An Investigation of Changes in College Students’ Conceptions of Mathematics and Mathematics Learning During Participation in a Reform-based Developmental Mathematics Course

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August 1999

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Dissertation Abstract

Prior research has established that student-held conceptions of mathematics and mathematics learning influence the learning of mathematics. It has also been established that the context surrounding students’ learning experiences plays an important role in the development of students’ conceptions. Reform efforts in mathematics education are beginning to change the context of mathematics learning for some students. The aim of this research study is to extend prior research by investigating the occurrence of changes in students’ conceptions of mathematics and mathematics learning during their participation in a reform-based developmental mathematics course. In addition, this study aimed to describe the conceptions of mathematics and mathematics learning held by students who had completed a reform-based developmental mathematics course.

This study employed methods that were greatly influenced by a research approach known as phenomenography, a qualitative research approach that has been used extensively to study conceptions. In particular, I interviewed 15 students who had completed a particular reform-based developmental mathematics course (i.e., Math 101). I also interviewed, several times each, four students while they were taking the course.

My analysis of the data led to the development of a description of the students’ conceptions of mathematics and mathematics learning and the identification of several changes in students’ views of mathematics and mathematics learning. For example, I observed that students generally see mathematics learning as something that is expert-based, but I also observed that there was a tendency during the course to change from seeing the learning of mathematics as a teacher-centered experience to seeing mathematics learning as more of a student-centered experience.
The findings of this study have implications for mathematics education. For example, since many student-held conceptions are sustained even in the face of new kinds of learning contexts, this study would suggest that mathematics learning experiences should be designed and implemented in grades K-12 that promote the development of desired conceptions of mathematics and mathematics learning. In addition, since changing conceptions is possible, this study suggests that curriculum be designed and implemented with the intention of changing students’ established conceptions of mathematics and mathematics learning to more desirable conceptions.