Stony Brook University
The Graduate School

Doctoral Defense Announcement

Abstract

The Integration of Mathematics in Middle School Science: Student and Teacher Impacts Related to Science Achievement and Attitudes Towards Integration

By

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Contemporary research has suggested that in order for students to compete globally in the 21st century workplace, pedagogy must shift to include the integration of science and mathematics, where teachers effectively incorporate the two subjects seamlessly. Mathematics can facilitate a deeper understanding of science concepts and has been linked to improved student perception of connections between science and mathematics. Although there is adequate literature to substantiate students' positive responses to integration in terms of attitudes, there has been little empirical data to support significant academic improvement on assessments when both subjects are taught in an integrated method.

This research study, conducted at several school districts on Long Island and New York City, New York, examines teachers' attitudes toward integration and students' attitudes about, and achievement on assessments in, an integrated 8th grade science classroom compared to students in a non-integrated classroom. An examination of these parameters was conducted to analyze the impact of the sizeable investment of time and resources needed to teach an integrated curriculum effectively. These resources included substantial teacher training, planning time, collaboration with colleagues, and administration of student assessments.

The findings show that students had positive outcomes associated with experiencing an integrated science and mathematics curriculum, though these were only weakly correlated with teacher confidence in implementing the integrated model successfully. The positive outcomes include the ability of students to understand scientific concepts within a concrete mathematical framework, improved confidence in applying mathematics to scientific ideas, and increased agreement with the usefulness of mathematics in interpreting science concepts. Implications of these research findings will be of benefit to educators and policymakers looking to adapt integrated curricula in order to improve the preparation of students to learn and achieve in a global society.

Date: March 18, 2016
Time: 11:30am
Place: 038 Life Sciences

Program: Science Education
Dissertation Advisor: Angela M. Kelly, PhD