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# Integrating Art into STEM Education

Jitendranath Gorai\*

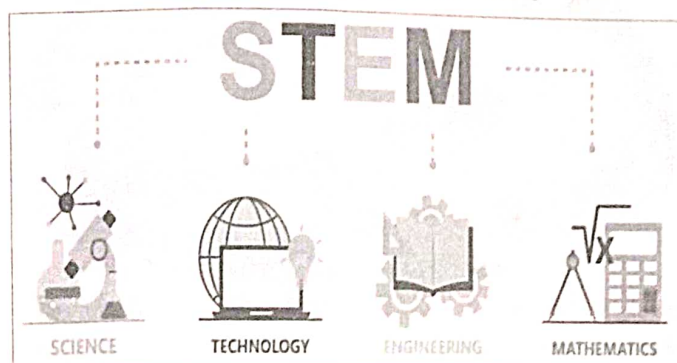
STEM stands for Science, Technology, Engineering, and Mathematics. STEM education includes theoretical and applied study of these subjects (Bhatnagar, 2024). In the United States, the National Science Foundation (NSF)'s scientific managers invented the phrase in 2001. The importance of including the arts in STEM education has increasingly come to light in recent years. Many benefits result from this integration, including the improvement of students' critical thinking, creativity, and problem-solving skills (Kelley & Knowles, 2016). To develop a range of vital skills, our outdated educational system needs to be restructured (Land, 2019). The arts use a more varied approach to help students build their STEM skills (Kellner, 2018). For example, Robert Root-Bernstein's study of scientific Nobel laureates from 1902 to 2005 showed that almost all of these scientific "geniuses" were not only masters of their sciences but also adept in the arts. Root-Bernstein and associates (2008).

The integration of art into the curriculum can enhance learning results and encourage holistic development in India, where STEM education is a significant emphasis (NEP, 2020). This article contains a set of lesson plans designed for the Indian educational system that integrate art into a variety of STEM courses. All of the plans are designed to help students become more creative while strengthening their grasp of STEM concepts and skills (Dunlop & Wills 2019). People can learn through their senses—visual, aural, and kinesthetic. For example, using pictures to illustrate the concept of seed germination helps the student picture the many stages. It is even more likely that the germination phases will stick in student's memory when audio explanations is added to the procedure (Land, 2019).

To solve this issue, educators are actively looking for ways to integrate the arts into STEM curricula. This method, which is often referred to as STEAM (Science, Technology, Engineering, Arts, and Mathematics), aims to create adaptable people who can handle complex challenges (Uştu

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Fig. 1- STEM Education



Picture Source: <https://www.shiksha.com/studyabroad/stem-education-an-overview-articlepage-2661>

et al., 2022). In India, where STEM education is highly valued, incorporating art into the curriculum has several advantages. Incorporating artistic elements into STEM courses can enhance students' understanding, engagement, and retention of the subject matter. It can also consider different learning styles and encourage a deeper regard for the arts and STEM fields.

## Incorporate Art into Diverse STEM Subject's Educational Context of India

We can start with clarifying basic scientific ideas such as the solar system, photosynthesis, and the water cycle. Divide the students into groups and give each group a concept. Encourage them to use artistic techniques like painting, sculpture, or sketching to illustrate their idea. Provide art items such as colorful paper, paint, clay, and more. After completing their artwork, each group is expected to show it to the class and explain how it embodies the scientific idea. Organize a conversation about the relationship between science and art, focusing on how AI-based smart panels may help artists better understand and remember cutting-edge scientific concepts.

### • Lesson Plan 1

Subject: Science

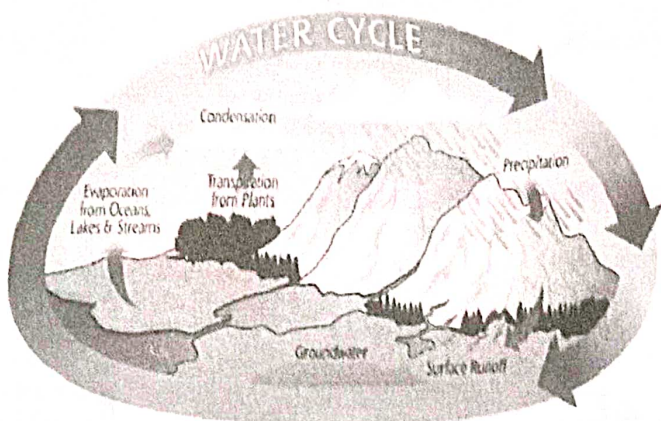
Class: 6-8

Objective: To Reinforce Understanding of Scientific Concepts through Artistic Representations.

Activity:



**Fig.2- Water Cycle**



Source: The Water Cycle | Precipitation Education (nasa.gov)

• **Lesson Plan 2**

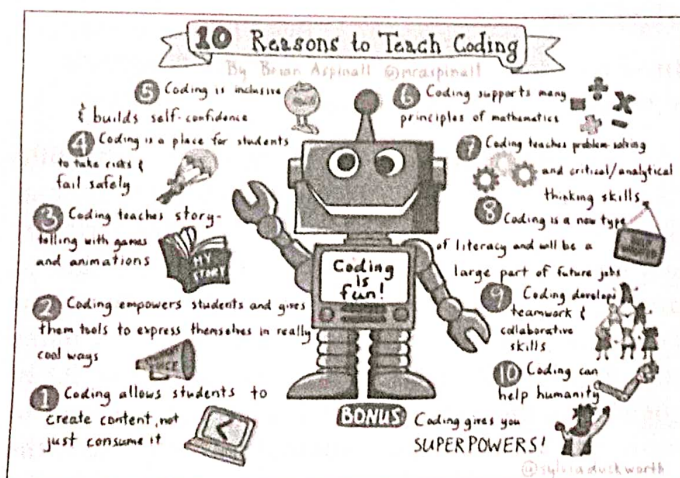
Subject: Technology

Class: 9-12

Objective: To Acquire Coding through Storytelling Method

Activity:

**Fig 3- Coding is Fun**



Source: How to Teach Kids Coding through Interactive Storytelling | by Priti Motwani

Begin by teaching them the foundations of coding using an easily accessible platform such as Scratch or Python. Set a theme or challenge for a storytelling project that focuses on environmental protection or sophisticated technology. Help students create a digital tale using coding, weaving in characters, interactions, and story arcs. Encourage students to enhance their stories with multimedia elements such as audio, animations, and pictures. Organize peer review workshops for

students to share their digital stories and provide constructive criticism. Celebrate their ingenuity by exhibiting finished products in a digital showcase or presentation.

• **Lesson Plan 3**

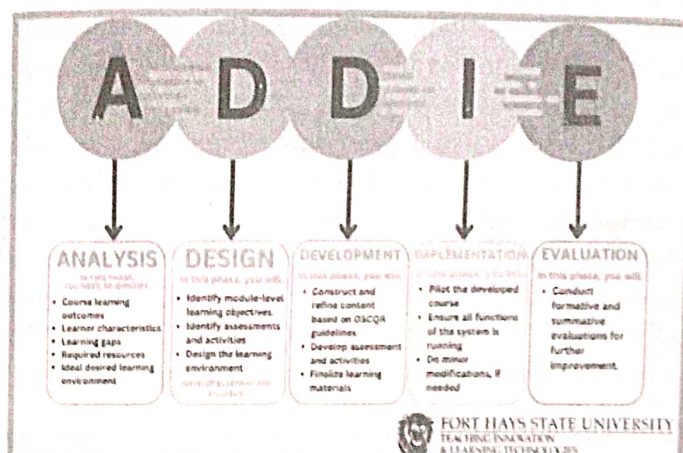
Subject: Engineering

Class: 11-12

Objective: To Develop Structure through ADDIE Model

Activity:

**Fig. 4 ADDIE Model**



Source: <https://tigerlearn.fhsu.edu/course-development-process-the-addie-model/>

The teacher will present the ADDIE approach to all students, gradually relating it to engineering principles. Students will be separated into small groups and assigned to design a specific structure, such as a bridge, residence, or park. They will subsequently be coached in carrying out their concepts using correct approaches. Students will be encouraged to make ADDIE models of their concepts from sustainable materials such as cardboard and colorful paper. Discussions will be facilitated to investigate the effects of various design decisions. Finally, each group will show their sustainable structural design and explain why they made their choices.

• **Lesson Plan 4**

Subject: Mathematic

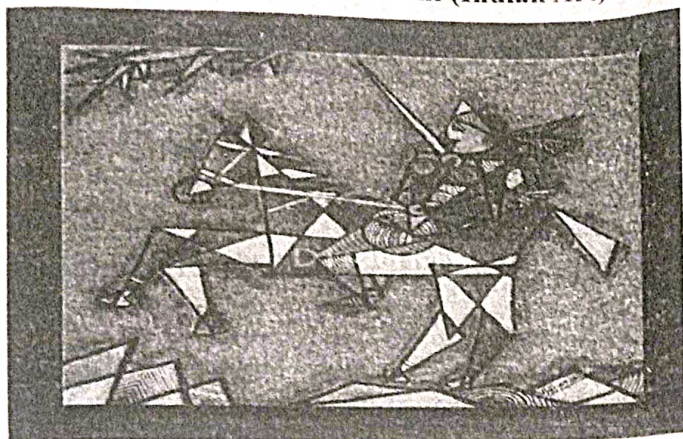
Class: 3-5

Objective: To Identify and Craft Geometric Designs Influenced by Traditional Indian Artistry

Activity:



**Fig-5: Jhansi Ki Rani (Indian Art)**



Source Picture: <https://dirums.com/blog-details/artizans-of-india-vishendra-n-singh>

Introducing students to the geometric patterns seen in mandalas, kolam, and rangoli—a type of traditional Indian art—is an excellent method to combine mathematical ideas with cultural history. Teach them about the fundamental forms of geometry and symmetry. Give them drawing instruments for geometry, like protractors, compasses, and rulers. Help them create their own geometric designs by adding traditional themes and patterns and gaining influence from Indian art. Encourage them to play around with color combinations, symmetry, and design complexity. Display their artwork in the classroom or school to honor the fusion of art and mathematics.

### Conclusion

Integrating art into STEM education offers manifold benefits for students, including fostering creativity, improving critical thinking skills, and establishing interdisciplinary connections. In India, where STEM is highly prioritized, infusing art into the curriculum can enhance educational outcomes and promote holistic development. The lesson plans provided herein present practical methods for combining art with various STEM fields, catering to the diverse interests and inquisitiveness of students.

Embracing STEAM education empowers Indian educators to cultivate well-rounded individuals equipped to thrive in a complex global landscape.

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