Starting from scratch: RIT program teaches first-year students how to learn

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Starting college on the right foot—and in the right frame of mind—can make the difference between completing a bachelor's degree and dropping out in the first or second year of school.

Rochester Institute of Technology is launching a $900,000 National Science Foundation-funded program to improve the retention of deaf, hard-of-hearing and first-generation undergraduates majoring in science, engineering and computer science. Between five and 10 percent of RIT's students are deaf or hard of hearing. Many attend the National Technical Institute for the Deaf or receive support services—such as interpreting and notetaking—from NTID while enrolled in one of RIT's other eight colleges.

RIT's Project IMPRESS (Integrating Metacognitive Processes and Research to Ensure Student Success) seeks to teach students self-reflection and self-assessment skills—key components of metacognition, or thinking about how one thinks and learns.

"We know that all students—not just our target population—overestimate their understanding," says Scott Franklin, professor in RIT's School of Physics and Astronomy. "Helping students see reflection, assessment and metacognition as a fundamental part of how they learn can make a huge impact on their success."

The program will hold a two-week summer experience in August 2014 for 20 incoming students. The cohort will take a new general education

course during the fall and spring semesters focusing on STEM metacognition. In the second year, the students will become learning assistants in a stand-alone program RIT's College of Science launched this fall to give students teaching experience.

"The explicit goal of this grant is to increase the number of deaf, hard-of-hearing and first-generation college students who successfully make it to their third year," Franklin says. "Because once they make it to their third year, chances that they'll make it through all four years are pretty good. The real drop-off occurs between years one and two."

The three-pronged program, open to all first-year students, will teach a metacognitive approach to learning. The cohort of 20 students will arrive on campus two weeks before the fall semester to participate in the initial phase of the program. Students will learn new skills as they investigate challenging problems from multiple disciplines. For instance, students will be asked to consider non-Newtonian fluids from the perspective of physics, mathematical and computational modeling, and biology and polymer chemistry. A similar exercise developed for incoming physics students at University of California at Berkeley inspired the RIT summer program.

Presenting students with different ways to approach a problem begins with self-reflection and discovery. Students will learn how they absorb information and how to articulate what affects their performance. Learning self-assessment—another component of metacognition— will help them gauge their comprehension of course material.

"The better a student can self-assess his or her knowledge, the better decisions they make about what and how much to study," Franklin says.

Instead of modifying existing courses, Franklin will develop a general education class dedicated to metacognition in the STEM disciplines. The

yearlong class will ask students—anywhere from 48 to 98—to read about metacognition and reflect on their direct courses.

"For example, what did I do this week where I had to make a judgment," Franklin says. "Or where I felt comfortable and my identity helped me learn? Or what did I do this week where I saw any implicit bias? That takes up their first year and solidifies their metacognitive processes."

During the second year of the program, the 20-student cohort of deaf, hard-of-hearing and first-generation college students will be funneled into the existing learning assistant program. They will help teach and observe the learning process from the perspective of an authority.

"If one of the metacognitive reasons people fail to thrive is because they're not confident or they don't have experience being confident, this helps build them up," Franklin says. "Because we are not telling them, not only do you know the material, you know it well enough to teach."

Assisting Franklin in the development and implementation of the program are Elizabeth Hane, associate professor/associate head of the Thomas H. Gosnell School of Life Sciences, and Geraldine Cochrane, Learning Assistant program coordinator, and members of the Science and Math Education Research Collaborative. The team will track the success rate of the cohort of students on an individual course basis and long-term. They will assess the drop, withdrawal and fail rate of the group compared to other populations and track the cohort's retention rate.

"There has been recent research about metacognition learning about self-reflective ideas and self-assessment, but not as much research into how these evolve and grow and change," Franklin says. "What we're doing is so new and so transformative that if it works, then you might consider all students take a course on metacognition."