Students come to college with significant amounts of prior knowledge, which often includes misconceptions that hinder their ability to succeed in STEM disciplines. They arrive with pre-formed notions which can make it more difficult for them to learn new material, or the “correct” versions of concepts they think they already know. These misconceptions can create barriers to student success.

Misconceptions, or “alternative beliefs,” have been widely studied in the physical sciences, but less research exists for the life sciences and other fields. Most of the research has been done at universities and K–12, but few studies have been done at community colleges.

During the 2014 – 2015 academic year, faculty from QCC’s Biology, Math, and Chemistry departments collaborated to conduct a controlled experiment to determine if student reflections can help resolve misconceptions in STEM courses. This work was supported by a pedagogical research challenge grant from QCC’s Center for Excellence in Teaching and Learning (CETL). Dr. Dona Boccio (Math), Dr. Kevin Kolack (Chemistry), and Dr. Mangala Tawde (Biology) were the PI’s in this grant.

The goal of the study was to identify and resolve misconceptions in three important gateway STEM courses: Elementary Algebra, Introductory Chemistry, and Anatomy and Physiology. Steps taken included:

1. Identify misconceptions students bring to the class by administering a pre-test at the beginning of the semester;
2. Design and implement on-campus reflection sessions outside classroom instruction to address or resolve the misconceptions;
3. Devise additional reflective activities for online assignments;
4. Conduct post-tests to determine if conceptual change occurred and resulted in improved academic performance.

On-campus reflection sessions used student reflective activities and guided-inquiry learning. Students reflected on their own prior knowledge and belief systems, analyzed each other’s erroneous beliefs, and worked with peers to discover correct concepts.
References:


