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From concrete to abstract: Student discoveries and conjectures using physical surfaces in multivariable calculus and physics.

By working with physical, dry-erasable surfaces and other representations of multivariable functions, students in the 'Raising Calculus to the Surface' and 'Raising Physics to the Surface' projects (NSF DUE-1246094 and NSF DUE-1611946, resp.) are able to explore new concepts in small groups and contribute their knowledge to the classroom. In this talk, I'll share how the classroom activities are designed to encourage student collaboration and exploration of new (and old) concepts, and how instructors utilize student ideas and conjectures to build the course content upon student ideas. (Received September 25, 2017)