

STAF Spotlight: The Secret is in Making Connections

Grad student Cammie Gray researches how to better prepare secondary math teachers

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How do you convince an undergraduate that a mandatory course is worth taking beyond the requirements for their major?

This question is central to the research of Cammie Gray, PhD candidate in the [UNH math education program](#) and recipient of a 2020 [Summer Teaching Assistant Fellowship \(STAF\)](#), an award given by the UNH graduate school to students who have served as teaching assistants and have performed exceptionally well both as TAs and students.

Gray is focused on one course in particular: abstract algebra.

Abstract algebra is an undergraduate course that is required for future secondary math teachers. Unlike other courses that might involve writing proofs or solving equations, abstract algebra explores the “why” of mathematics. Why is a negative times a negative a positive? Why is a number divided by zero undefined? These are the types of questions one would explore in abstract algebra.

Gray sees this course as incredibly valuable, a “backstage pass where students learn why math works the way that it works.” She believes that it equips teachers with a deeper understanding of the subjects that they will be teaching, which in turn can give their students explanations beyond facts to memorize.

And yet, not all preservice teachers share this perspective.

“Most future teachers take this course and see it as this totally separate thing where they’re doing all of these abstract proofs and there’s no relation to what they’ll be teaching,” Gray says.

But for Gray, her own experience teaching says just the opposite. Before Gray was a PhD researcher, she was a middle and high school math teacher. And before that, she was an undergraduate math education major. She had a positive experience in abstract algebra as student, and now having served as a teacher, she sees how this course directly prepared her for situations she encountered as a teacher.

Thus became the subject of her PhD: how to help future teachers see how relevant and valuable abstract algebra can be, and in turn, better prepare teachers for their careers. At the core of Gray’s research is a sincere desire to equip preservice math teachers with the skills and knowledge needed to sustain their future students’ curiosity.



CAMMIE GRAY

PRESENTING POSTER AT ANNUAL RESEARCH IN UNDERGRADUATE MATHEMATICS EDUCATION CONFERENCE 2020 IN BOSTON

Gray's proposed solution to this disconnect is to provide abstract algebra students with short in-class warmup activities to make meaningful connections between their course content and potential classroom situations in the future.

"I really think that if you just give students the opportunity to think about situations where they might use [abstract algebra] in teaching, they might do some of the work on their own in terms of making connections," she says.

She created and tested these activities over the past year in a UNH undergraduate course with associate professor of mathematics and statistics [Edward Hinson](#). Now with a STAF award for the summer, she is sorting through a series of student interviews to begin drawing conclusions on how effective her warm-up activities were.

"Cammie's results will be interesting to mathematics faculty and to STEM educators, in general," says professor of mathematics [Rita Hibschweiler](#). "Her research, thus far, has allowed her to design unique activities for the abstract algebra classroom. Indeed, these activities are now in use, in the classroom of Professor Edward Hinson, as part of our abstract algebra sequence."

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