The Use of Manipulatives in Mathematics Classrooms

Alexa M. Musacchio

Layperson Summary

Program: MDSK
Advisor: Dr. Michelle Stephan

Spring 2015
The traditional approach to mathematics instruction usually includes a teacher-centered environment, direct instruction with very little inquiry, and learning for memorization instead of understanding. This direct approach to mathematics is ineffective because it fails to help students link the mathematical procedures to the underlying meaning of the steps (Pitsolantis & Osana, 2013, p. 22). Additionally, students cannot transfer what they have learned into contexts other than the simplified problems provided in class. Cross (1999) stated that “students remember what they understand”, not what teachers tell them to memorize (p. 9).

In order to combat simply learning mathematical calculations, The National Council of Teachers of Mathematics (NCTM) encourages teachers to “value and encourage the use of a variety of tools” (p. 52). All students learn differently, whether they are visual learners, auditory learners, or kinesthetic learners. Therefore, teachers need to be prepared with various resources to better engage the young adolescents of their class. These resources are called mathematical manipulatives, which “refer to concrete materials, [that is], physical objects students can manipulate to explore and develop an understanding of a mathematical concept” (Bouck & Flanagan, 2010, p. 186).

Manipulatives can come in many different forms, so this study will focus on which manipulatives are effective, how to successfully choose and implement appropriate manipulatives, and the characteristics of them that allow students to engage with them productively. I will collect and compare data I receive from observing of a middle grades’ mathematics class to support my predication that
mathematics manipulatives help students gain and maintain deeper understandings. This will include observing the differences in instruction, student participation, and assessment results of two different classes, one that uses manipulatives throughout the lesson and one that uses a direct approach to mathematics. This study will take place in a suburban middle school that works toward implementing inquiry-based instruction in their mathematics program. In addition to observation, I will interview teachers to determine their reasoning of which manipulatives they choose to implement in their lessons. I will also interview students to collect their opinions toward their instructor’s use of manipulatives and how they enjoy interacting with math during the lesson.