Benjamin T. Manning
Engineering Education Research Statement

Over the course of my educational and professional career, I have been involved with physics and education research. While studying physics at Michigan Technological University, I worked with Dr. Jae Yong Suh through the 2015 Summer Undergraduate Research Fellowship to assist with research on the production and analysis of gold monolayers produced with the Langmuir–Blodgett Method. Through this experience, I wrote multiple MATLAB and Python simulations and programs to filter and analyze surface pressure data produced in the production of the monolayers, and was trained in the use of atomic force and scanning-tunneling microscopes to determine if monolayers were achieved. In the summer of 2016, Dr. Suh assigned me to working on the fabrication of Vanadium dioxide, a temperature-sensitive material that can change from a semiconductor to a metal on the infrared spectrum. In this time, I used Pulse Laser Deposition on a vanadium source in an oxygen-rich vacuum chamber to produce the material. I redesigned and implemented a new stepper motor system to move the material source inside of the chamber to have better control to create more uniform layers. I also learned how to use heat processing in a clean-room environment and X-ray Diffraction to determine the quality of the material created.

While pursuing my Master's degree in Teaching through the Woodrow Wilson Teaching Fellowship at Piedmont College and my teaching in Barrow County, Georgia, I worked with multiple researchers to collect and analyze anonymous data from students around the county, state, and the nation to determine effective teaching methods that can be used universally in STEM environments. I was the leader in my school for data and analytics of school-wide data, including exam review, informal teacher assessments, student goals and outcomes, and school impacts on the community.

I am interested in pursuing research in secondary engineering education, focusing primarily on how we can ensure the knowledge and skill gap between high school and college, the workforce, or whatever avenue the student decides gets bridged. I believe researching and creating methods to develop a student's self-efficacy to pursue the thrill of discovery in STEM in the form of quick-return, problem-based learning will encourage students to pursue knowledge in whatever field or career path they choose. Engineering Education has a unique position to help bridge this gap for numerous subjects even outside of the STEM categories, including the social sciences and language arts. Using Engineering Education, we can encourage and inspire students to chase the thrill of discovery regardless of the discipline they choose to pursue, and I am passionate about finding the most effective methods to do so, and finding ways to provide those resources to anyone who wants them.