The Biology Core Curriculum (Biocore) program is an honors level series of biology courses that meet the core curriculum requirements of biology majors at UW-Madison, and upper-class students in the Biocore program. Biocore 324 is a student-centered classroom physiology laboratory that is based on preparing students for graduate research and/or a professional program in the medical field. As an elective laboratory experience that is based on preparing students for graduate research and/or a professional program in the medical field, one course objective should be to instill a sense of excitement and confidence in these students regarding scientific research. Inquiry-based physiology laboratories have been successful in improving confidence in undergraduate student’s ability to formulate questions and hypotheses, design experiments, collect and analyze data and make conclusions. It is our goal to improve student achievement, since more positive attitudes toward the science learning experience have been associated with better achievement in science.

**STUDY QUESTION**
Do syllabus modifications to an existing student-centered laboratory course increase student confidence in and achievement of science process skills?

**METHODS**

**INTERVENTION:**
Changed syllabus from three to two research projects during the semester

**DATA COLLECTION:**
- Rubric scores on written research papers
- Pre- and Post-Student Assessment of their Learning Gains (SALG) surveys

**RESULTS**

**Figure 1.** Paper numbers (2-6) represent chronological order. Papers 2-4 (blue) represent written papers for project 1, a 10-week long animal physiology project. Papers 5-6 (green) represent written papers for project 2, 5-week long plant physiology project. Bars represent mean rubric scores ± s.e.m., n= 28.

**Figure 2.** Results section of written paper assignments. There were no significant differences in mean Results section rubric scores between the two TA sections (AK and TLC) of the class for any of the written assignments (p > 0.296). Combining both sections, there was a significant increase in rubric scores from Paper 2 to Paper 4 (animal physiology project, p = 0.0011), and again from Paper 5 to Paper 6 (plant physiology project, p = 0.0003). Bars represent mean rubric scores ± s.e.m., n= 28.

**POST-SALG: Example Survey Questions & Mean Response Scores**

- (No gain=1, A little gain=2, Good gain=3, Exceptional gain=4)

**SUMMARY**

- For all main sections of written research papers, students improved with each review and rewrite; however, student performance in the Results section did not peak until the final course assignment.
- During the second project (5 week duration), students advanced writing skills to the same level achieved following the first project that lasted 10 weeks. This increased achievement rate indicates a long-lasting impact of learning gained during the slower-paced introductory project.
- Post-SALG survey responses show good to exceptional gains reported by students on understanding of statistical applications to their research and on confidence regarding their research projects.

**REFERENCES**