

Students' Mathematical Inventions and Intuitions: An Embodied Perspective

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11:00 am – 12:00 pm

Room 2121, Benjamin Building

(Complimentary lunch will be provided after the talk)

Abstract:

Students' invented solution strategies and mathematical intuitions offer insights about the nature and development of mathematical reasoning. In beginning algebra, students exhibit methods that reveal the power of language to organize action-based quantitative reasoning schemes into proto-algebraic strategies that can surpass formal solution methods. Students' action-based schemes can form the basis of effective classroom interventions. In high school-level geometry, students' gestures and actions reveal mathematical intuitions that facilitate valid proof formulation anchored in geometric transformations rather than logical deduction. These suggest principles for designing body-based interventions in the form of motion-capture video games for geometry education. Together, these examples contribute to an emerging framework of embodied mathematical imagination and cognition (EMIC) that offer promising approaches for math teaching and curriculum design.

Bio:

Mitchell J. Nathan is a Professor of Educational Psychology (Learning Sciences) in the School of Education at the University of Wisconsin-Madison. In his research, Dr. Nathan uses experimental design, video-based discourse analysis methods, and educational technology to study both learning and teaching of engineering and mathematics in school settings. He researches how teachers' beliefs and content knowledge lead to Expert Blind Spot and how they shape their views of which students should have access to future academic and career pathways in engineering and STEM. He has also investigated students' development of algebraic thinking and the barriers students face in project based learning intended to promote integrated STEM education. He currently studies the role of language, symbols, and physical action in STEM teaching and learning. Dr. Nathan was a founding officer of the International Society of the Learning Sciences (2002), and also founded the American Education Research Association (AERA) Division C section on *Engineering and Computer Science Education* (2013).

Dr. Nathan is currently serving on a National Academies of Science consensus committee Engaging Middle and High School Students in Science and Engineering: New Approaches to Investigation and Design, which will examine current research on STEM education using science investigations and engineering design problems for middle and high school students, and propose a new vision for science education embodied in the 2012 Framework for K-12 Science Education and the Next Generation Science Standards (NGSS)

Dr. Nathan has been recognized for his teaching excellence through his nomination to the University of Wisconsin's Teaching Academy, and previously served on its executive board.



For more information about our colloquium series,
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