Monster-barring as a Catalyst for Connecting Secondary Algebra to Abstract Algebra

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Abstract: In this talk we will report on a teaching experiment in which a pair of prospective secondary mathematics teachers leverage their knowledge of secondary algebra in order to develop effective understandings of the concepts of zero-divisor and the zero-product property (ZPP) in abstract algebra. A critical step in the learning trajectory involved the outright rejection of the legitimacy of zero-divisors as counterexamples to the ZPP, an activity known as monster-barring (Lakatos, 1976; Larsen & Zandieh, 2008). This monster-barring activity was then productively repurposed as a meaningful way for the students to distinguish between types of abstract algebraic structures (namely, rings that are integral domains vs. rings that are not). We draw several key implications for the teaching and learning of abstract algebra as well as the preparation of secondary mathematics teachers.

Dr. John Paul Cook is an assistant professor of mathematics at Oklahoma State University. His research includes issues related to the teaching and learning of abstract algebra. His most recent publication in the Journal of Mathematical Behavior (entitled "An undergraduate student's thinking about zero-divisors and the zero-product property) investigated the question of why students might overextend the zero-product property to contexts in which it does not hold.

Rosaura Uscanga is a Ph.D. student in the Department of Mathematics at Oklahoma State University. She received her B.Sc. in mathematics from the University of Texas at Arlington and M.A. in mathematics from Oklahoma State University. Her main area of research is investigating student thinking in Abstract Algebra, but is also interested in research related to student affect. She is currently a research assistant on an NSF grant looking at how secondary school teachers’ knowledge influences their practice.