EDU Skyline Lecture

Technische Universität München

Understanding How Digital Tools Foster Mathematical Learning: Framework-Guided Investigations in Primary and Secondary Classrooms

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Digital tools are widely used in mathematics classrooms, yet the mechanisms by which they promote learning are still insufficiently understood. This talk introduces the CoDiL framework—a cognitive process model that explains how digitally enriched instruction can stimulate content-specific learning activities and support knowledge construction. I will present two classroom-based mediation studies that empirically apply this framework. The first study (*N* = 300) examines how adaptive features in a digital learning environment for fractions affect cognitive engagement and outcomes in 6th grade. The second study (*N* = 70) investigates how programming whole paths fosters algorithmic thinking in 2nd and 3rd graders learning computational thinking. In both cases, learning effects were mediated by students' engagement with specific digital features. These findings support the CoDiL framework's core assumption: For digital tools to be effective, their instructional features must align with targeted learning activities—and learners must engage meaningfully. Implications for design and evaluation are discussed.

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