2013 BLC Catalytic Grant Proposal **Biology Leadership Collaborative: Developing a Faculty Mentoring Network to Promote Biology Education Research**

Collaborators

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Issue

Many faculty are enthusiastic about establishing biology education research in their classrooms, and may even be collecting data. However, most have a background in biology field or bench research, not education research. Therefore, there is a substantial barrier to progress in developing education research because faculty must be mentored in the methodologies necessary for successful research and publication in education. Additionally, research is collaborative. That collaboration shapes our questions, refines our thinking, and helps us see pitfalls and alternative explanations of results. In many college settings teaching is siloed. We do not often work with education research colleagues whose "labs" are right down the hall and whose equipment we share. Most of us do not have post-docs or graduate students who bring fresh ideas and techniques to add to our projects. Collaboration opportunities are limited.

Proposed Project

We wish to form a collaborative group to help one another move along our own research path with Peggy Brickman's expert guidance. The project will be initiated with each person submitting to the group a broad question about student learning that they wish to investigate or which they have already begun to investigate, as well as any literature about previous similar studies, information about their research setting and any preliminary data they may have. After everyone reads and considers the shared ideas, there will be a Skype meeting with the group to get some "homework" ideas from Peggy. We will then plan a face-to-face meeting for a day and half together. Personal schedules and fund availability will influence who is able to come to Chapel Hill and who may have to join us "virtually." Grant funding would provide a modest consultant fee and travel funding for Peggy with the remainder used as travel money for others to come to Chapel Hill. Thus, the purpose of the funding is to make possible this opportunity to work intensely together. This is the main catalytic activity.

Convergence of research ideas will be a goal for the group, though certainly not everyone will have the same research question. The degree to which this is possible will become clear as we proceed. At the BLC Peggy gave us a list of problems that we might pursue. We will see if several of us might choose the same or similar problems so that we may use the same methods and thus be more helpful to one another.

In addition to the members of the BLC, select teaching faculty at the meeting location in Chapel Hill will be invited to join the process. This would include several faculty in the Biology Department as well as members of the UNC Large Lecture Learning Community. While these additional members may not be part of the core group, we know from our brief participation with Peggy at the BLC that even short-term guidance from Peggy and inspiration from sharing in a group setting can generate enthusiasm to drive the research process forward.

The product of our meeting in Chapel Hill should be a clear research plan for each faculty member that can be implemented in Fall 2013 or, at the latest, during Spring 2014. Our goal would be to have at least preliminary data to share at the 2014 BLC.

Areas of research interest currently include:

- the analysis of variables that contribute to the success or failure of student-generated drawings (external representations) as learning exercises.
- flipped class mode in general, and of particular group activities and case studies on the ability of students to learn and apply concepts to real biological problems
- the concept of "productive failure" (Kapur and Bielaczyc 2012) - that students who work on complex problems without instructor guidance at first, to be given guidance and troubleshooting only later, learn more deeply than students who are given explicit guidance from the start. Also the idea of desirable difficulties of Robert Bjork.
- evaluating class exercises that target particular misconceptions
- evaluating the relationship between student learning outcomes and student success in course performance.

Anticipated Impacts of the Project

The project will have short-term and long-term impacts. Over the short term, the project will establish collaborations that will advance each participant's success in biology education research. Over the long term, each participant will be more successful in contributing to the biology education research literature (having a broad impact on professors and students), and will also be more qualified to serve as mentors to beginning educators (e.g., graduate student teaching assistants, junior faculty) as well as established professors (e.g., BLC colleagues, senior faculty), thereby building up the research network within our home institutions and beyond. These studies will also make available additional information about the efficacy of methodologies being researched.

Justification

A catalyst promotes reactions that are fundamentally possible, but increases the likelihood and speed at which they occur. It is exactly that being proposed here. A group of faculty from diverse institutions seeks to develop and implement research projects that relate to their own classes but have relevance to biology education in general. This inter-college mentoring

network will assist faculty in generating the hypotheses and collecting the relevant data that will answer outstanding questions in college-level biology education.

Our idea for the inter-college working group was sparked by Peggy Brickman's presentation at BLC 10, which challenged us to ask questions about our teaching and our students' learning to understand how effective we are as biology educators. We are scientists seeking empirical evidence. Peggy made it clear that any of us could develop questions that move the field forward. That is precisely what we want to do. Research today is collaborative. That collaboration shapes our questions, refines our thinking, and helps us see pitfalls and alternative explanations of results. However, opportunities for collaboration or mentoring in biology education research are limited within our home institutions. This BLC Catalytic Grant will help us develop a research mentoring network across seven institutions that will not only benefit the participants but ultimately the BLC community and beyond.

Timeline

Summer 2013: The group will share preliminary ideas and have a group meeting in Chapel Hill in preparation for Fall semester. The Chapel Hill meeting will result in a clear research plan for each faculty member

September 4, 2013: Interim reports will be filed including a list of hypotheses and research plans and methodologies for each collaborator

Fall 2013: The group will share progress with at least one all-group virtual meeting planned for October

December 2013 Collaborative "check-in" with Fall semester progress

Spring 2014: The data collection continues and write-up begins

June 6, 2014: Final report due.

Budget

Description	**Cost**
Peggy Brickman, Travel to Chapel Hill and Stipend	$2000
Kim Quillin travel to Chapel Hill	$500
Andrea Aspbury travel to Chapel Hill	$500
Jung Choi travel to Chapel Hill	$500
Andrea Weeks travel to Chapel Hill	$500
Dominic Lannutti travel to Chapel Hill	$500
Jean and Peter DeSaix expenses associated with meeting	$500
Total:	$5,000