

BLC Application, Spring 2013

1. Title of project:

Developing Training for Undergraduate and Graduate Teaching Assistants

2. Name and institution of collaborators

Drs. Laurel Roberts, Bina Vanmali, and Allyson Zeamer met in March 2013 at the Biology Leadership Conference. Our shared excitement about the ideas presented and the need for TA training materials discussed at the conference inspired us to want to work together to develop training materials for undergraduate and graduate TAs. A bit about each of us follows.

Laurel Roberts, University of Pittsburgh

Dr. Roberts will begin her 18th year as a lecturer at the University of Pittsburgh (Pitt) this fall. Pitt is large (~29,000 students), public, and research-oriented. She teaches courses in introductory biology (two semester sequence), ecology, and human physiology with lab. At least 25% of students at Pitt are pre-professional, pursuing careers in pharmacy, medicine, dentistry, or other health-related careers. Roughly 1000 students major in biological sciences, making it one of the largest departments on campus. Dr. Roberts spends her summers teaching for a pre-med program in Pitt's School of Medicine.

In the fall, Dr. Roberts will have a total of 25 TAs for her three lecture classes. She and colleagues are concerned that they no longer have enough one-on-one time with each UTA (because there are so many per course), which is previously how they trained them in ethical and pedagogical issues. She would like to develop materials that could be accessed by all the instructors and UTAs in the department and ensure uniformity in training. Dr. Roberts is an editor with the iCollaborative of the MedEdPortal sponsored by the AAMC and an ambassador for the BioSci Education Network (BEN) sponsored by AAAS. Having published through both of these, she believes that this project would be a welcome addition to both or either.

Binaben (Bina) Vanmali, Arizona State University

Dr. Vanmali is finishing her first year in the School of Life Sciences (SOLS) at Arizona State University (ASU), the largest undergraduate campus in the United States. The academically, ethnically, and socioeconomically diverse student population is one of ASU's greatest strengths, although it poses great challenges for effective teaching and learning. Specifically, SOLS deals with issues of scale and diversity (15% of our majors are in the Barrett Honors College, 15% test into remedial math, and many are first generation college students). Noted for its high quality life sciences research, SOLS is "home" to 300+ graduate students and more than 2900+ undergraduate life sciences majors. As such, SOLS offers many *large* lower division courses and in recent years, even the upper division courses have enrolled 200-300+ students per section. Hence, we employ approximately ~30-35 undergraduate and 123 graduate TAs each semester.

Dr. Vanmali's position includes curriculum development and reform, teaching, and biology education research. She teaches two types of courses for introductory biology majors (both two semesters long) and graduate courses in biology education.

Alyson Zeamer, University of Texas at San Antonio

Dr. Zeamer has been an Instructor and Lab Coordinator in the Biology Department at UTSA for two years. UTSA enrolls more than 30,000 students of diverse backgrounds, including >45% Hispanic students, and up to 60% minority students overall. There are many research opportunities in the STEM fields, especially biology, and UTSA is currently in the middle of a campaign to become a Tier One University.

Dr. Zeamer currently teaches Contemporary Biosciences I, Genetics, and Animal Behavior as well as run the Neurobiology Lab and the Developmental Biology Lab. Several of these classes are quite large, with more than 2000 students enrolled in Biosciences 1 each year. Because of this, Dr. Zeamer relies upon a maximum of 25 undergraduate and graduate TAs each semester to help with these courses. At this time, the only TA training that these TAs receive is the one afternoon they spend with her prior to the start of each semester.

3. The issue the project intends to address

Each campus has different reasons for creating and implementing a course for training and supporting undergraduate and graduate TAs. Budgets for TAs have decreased at many institutions, yet there is increasing interest in leadership opportunities for both graduates and undergraduates, as well as a great need for TAs. Examples include:

- At Pitt, introductory biology sections average 250-300 students so there is a vital need for TAs, especially peers who can help students navigate the course. The introductory lab coordinator would also like to start using UTAs, so networking with ASU and UTSA would be very helpful.
- The SOLS at ASU has created a new two semester course for introductory biology majors that will employ a "flipped approach" and require all 456 students per class to attend weekly "active learning sessions," in addition to weekly labs. The other courses within SOLS also use the active learning classroom and/or have labs attached to the courses. TAs are employed to support teaching and learning.
- At UTSA, Dr. Zeamer and colleagues have developed a one hour quantitative learning course (QL Session) that students enroll in along with their introductory Biosciences 1 course. Because up to 1300 students enroll in this course each semester, there are up to 40 sections that meet each week, each of which requires an undergraduate TA to facilitate the class. Because the idea behind these QL Sessions is that students will learn through peer-led group work, TAs must be trained not only in classroom management, but also understand how to facilitate their students' group learning.

At all three universities, these circumstances have created a need for TAs—both undergraduate and graduate—to staff more than just the labs. The movement toward more active and peer learning has also demanded that TAs be well-versed in basic science teaching learning theories and strategies. However, there is currently little to no standardized training in place to help them succeed in most of these positions. From a

pedagogical standpoint, accessing and training a largely untapped pool of TAs allows departments to increase the implementation of active learning curricula.

At Pitt, there is currently no formal training for UTAs. In fact, the department responsible for training graduate TAs has been specifically informed that they are NOT to train undergraduates.

At ASU, prior to Dr. Vanmali's arrival, SOLS implemented an "Innovative TA" Program to train graduate TAs in use of active learning strategies in the classroom. Approximately 100 graduate students completed the course for the 2012-2013 school year. This course will be part of Dr. Vanmali's work starting in Spring 2014 and as such, she is interested in revising and improving both the content offered and the strategies employed. Currently, the course only supports graduate TA development, but once Dr. Vanmali takes over, the intent is to open it up to undergraduate TAs as well.

At UTSA, there is little structure in place. Dr. Zeamer's goal is to launch a new course for graduate students, eventually requiring all incoming graduate students to complete the training before becoming a TA. She would eventually like to incorporate many of the same ideas from the course into a week-long summer training workshop for the undergraduate TAs.

4. A short description of the proposed project

The overall aim is to work as a team to develop a course and/or series of training modules that would include learning theories, basic pedagogical techniques (i.e. leading class discussions, writing questions at different Bloom's levels, other types of assessment, etc.) and ethical concerns (i.e. sexual harassment, when to seek help, etc). We intend to train new TAs in our respective departments and potentially TAs from other STEM disciplines in the practical aspects of course design and implementation.

The courses will incorporate current research on classroom structure and teaching methods with an emphasis on how they apply to classrooms in the STEM disciplines. The course will cover various topics including, but not limited to

- developing a teaching philosophy
- preparing a syllabus linked to a specific course they would like, or plan to teach
- structuring learning activities that help their students to acquire specific skills
- effectively using new teaching tools and technology
- how to develop appropriate rubrics and assessments linked to their course objectives, and
- developing strategies for addressing cultural diversity, gender issues, different learning styles, and physical and learning disabilities.

This project will be evaluated using both quantitative and qualitative data collection methods. Pre- and post-surveys will help us to determine effectiveness, as well as areas where improvement is needed. In addition, interviews and/or focus groups may be implemented to further assess efficacy. Long-term, we hope to find out how TAs felt their training supported their development 1, 2, 3, and maybe 4 years out.

5. The anticipated impacts of the project

Two of the three departments have very little standardized training in place to prepare, support and help new TAs succeed in front of a classroom. In addition, each campus has a different demographic of students. The training found at the third institution is new and unfinished. Most TAs are unaware of how much research has been done or what sorts of resources are available to them to help prepare them for their roles as TAs. Remarkably, many faculty members are also unaware of the resources available to help them train and support TAs. By collaborating across institutions, we plan to develop solid training materials to help undergraduate and graduate TAs make a strong start at a wide range of campuses. We will share those materials and resources with other instructors and campuses via publication and resources such as the BioSciEducationNetwork (BEN).

6. A justification – why should this project be funded?

In order to produce materials that will be valuable for multiple campuses, programs, and even STEM fields, we need to collaborate with others who share similar goals. However, funds for such projects are practically non-existent at most institutions. Because the outcomes of this project have the potential to help many campuses to implement TA training without the need to invest additional time or money in creating appropriate materials, it is a worthwhile endeavor. Such materials will advance undergraduate biology education (and other STEM fields) by developing and supporting the professional development of undergraduate and graduate TAs.

To ensure that high-quality materials are developed, it is important that those undertaking this endeavor are suited to the tasks at hand. This team is composed of three experienced biology instructors. As a team, we each bring unique strengths and insights that will contribute to the creation of TA training that would serve both undergraduate and graduate student development needs at a variety of campuses.

- Dr. Laurel Roberts has been teaching at the college level since 1992 (community college and university). She has used undergraduates as teaching assistants for ~10 years. In the beginning, it was a casual, volunteer relationship. Now, the program has become so popular that her program offers two tiers. A first time UTA can earn 1 credit hour pass/fail. Experienced UTAs may earn more credits and be rewarded with an “Honors” designation on their transcript. The program has also reached the point where interested students are sometimes turned away.
- Dr. Vanmali has been teaching at the college level for 7+ years (community college, liberal arts, and university level). She holds advanced degrees in both science education and biology and is well-versed in the education research literature, including important areas such as learning theories, effective teaching and learning strategies, assessment, diversity issues, and data collection methods for educational research. In addition, she ran the Science Tutoring Unit at the University of Missouri for 4 years, where she was solely responsible for creating and implementing training for all science tutors and graduate TAs that worked in the Learning Center. As an instructor, she has relied on graduate and undergraduate TAs for 6 years. Her background in teaching, student learning, and academic support all combine to help her support the development of students (both undergraduate and graduate) as teachers.
- Dr. Zeamer has been teaching full time at the University level for a little over 2 years. In addition, she has extensive training in developing and implementing active learning in

the classroom. Specifically, she has experience with problem based learning, which she spent two years developing for high school Biology classes in Atlanta and with quantitative techniques in the science classroom, which she has spent the last two years implementing in the QL sessions at UTSA. She also coordinates two different teaching labs, including training TAs to do a variety of tasks from running a lab to being a group facilitator. She conducted research in behavioral, cognitive, and developmental neuroscience for ten years before becoming an instructor and lab coordinator. This gives her a unique background because she can connect with students by bringing many real life examples of current research into the classroom.

7. A timeline/calendar for activities

- Summer 2013: Brainstorming via email and Skype meetings; Drs. Zeamer and Vanmali will survey current students to determine the content perceived for training needs
- Fall 2013: Materials development; continuation of sharing ideas and resources to develop materials
- September 2013: Provide interim report to BLC
- End of 2013: Meet in person to finalize plans for development, identify contributions of each person, and coordinate efforts for preparing training materials and evaluations
- Spring 2014: Dr. Roberts will pilot the course. Ideally, Drs. Zeamer and Vanmali will also be able to do so, at least with some groups of TAs. During the pilot, data will be collected to assess learning gains and perceived value of materials. Surveys and/or qualitative measures will be used for data collection. Data will be analyzed and prepared for sharing at BLC 2014.
- Late spring/Early summer 2014: Have materials ready for distribution and provide final report to BLC (6.6.14)
- Present materials and supporting data at BLC 2014

8. A simple itemized budget with a description of each item and estimated costs

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| •Travel: The team will meet once or twice at one of our campuses | \$3500 |
| •Supplies i.e. books and other materials: | \$300-500 |
| •TA for B. Vanmali (for comprehensive literature search + conducting surveys) | \$1000-1200 |