USU Engineering Faculty Partners with National Federation of the Blind to Develop Non-Visual Teaching Methods

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News Release — LOGAN, UTAH, Feb. 27, 2018 — A researcher at Utah State University is developing non-visual techniques to teach the fundamentals of engineering to students who are blind or low vision.

Dr. Wade Goodridge, an assistant professor of engineering education at USU, is partnering with the National Federation of the Blind to help students develop spatial abilities and increase their awareness of education and career opportunities in engineering. Goodridge will receive $400,000 of a larger $2 million National Science Foundation grant that was awarded to the National Federation of the Blind earlier this month. Goodridge will be responsible for overseeing a new research study on spatial ability among blind and low vision students.

Spatial ability — sometimes referred to as spatial cognition or mental mapping — is a crucial skill for many hands-on professions including engineering.

“Spatial ability means being able to visualize an object in different orientations,” said Goodridge. “For example, choose an item and mentally pick it up and rotate it. Or take that object and mentally slice it in half. Can you visualize the pieces in this new perspective?”

Experts have shown that spatial ability is highly correlated to success in both engineering students and practicing engineers. With under-developed spatial ability skills, students may struggle to mentally construct the engineering problems presented in the classroom. Goodridge says students have varying levels of spatial ability but says improvement is possible through training and exercise. Assessing and improving spatial ability in a student who is blind or low vision represents a unique challenge in spatial cognition research — but one Goodridge says is crucial for removing barriers that keep students from pursuing science, technology, engineering and math (STEM) careers.

“Since we know that spatial ability is a strong indicator of success in STEM education and STEM professions, we need to understand how it is developed in our blind youth and how they utilize it in solving engineering problems,” said Goodridge. “We can then develop methods to leverage spatial thinking and help our students have better chances to succeed.”

Goodridge is a leading expert in spatial cognition and has published several studies on how to measure and improve spatial cognition. He and his team will use the funding to develop an existing technology used to measure spatial ability in blind and low vision people. His team will also create new engineering-based curricula designed to improve spatial ability.
Experts say many blind people struggle with mental mapping primarily because they do not have access to educational opportunities. Photo: NFB

Experts say many blind people struggle with mental mapping primarily because they do not have access to educational opportunities that foster development of spatial cognition skills. Among the STEM disciplines, engineering relies most heavily on spatial reasoning skills.

“A combination of lack of knowledge about nonvisual techniques and society's low expectations for the blind prevents too many blind youth from developing spatial reasoning skills and, if they desire, participating in engineering or other fields that use these skills,” said Mark A. Riccobono, President of the National Federation of the Blind. “We have dedicated significant resources to changing this unacceptable status quo, and we thank the National Science Foundation and our partners at Utah State and the Science Museum of Minnesota for helping us accelerate our progress and broaden our reach.”

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