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Shelby Stanhope* (shelby.stanhope@afacademy.af.edu). *Supporting Spatial Conceptualization in Multivariable Calculus Using 3D Printed Surfaces and Experiential Learning Field Trips.*

A unique transition occurs as students enter multivariable calculus. Up to this point, students have spent their mathematical careers becoming experts in the two-dimensional xy-plane. Adding another dimensions allows us to explore this 3D world we live in, but the transition to three dimensional mathematical thinking does not come easily to many students. To support students' spatial understanding of concepts in the course, we introduced tactile manipulatives and experiential learning field trips. In this presentation, I will discuss the use 3D printed surfaces in the classroom. Students can touch, write on, and rotate the surfaces as they work with a classmate to build their understanding of new concepts through a series of guided activities. Additionally, I will discuss two experiential learning activities, which provide the opportunity for students to see math in action, bringing together concepts they have seen, but can now feel and experience themselves. One activity requires a sloped surface (like a small hillside or graded slope of grass) and the other can be accomplished remotely (via video field trip to a wind tunnel). Student testimonies reveal that they often think back to the field trip activities to discuss concepts and to explain material to other students. (Received September 15, 2020)