TEXAS STATE UNIVERSITY

Department of Mathematics Colloquium

Investigating Students' Combinatorial Reasoning in a Computational Setting:

Using Programming to Distinguish Four Fundamental Types of Counting Problems

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Computational thinking and activity are increasingly important aspects of scientific and mathematical work. In mathematics education, there is a need to investigate the ways in which students' computational activity affects how they reason about mathematical concepts. In addition, when solving counting problems, students often struggle with determining what problem type they are trying to solve, and, thus, what formula appropriately applies. Students could benefit from interventions to help them conceptually understand key distinctions between problem types and to differentiate meaningfully between such problems. In this talk, I investigate undergraduate students' understanding of counting problems in the context of elementary Python computer programming. I show that four straightforward program commands correspond to four canonical combinatorial problem types, and I demonstrate that such programming seemed to reinforce important combinatorial distinctions for the students I interviewed. I also suggest that the findings in this paper represent one example of a way in which a computational setting may facilitate mathematical learning.