Design Thinking for Middle School STEM

STEM Education Workshop for Classes 6–8 Educators

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June 28, 2025

Organised by ANG Sahodaya School Complex

Session Overview

- 90-minute workshop for Classes 6–8 teachers in Bhagalpur and Munger
- Focus: Integrate design thinking into CBSE-aligned STEM education
- Emphasizes experiential, student-centered learning
- Includes hands-on activities, assessment strategies, and resources
- Aligns with NEP 2020 and CBSE syllabus [3]

Learning Objectives

- Understand design thinking principles for STEM education
- Design CBSE-aligned, experiential STEM lessons for Classes 6–8
- Develop rubrics for assessing creativity and collaboration
- Explore tools and resources for design thinking projects
- Build confidence in fostering 21st-century skills

Session Schedule

Time	Segment	
5 min	Opening Remarks and Objectives	
15 min	Design Thinking: Principles and CBSE Integra	
	tion	
25 min	Designing STEM Lessons with Design Thinking	
25 min	min Hands-On Activity: Lesson Plan Design	
20 min	Assessment, Resources, and Action Plan	

Design Thinking Framework

- Empathize: Understand student or community needs
- **Define**: State a clear, CBSE-relevant problem
- **Ideate**: Brainstorm creative solutions
- **Prototype**: Build simple, tangible models
- **Test**: Test and refine based on feedback

Design Thinking Framework

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Example: Design a low-cost classroom cooler [6]

Integrating Design Thinking with CBSE

- Science: Experiments (e.g., water filter, Class 6)
- Mathematics: Geometry, data handling (e.g., garden layout, Class 7)
- Technology: Coding in Scratch (e.g., science animation, Class 8)

Table: Example: Classroom Cooling Project

Activity	
Interview peers on heat issues	
"How to cool classrooms affordably?"	
Brainstorm fans, shades, ventilation	
otype Build cardboard shade model	
Measure temperature change	

Designing CBSE-Aligned Lessons

- 1. **Driving Question**: CBSE-relevant (e.g., "How to reduce school waste?")
- 2. **Process**: Guide through design thinking stages
- 3. **Product**: Prototype, chart, or presentation
- 4. **Reflection**: Evaluate process and teamwork

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Steps: Select CBSE topic, create real-world context, integrate STEM, plan assessments [3]

Example Lesson: Reducing School Waste

- **Driving Question**: How to reduce cafeteria waste?
- CBSE Topics: Science (Class 6: garbage), Math (Class 7: data handling)
- Activity:
 - Survey waste types (Empathize)
 - Define: Too much plastic waste
 - Ideate: Compost bins, reusable containers
 - Prototype: Model compost bin
 - Test: Graph waste reduction
- Outcome: Bar graph and prototype

Hands-On Activity: Design a Lesson

- 1. **Groups**: 4–5 teachers
- 2. **Task**: Design a CBSE-aligned STEM lesson
- 3. Components:
 - Driving question (e.g., water conservation)
 - STEM integration (e.g., science + math)
 - Student product (e.g., prototype)
 - Rubric (4-5 criteria)
- 4. **Time**: 40 min design, 20 min peer review
- 5. **Prototype**: Build with cardboard, tape

Assessment Strategies

Table: CBSE-Aligned Rubric

Criterion	Excellent (4)	Good (3)
Scientific Un-	Thorough CBSE	Minor errors
derstanding	concept use	
Creativity	Highly innovative	Some originality
	solution	

• **Formative**: Monitor ideation, prototypes

• **Peer Feedback**: Critique group work

• **Reflection**: Write on design process

Project Ideas for Classes 6–8

- Low-Cost Air Cooler: Heat transfer, area calculations
- Compost Bin: Waste management, volume, data handling
- Solar Lantern: Circuits, angle measurement
- Drip Irrigation: Water conservation, volume ratios
- Bridge Design: Forces, geometry
- Weather Station: Climate, statistical analysis
- Windmill: Renewable energy, speed calculations
- Soil Testing Kit: Soil chemistry, proportions
- Scratch Game: Coding, coordinates
- Flood-Resistant House: Materials, mensuration

Resources

- CBSE/NCERT: Textbooks, lab manuals [8]
- Digital Tools:
 - Scratch (https://scratch.mit.edu)
 - GeoGebra (https://www.geogebra.org)
 - Canva (https://www.canva.com)
- Physical: Cardboard, tape, recycled materials
- **Professional**: IDEO Toolkit [6], CBSE modules

Action Plan

- **Implement**: Design one lesson within 3 months
- Share: Join ANG Sahodaya WhatsApp group
- **Reflect**: Submit lesson outcome report
- **Connect**: Engage with SCERT Bihar, STEMpedia [10]

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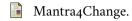
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Thank you for your engagement!

Empower Classes 6–8 with creative STEM solutions!