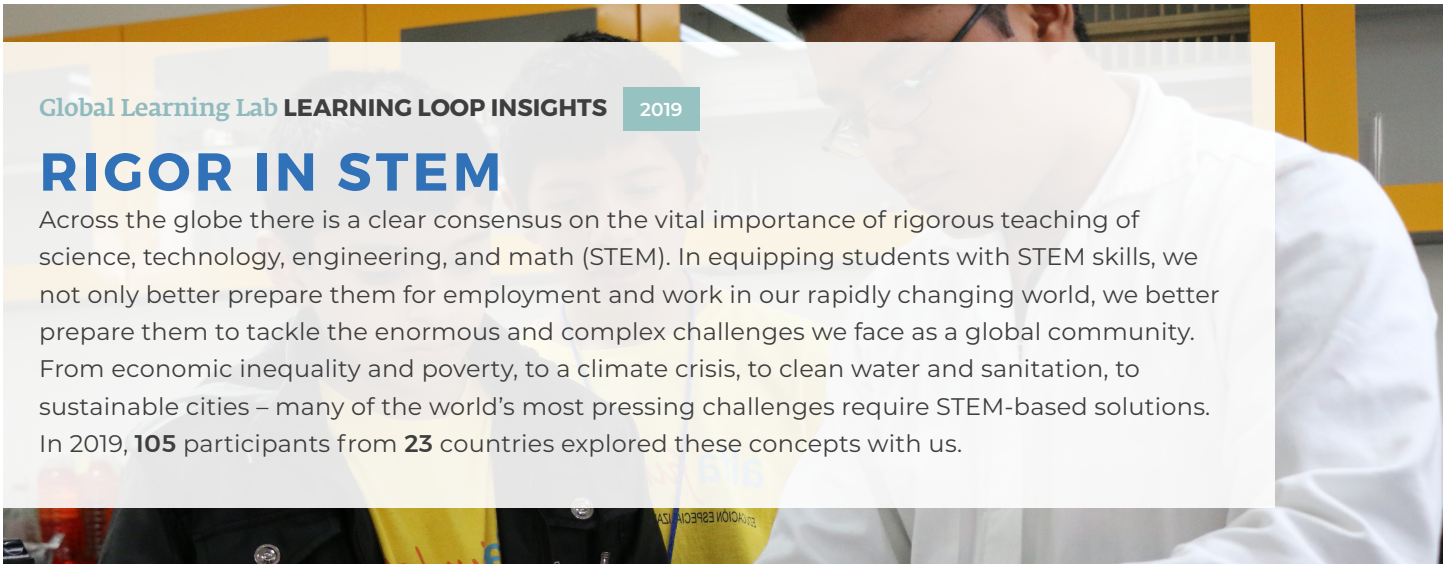

Global Learning Lab **LEARNING LOOP INSIGHTS** 2019

# RIGOR IN STEM

Across the globe there is a clear consensus on the vital importance of rigorous teaching of science, technology, engineering, and math (STEM). In equipping students with STEM skills, we not only better prepare them for employment and work in our rapidly changing world, we better prepare them to tackle the enormous and complex challenges we face as a global community. From economic inequality and poverty, to a climate crisis, to clean water and sanitation, to sustainable cities – many of the world's most pressing challenges require STEM-based solutions. In 2019, **105** participants from **23** countries explored these concepts with us.

## KEY INSIGHTS

*From discipline-based to integrated and interdisciplinary*. Instruction in the sciences and mathematics is increasingly expanding to be more integrated and interdisciplinary. Transdisciplinary learning opportunities combine knowledge, skills, and mindsets across domains.

*From knowledge-based to practice-based*. Practice must shift from memorization of abstract concepts to be more practice-based, conceptual, and creative. Students should be set up to solve real-world problems relevant to their lives, passions, and future job prospects. Teachers should facilitate student agency and create learning experiences that are purposeful and that connect to broader systems.

*From content-led to inquiry-driven*. Students experience agency when teachers shift from a strict, inflexible content-led curriculum to a more inquiry-driven, discovery-focused process in which they facilitate student learning. Rather than simply relaying content knowledge, teachers create and hold space for innovation and engagement.

*From didactic, passive learning to active, hands-on engagement*. Research-informed metacognitive strategies suggest that active, hands-on opportunities enhance and sustain student learning. When students think more explicitly about their own learning process, they take greater responsibility for their own performance and are more likely to self-identify what is required to be successful.

*From individual work to collaborative work*. Research suggests that collaborative, team-based approaches to learning are highly effective. Methodologies that support talk and interaction between students—particularly across lines of difference—to accomplish a shared goal are proven, positive approaches.

*From future scientists to global citizens*. Making STEM more accessible and inclusive from early learning through secondary school and beyond breaks down the barriers of once exclusive, elitist, and often male-dominated domains to form a learning community of global, diverse citizens who are critical thinkers and problem solvers.

The Global Learning Lab hosts learning loops regularly. They examine research, on the ground video examples, and other guidance for classrooms and communities. We also encourage you to explore other Learning Loop insights.

### CLASSROOMS & RESOURCES STUDIED

**Prapti Bashin**'s Classroom, Delhi, India

**Peter Tabichi**'s Classroom, Kenya (Varkey Global Teacher Prize Winner)

**Primary Math** Classroom, Singapore (from Ministry of Education, Singapore)

**Singapore's 21st Century Teaching Strategies**

**Projects that Work: Mission to Mars**, United States

**Thinking, Doing, Talking Science**, an **Education Endowment Foundation** (EEF) program that makes lessons in primary schools more practical, creative, and challenging