students. Dewey (1938) advocated for a learning approach that connected classroom experiences to students' lives and communities. Society or field-based learning strategies have gained prominence in science education as they provide opportunities for students to connect scientific concepts to real-world contexts and engage in authentic learning experiences. Roth and Barton (2004) studied the potential of community-based science education to enhance student learning and engagement. Field-based science learning strategies highlights the importance of connecting scientific concepts to real-world contexts and providing students with authentic learning experiences.

Conceptual Understanding of STS Education

Science, Technology, and Society (STS) education is a field that bridges the gap between scientific knowledge and its societal implications. Science, Technology, and Society: A framework for science education (Roth and Barton, 2004), provides a theoretical foundation for understanding the relationship between science and society. STS teaching is not about knowing the application of science in society, but about developing students' attitudes and about ways of looking at problems and deriving personally significant solutions for them. It is about, way that science works in its social context. It goes beyond the traditional focus on scientific facts and formulas to explore the relationships between science, technology, and society.

Definitions

- Yore and Treagust (2006): "STS is a broad field of study that investigates the relationships between science, technology, and society."
- Cozzens (2010): "STS is an interdisciplinary field that examines the social, cultural, political, and ethical implications of scientific and technological developments."
- Latour (1987): "STS is a way of following scientists and engineers in their laboratories and field sites, to understand how they construct their knowledge and how this knowledge is used in society."
- Haraway (1985): "STS is a way of thinking about the world that challenges traditional boundaries between humans and machines, nature and culture, and science and society."

Goals of STS Education

1. **Interdisciplinary Approach:** STS education emphasizes the interconnectedness of science, technology, and society. It recognizes that scientific advancements have profound impacts on social, economic, and cultural aspects of life.
2. **Critical Thinking:** STS education fosters critical thinking skills in students. It encourages them to analyze and evaluate scientific information, question assumptions, and make informed decisions.
3. **Civic Engagement:** STS education promotes civic engagement by equipping students with the knowledge and skills to participate in discussions and decisions related to science and technology.
4. **Ethical Considerations:** STS education addresses the ethical implications of scientific and technological advancements. It helps students understand the potential benefits and risks of new technologies and make informed judgments.
5. **Problem-Solving:** STS education encourages problem-solving skills by presenting students with real-world challenges that require the application of scientific knowledge and technological solutions.
6. **Scientific Literacy:** STS education aims to develop scientific literacy, enabling students to understand and appreciate the nature of science, its methods, and its impact on society.

Theoretical Background of STS Education

The Science, Technology, and Society (STS) education draws upon a rich theoretical foundation that explores the complex interplay between science, technology, and society. While STS is a relatively new field, it has benefited from insights from various disciplines, including:

1. Philosophy of Science:

- **Relativism:** This perspective suggests that scientific knowledge is not objective but is influenced by social, cultural, and historical factors.
- **Social Construction of Knowledge:** This concept argues that scientific facts are not merely discovered but are actively constructed through social processes.

2. Sociology of Knowledge:

- **Social Determinants of Knowledge:** This theory emphasizes that the production and dissemination of scientific knowledge are shaped by social structures, power relations, and economic interests.

3. History of Science:

- **Case Studies:** Historical studies of scientific discoveries and technological innovations provide insights into the social, cultural, and economic contexts that influenced scientific development.

4. Cultural Studies:

- Representation: Cultural studies examine how science and technology are represented in popular culture, media, and public discourse.

5. Critical Theory:

- Power and Knowledge: Critical theory analyzes how power relations shape the production and dissemination of knowledge, often to maintain dominant ideologies.

Key Components of STS Education:

- Curriculum: STS curricula should be designed to integrate science, technology, and society concepts across different grade levels and subject areas.
- Teaching Strategies: Effective STS teaching strategies include inquiry-based learning, case studies, debates, and community-based projects.
- Assessment: Assessments should measure students' understanding of scientific concepts, their ability to analyze societal implications, and their critical thinking skills.
- Resources: Access to relevant resources, such as books, articles, and online materials, is essential for STS education.

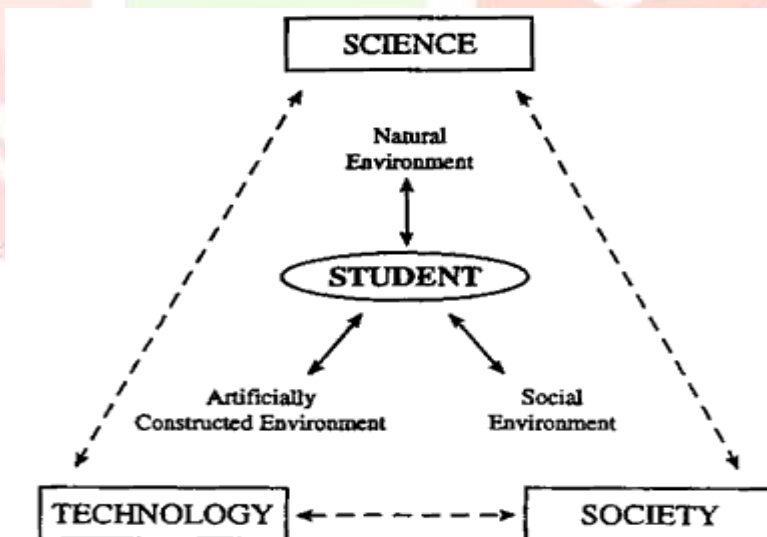


Fig. 1: Interactions Between Science -Technology- Society (Aikenhead, 1987)

Benefits of STS Education:

- **Relevance to Real-World Issues:** STS education connects scientific concepts to real-world issues, making learning more engaging and meaningful.
- **Critical Thinking:** It develops critical thinking skills, enabling students to evaluate information and make informed decisions.
- **Civic Engagement:** STS education prepares students to be active and informed citizens by fostering their understanding of scientific and technological issues.
- **Ethical Awareness:** It promotes ethical awareness and helps students consider the consequences of scientific and technological advancements.
- **Problem-Solving:** STS education equips students with problem-solving skills that can be applied to various challenges.
- **Interdisciplinary Learning:** STS transcends disciplinary boundaries, integrating concepts from various fields such as science, technology, humanities, and social sciences. This interdisciplinary approach provides a more comprehensive understanding of complex issues.
- **Lifelong Learning:** The STS approach promotes lifelong learning by emphasizing the dynamic nature of science and technology. It encourages students to stay informed about current developments and to adapt their knowledge to changing circumstances.

STS education is a valuable approach to science education that goes beyond the traditional focus on scientific facts and formulas. By integrating science, technology, and society, STS education promotes critical thinking, civic engagement, and ethical awareness, preparing students for the challenges and opportunities of the 21st century. Science, Technology, and Society (STS) education has emerged as a significant field in recent decades, aiming to bridge the gap between scientific knowledge and its societal implications.

Related literature on STS Education

- **The Role of STS in Science Education:**

- Science, technology, and society: A curriculum for the 21st century (Yager, 1988) : This seminal work laid the foundation for STS education, emphasizing the importance of connecting scientific knowledge to societal issues.

- **STS-Based Teaching Strategies:**

- The case for interdisciplinary science education (Bybee, 1985) : Bybee advocated for an interdisciplinary approach to STS education, integrating science, technology, and society concepts.
- Science, technology, and society: A framework for science education (Roth and Barton, 2004): This framework provided a theoretical foundation for STS education, emphasizing the importance of authentic learning experiences.

- **The Impact of STS on Student Learning:**

- How students learn: Science in the classroom (National Research Council, 2006) : This report explored the benefits of STS education, including increased student engagement, motivation, and critical thinking skills.
- Situated cognition: A psychological framework for understanding science, technology, and society (Barton and Collins, 1997) : This work highlighted the importance of context and social interaction in learning, emphasizing the relevance of STS education.

Challenges of STS Education

- Integration into Curricula: Incorporating STS into existing curricula can be challenging due to time constraints and the need to balance it with traditional science content.
- Teacher Preparation: Many teachers may lack the necessary knowledge or skills to effectively teach STS concepts.
- Assessment: Developing appropriate assessment tools to measure students' understanding of STS concepts can be difficult.
- Resource Availability: Access to relevant resources, such as case studies, real-world examples, and technology, may be limited in some schools.
- Social and Cultural Context: STS education can be influenced by social and cultural factors, which may vary across different regions and communities.

Conclusion

Interdisciplinary Perspectives on Science, Technology, and Society (STS) offer a comprehensive and holistic understanding of the complex relationships between these three domains. By examining these interactions from multiple angles, one can gain valuable insights into the social, ethical, and environmental implications of scientific and technological advancements. STS offer a powerful tool for understanding the complex relationships between Science, Technology, and Society. STS focuses on integrating social issues in to science education domain to bring out resolution through technologically driven strategies. STS approach is a path breaking to foster scientific attitude, scientific temper and problem-solving skills for future generation.

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