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UMaine Today



Graduate teaching assistants for math preserve teamwork, engagement despite pandemic

January 6, 2021

Collaboration fosters learning in mathematics courses at the University of Maine. In the midst of the COVID-19 pandemic that brought isolation to many, graduate teaching assistants took measures to enable students to participate in collaborative group work in their classes.

Whether remote or in-person, 17 graduate teaching assistants ensured students enrolled in courses for precalculus, calculus and teaching elementary mathematics could work together to solve problems, says Natasha Speer, an associate professor of mathematics education at the University of Maine.

"There has been a lot of research in how people learn in math, and the one thing found over and over again is that people need to try challenging problems and they need to communicate with each other to develop a strong understanding of the ideas," she says.

For online recitations, graduate teaching assistants use Zoom breakout rooms so students can speak with each other, and virtual whiteboards so they can collaborate in ways similar to what would happen in person. Speer says to ensure participation, they have found that having groups select a reporter to discuss the group's work during whole-class discussions is very effective and is a tactic many may continue to use after the pandemic. There are other tools built into Zoom that enable instructors to pose multiple-choice questions, as would be done with clickers in person, and the chat feature can be used to get responses from students as well, Speer says.

Students who learned in-person prior to the Thanksgiving holiday worked in groups while following COVID-19 guidance, with each group sending a member to board to compose their work or using online tools in cases where some students participated in-person and others were remote.

Hazel Cashman, a teaching assistant from the Master of Science in Teaching program, says engaging students through Zoom poses challenges at times, but she and her colleagues have achieved progress in fostering collaboration. Cashman instructs a precalculus course with guidance from Timothy Boester, assistant professor of mathematics education.

This semester was Cashman's first teaching experience and she says, "It's been a unique challenge trying to engage students through Zoom, and each week has its own successes and setbacks."

"It takes a while to form a sense of community over Zoom, but I think students are finally settled into the rhythm of group work and are needing a bit less encouragement to collaborate with each other during recitations," she added.

Faculty and graduate teaching assistants met the summer before the fall semester to learn about and devise methods for instruction during the pandemic. Speer says the department had to decide over the summer whether to offer in-person instruction. Once the department resolved to incorporate it alongside remote teaching, they devised methods for offering 25-student recitations, utilizing large rooms in Estabrooke Hall and other buildings.

"We had no idea whether it would work or not, but we made some plans and figured out other things along the way," Speer says. "We're really fortunate that department leadership, the chair and faculty were willing to take on something so challenging."

The shift to remote instruction prompted instructors to deploy other new methods for maintaining student engagement and ensuring they excel in their courses.

Speer says many faculty and teaching assistants issued more assessments than in previous years, replacing several periodic exams with more frequent quizzes. Cashman says she meets with students one-on-one to check on their progress and receive feedback, which "helps to let students know that we see and respect the challenges they're facing."

"After each recitation, I email every student to provide slides and pictures of everything on the classroom whiteboard to ensure everyone, including the absent students, always has access to all recitation materials," says Prashanta Bajracharya, a Ph.D. student of civil engineering serving as a graduate teaching assistant for calculus. "And I have had several one-on-one Zoom sessions with several students outside my office hours to help with any issues they were facing. With these endeavors, I hope to be making a difference in the learning outcomes of my students."

Despite the challenges posed by the pandemic, Matt Ackley, a master's student of mathematics teaching calculus, says students' efforts to grasp course material has exceeded his expectations. Ackley's classes this semester have consistently experienced the highest levels of attendance he has witnessed in four semesters of teaching, "and engagement has been similarly high," he says.

"In past semesters, preparatory meetings for the course revolved around increasing student engagement and comprehension even when no physical constraints were in place. This semester, it felt like we were reinventing the wheel in this regard; the goal stayed the same while the conversations around it changed dramatically," Ackley says. "The challenge facing us has certainly been more concrete this semester, but I have been glad to see everybody — across both the department and the student body — working together against it."

Facilitating learning during the pandemic has been a learning experience for the teaching assistants. Speer says for 13, this semester was their first teaching.

"Imagine rebuilding a ship when you are already in the sea. That is how teaching felt like this semester. I spent a lot of time thinking about new ways to make recitations fun again with all the distance and awkwardness," says master's student in teaching student Anupam Raj, who served as a graduate teaching assistant for a calculus course. "This semester has taught me that there is no saturation to creativity and efficiency in teaching. What we perceive as constraints to learning in a normal classroom can always be breached and pushed forward. In 2020, it took a pandemic for me to realize that."

Watching the graduate teaching assistants and faculty manage courses during the pandemic has been exciting for Speer, she says, and witnessing students' enthusiasm toward learning despite the different challenges has been rewarding.

"It has been very impressive how graduate students have adapted to all of this," Speer says. "Everyone seems to be enthusiastic about making the best of these circumstances."

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