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## Transforming Math and Science Teaching: Insights from Haryana's STEM\_मंच Program (2024-25)

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### ORIGINAL ARTICLE



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### ABSTRACT

*This research examines the impact and implementation of the STEM\_मंच Program, covering both Mathematics and Science subjects, conducted across Haryana Government schools for Classes 6 to 8 during the academic year 2024–25. The initiative, grounded in micro-improvements and experiential learning, aimed to foster mathematical and scientific conceptual clarity, student engagement, and teaching innovation. Key findings indicate significant improvements in classroom practices, teacher participation, and student outcomes, making Haryana's model a replicable blueprint for systemic STEM reform in India.*

### KEY WORDS

*STEM\_मंच, Method, Education.*

### INTRODUCTION

STEM education plays a pivotal role in equipping young learners with critical thinking, problem-solving skills, and future-ready competencies. The urgency for reform is underscored by rapid advancements in science and technology, and the need for an agile, skilled workforce adept in mathematics, computer science, data analysis, and interdisciplinary knowledge.

The “STEM\_मंच Program” in Haryana was designed within the vision of the National Education Policy 2020 and NIPUN Bharat Mission, both of which emphasize activity-based, hands-on, and competency-driven learning in foundational and middle stages. Haryana emerged as a leading state for piloting micro-improvement cycles, teacher development, and innovative classroom integration for STEM subjects.

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## Methodology

### Program Design

The program was implemented by the State Council of Educational Research and Training (SCERT), Haryana, with Shiksha Lokam supporting the content planning process and ThinkTac providing content support. A structured monthly cycle approach, platform-based documentation, and regular orientation sessions characterized the workflow:

- Teacher Onboarding: Registration and access to digital learning resources via DIKSHA.
- Training: Live sessions led by educators, emphasizing hands-on science and mathematics pedagogy for every cycle.
- Classroom Implementation: Teachers facilitated activities using low-cost house hold materials, and students conducted experiments and recorded observations.
- Reflection and Reporting: Documentation through DIKSHA, including evidence uploads and feedback cycles.

### Data Collection

Metrics included:

- Participation numbers (schools, teachers, students).
- Project submissions, assessment quizzes, and pre/post evaluations.
- Feedback from orientation and STEM Mela events.
- Qualitative data from educator interviews and DIKSHA analytics.

## Program Implementation

### Phases and Activities

The initiative ran for six to eight months, segmented into four stages:

1. **Preparation:** Joint planning, curriculum alignment, resource creation, and state-wide orientation.
2. **Implementation:** Monthly cycles with varied math (fractions, linear equations) and science (food test, DIY models) activities. Activities changed based on curricular requirements and allowed contextualization for schools.
3. **Evaluation:** Schools measured student understanding through observation sheets, pre/post quizzes, and reporting via DIKSHA.
4. **Celebration:** The STEM Mela concluded each cycle, showcasing student projects, model exhibits, and engaging the broader community.

### Outreach Practices

Rigorous outreach was employed:

- Motivational messages (“Monday Motivation”, “Thoughtful Thursday”), follow-up calls, and coordination at all administrative levels.
- Teacher mentors mapped to clusters, providing targeted support and peer learning forums through WhatsApp and workshops.

## Findings and Analysis

### Participation and Reach

- 1,100 schools, both urban and rural, participated statewide.
- Over 9,000 teachers registered and engaged in micro-improvement cycles.
- Attendance of 15,000 students in hands-on STEM activities.

- 957 schools hosted a culminating STEM Mela, with broad district and block official participation.
- High levels of voluntary teacher engagement, with 80% of schools completing projects across multiple cycles.

### **Educational Outcomes**

- Clear improvement in conceptual understanding measured through pre/post evaluations.
- Increased student curiosity and critical thinking observed through classroom activities and project presentations.
- Teachers reported higher motivation due to simple, scalable activities aligning with curriculum and leveraging household materials.

### **Technology and Platform Integration**

- Widespread use of the DIKSHA platform for training, implementation, and evidence submission.
- Data from DIKSHA enabled quantifiable evaluation, tracking progress at teacher, school and district levels.

### **Case Studies and Examples**

A notable example includes the “DIY Compass” science project from the sixth cycle, where students constructed compasses and recorded experiment outcomes. Such projects not only build scientific aptitude but also reinforce the merits of experiential learning and documentable improvement cycles.

The STEM Mela events further demonstrated community engagement, as students, teachers, and officials collectively celebrated achievements and showcased creative exhibits and projects, driving recognition and motivation for future cycles.

### **Challenges and Learnings**

#### **Challenges**

- **Technical Issues:** DIKSHA platform login/project submission troubles, and cumbersome data analysis affected managing real-time feedback.
- **Monitoring Support:** Absence of integrated real-time feedback mechanisms for teacher mentors and program supervisors.
- **Documentation Complexity:** Teachers found certain documentation tasks burdensome, particularly for data entry on DIKSHA.

#### **Learnings**

- Voluntary participation, driven by simple and enjoyable activities, results in deeper teacher engagement.
- Scalable materials allow replication and expansion across schools and districts.
- Regular mentoring and peer forums are critical for sustained participation and support.
- The DIKSHA platform facilitated transparency and data-driven decision-making.

### **Recommendations**

Drawing from the program’s successes and areas for improvement, the following recommendations are advanced:

- **Infrastructure Enhancement:** Upgrade digital platforms for seamless access and real-time analytics.
- **Integrated Feedback:** Embed live feedback and support modules within teacher mentor workflows to monitor and resolve issues promptly.
- **Ease Documentation:** Simplify project documentation protocols to reduce teacher workload and maximize reporting accuracy.

- **Expand Training:** Increase frequency and depth of live teacher training, extending programs to primary grades and broader disciplines.
- **Replication and Scale:** Develop plug-and-play activity kits and lesson guides for future phases in other states, drawing from Haryana's micro-improvement model.

## CONCLUSION

The STEM\_संच Program in Haryana exemplifies the transformative potential of activity-based, micro-improvement driven approaches in public education. The convergence of policy alignment (NEP, NIPUN Bharat), implementation (SCERT), and digital reporting (DIKSHA) has produced measurable gains in engagement, learning, and scalable improvement. The program's inclusive model, strong outreach, and evidence-based practices have positioned Haryana as a beacon for experiential STEM reform nationally. Future cycles must prioritize technological infrastructure, sustained training, and documented feedback to further consolidate and expand educational impact.

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