

## Project Summary

### **“Peer Review as a mechanism for both curriculum reform and assessment”**

NSF Course Curriculum Laboratory Improvement, Adaptation & Implementation award to  
University of South Carolina, Department of Biological Sciences  
Briana Timmerman, Jon Singer, Tom Reeves and Sarah Woodin

### **Challenges**

Departmental review of undergraduate biology laboratory experiences at the University of South Carolina revealed: a lack of emphasis on science inquiry skills, dissimilar introductory experiences for transfer students and the lack of comprehensive performance assessment benchmarks. Thus, a potential gap exists between the experiences provided by our current curriculum and the sophisticated understanding of science desired for our graduating majors.

These challenges are being addressed by several department initiatives. We are seeking funding to enable us to integrate a performance assessment system to illuminate our students’ evolving inquiry skills. We have chosen the *Calibrated Peer Review* system developed at UCLA through NSF funding as the central mechanism to achieve these goals.

### **Current Initiatives**

USC Biology has enacted several inquiry-based reforms over the last 18 months including integration of the genetics visualization software *BioLogica*, the natural selection program *Galapagos Finches* and frequent use of peer review.

### **Goals and objectives**

We request funding to enable four key objectives:

1. Integration of the *Calibrated Peer Review* system in our introductory and sophomore biology laboratories.
2. Development of comprehensive performance assessment criteria and evaluation of the efficacy of our undergraduate curriculum by tracking changes in student inquiry skills from freshman to senior year.
3. Professional development for faculty and teaching assistants in the pedagogical practices associated with inquiry-based, reflective learning
4. Integration of curriculum reforms at our largest two-year partner institution (Midlands Technical College).

The *Calibrated Peer Review* software facilitates students’ critical thinking and evaluation skills by providing a framework within which students 1) receive guided experiences in evaluating example work (calibration phase), 2) anonymously review the work of peers and 3) self-assess. Integration of *CPR* to introductory and sophomore level laboratories will improve students’ critical thinking and science inquiry skills. We will evaluate the impact of these reforms by tracking changes in students’ written lab reports across freshman, sophomore and senior year. Evaluation criteria, evaluation scoring guides and mechanisms for ensuring inter-rater reliability will be critical aspects addressed by the project. We expect that peer review will improve undergraduate science inquiry skills. Capturing said lab reports via the *CPR* system will provide a novel mechanism to evaluate the efficacy of our curriculum as a whole.

Successful innovation requires pervasive and substantial professional development. Our third objective provides support to faculty and teaching assistants responsible for enacting the curricular innovations. Establishment of a peer teaching evaluation system as well as advanced pedagogical training opportunities are expected to result in improved teaching for undergraduate students.

The fourth objective extends these curriculum reforms to Midlands Technical College. We will compare performance of MTC transfer students in the sophomore level USC courses to the performance of students who took the entire sequence at USC to determine the effectiveness of the curriculum alignment efforts over time.

**Broader impacts:**

Beyond the enhanced education offered to approximately 1700 undergraduates per year, we anticipate publications investigating models for aligning laboratory experiences between four-year and two-year institutions, performance assessment systems for measuring knowledge construction, and the impact of the peer review process on students' development as future scientists.