

24 - 26 April 2026

Madrid , Spain

## Learning from Crises: A STEM Approach for Teaching in Real-World Contexts

**Adriana María Soto Zuluaga , Sandra García Zamora , Kelly Cardona Soto**

*Instituto Tecnológico Metropolitano, Colombia*

### Abstract

The crises facing today's world, marked by profound social, economic, environmental, and technological transformations, constitute a key framework for interpreting contemporary reality. Phenomena such as the COVID-19 pandemic, climate change, and growing global socio-economic inequalities have revealed not only the fragility of existing systems, but also the limitations of traditional models of knowledge and teaching that, in many educational contexts, still fail to fully engage with current social transformations. From this perspective, critical situations make visible structural tensions and historical problems that directly challenge educational systems. Within this context, the STEM approach gains particular relevance, as it integrates knowledge from science, technology, engineering, and mathematics to understand real-world issues and work with data, linking learning to social contexts. This study is situated within the project Classroom Innovation: A Challenge for Colombian Education (Contract 2023-063), funded by Minciencias and ICETEX. Employing a qualitative methodology, the research draws on Design-Based Research (DBR) alongside documentary analysis, with the goal of developing didactic strategies tailored for secondary and higher education levels. DBR unfolds through iterative cycles encompassing problem identification, instructional design, theoretical reflection, and successive refinement. These cycles are carried out collaboratively in seminar-style sessions involving teacher-researchers from multiple Colombian universities engaged in the project. Our results suggest that centering social crises within the educational process promotes a more profound and context-sensitive comprehension of reality. Ultimately, this framework nurtures an ethical and civic mindset by utilizing data to illuminate social challenges and confront inequalities from a critical, interdisciplinary perspective.

**Keywords:** Critical Situations; Educational Contexts; Real-World Data; STEM Approach