Oral Defense Announcement
University of Missouri – St. Louis Graduate School

An oral examination in defense of the dissertation for the degree
Doctor of Philosophy in Education with an emphasis in Teaching and Learning Processes

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M.N.S. in Mathematics, May, 2012, Southeast Missouri State University
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The Effect of Using Virtual Manipulatives on Students’ Ability to Mentally Compare
Proper Fractions

Date: May 8, 2020
Time: 10:30 a.m. to 12:30 p.m.
Place: Zoom

Abstract
This study proposes a method to analyze the effects of the use of virtual fraction models (circle/bar/number line) on students’ ability to mentally compare proper fractions. Since developing a sense of magnitude with both whole numbers and rational numbers is highly correlated with improved performance on standardized assessments and improved performance in later algebra classes, special attention is directed to the bar and number line as they are linear representations.

The study used an experimental pretest/posttest group design by randomly assigning subjects within class sections to a control group (physical fraction circles) and treatment groups with seven different methods of comparing fractions (virtual fraction circle, virtual bar model, virtual number line, and all combinations). The pretest and posttest instruments identifying student reasoning in fraction comparison used in the study were developed by the Education Development Center’s Eliciting Mathematics Misconceptions Project. The instruments were designed to gauge students’ dependence on whole number reasoning, the unit fraction, and gap reasoning (the difference between the numerator and denominator).

The use of the virtual fraction circle should determine whether a technology bias is inherent in the study, while the bar model and the number line model show a more linear view of the fractions. Analysis of variance was performed on the differences between pretest and posttest scores and the differences between a pre/post classification on a scale of student comparison method to examine any overall effect on student performance.

Defense of Dissertation Committee
Dr. Keith Miller, Ph.D.
Dr. Natalie Bolton, Ph.D.
Dr. Amber Candela, Ph.D.
Dr. Helene Sherman, Ph.D.