

2018 Innovation Mini-Grant Application



Shasta College is committed to supporting innovation ideas that enhance student learning and success. As a result of the 2015 Governor's Innovation Award, there is now a designated fund (up to \$100,000 per year for the next three to five years) to support faculty and staff projects that ultimately result in increased goal attainment for students. In accordance with the criteria for the Innovation Award, practices that enhance transfer and four-year degree completion while reducing time to degree are the highest priorities.

Please complete this application and submit it to the Office of Grant Development by February 28, 2018. For questions, please contact Amy Schutter, Director of Grant Development, at aschutter@shastacollege.edu or 242-7713.

Submitted by:	Mark Blaser, Divan Fard, Rebecca Osborne, Tim Shelton, Jessica Tyson
Division/Dept. Name:	SLAM/Chemistry and Biology
Project Name:	Class Set of Tablets to Improve Student Engagement and Learning
Project Overview Please provide a brief overview of the project.	
<p>It has been shown in multiple contexts, from elementary school through medical school, that effective use of electronic tablets in an active learning environment can: significantly boost student performance in conceptual understanding and problem solving ability; facilitate more efficient learning of material that is difficult to visualize or interact with; and improve students' confidence in their ability to learn.* This project proposes a pilot program to make extensive use of tablets in the chemistry and biology courses of five Shasta College instructors, with the goal of improving student performance in these courses. Additionally, this project will yield valuable information regarding the effectiveness of tablet-based instruction at the community college level, which is currently not very robust. (*We have compiled many studies and publications that support this claim, and these are available upon request.)</p>	
Student Impact	<p>The main focus of the Innovation Award funds is to positively impact student learning and success. Please describe how your project will:</p> <ul style="list-style-type: none"> Improve one or more Student Learning Outcomes (SLOs) Increase student engagement and/or success Reduce the amount of time for a student to complete a Certificate, Associates Degree or Bachelor's Degree Document measurable results (consult with the Research Office)
<p>The primary project goal is implementation of versatile mobile technology to better engage students in lecture, discussion and lab. We posit this may lead to improved student learning outcomes, higher course completion rates and higher retention (and therefore less time for students to complete required courses, be ready to transfer to university, and earn their degrees). This project will also lower the cost requirement on students that do not have access to mobile devices in courses that require them (which includes most chemistry and biology courses we offer). Currently mobile technology is being leveraged by a majority of chemistry faculty in a variety of ways: 1) to create instructional screencasts and tutorials that help students learn challenging concepts and allow them to observe refined problem-solving methods outside the classroom; 2) to facilitate student engagement and formative assessment during class via student response systems (this has been shown to provide distinct learning benefits for students, but lack of a unified engagement platform limits what can be accomplished and presented in class, e.g. many students lack a smart device with a sufficiently large screen to effectively engage with instructional technologies such as science simulations, chemical structure drawing, etc.); and 3) to allow the instructor to be "untethered" from the lectern computer during class, which maintains dissemination of instructional material while facilitating better interactions between the instructor and</p>	

students. Additionally, we rely heavily on computers and interactive probeware (sensors for temperature, pH, absorbance, etc.) for data collection and analysis, but the current data collection systems in the chemistry labs are unwieldy and ancient and have significant disadvantages in their ability to effectively accomplish the learning objectives, present information, and collect data in the field. Having a sufficient number of tablets for use in class would substantially improve engagement and learning by allowing all students to interact appropriately with the specific learning activity (simulation, experimental data collection, group problem-solving, etc.), would facilitate data collection on a more functional and flexible platform (e.g. allowing data collection outside of the lab), and would provide students with a more effective means of presenting their classwork and projects. Participating instructors will develop multiple tablet-based activities for their classes and will use these activities with their students. Student performance on the activities themselves, and on later assessments based on these activities, will be compared with student data from previous years and/or results from students using similar but non-tablet-based activities. Students will also be surveyed regarding how enjoyable and effective they found the activities, and instructors will make (observational) assessments of student engagement during these activities. Participating instructors will meet frequently during the 2018-2019 school year to share results, discuss progress, and consider modifications if warranted. Student feedback will be solicited, and discussions with groups of participating students will be held. Collaborators with data analysis expertise (please see the next section for details) and the Shasta College research office will be consulted regarding the data collection and analysis.

Collaboration

Mini-grant projects often involve collaboration between multiple divisions/departments and/or outside entities (K-12, CSU/UC, or community partnerships). Please:

- List any internal and/or external collaborative partners
- Confirm that the partners are aware of the project and what their role in implementation will be

This project has the potential to improve student engagement and learning and increase success rates in course completion, retention and persistence. If we can increase student learning outcomes and show students more effective learning methods, we can help students to more successfully make the transition from high school to university and be more likely to continue in the academically challenging STEM majors. This could lead to better student success at Shasta College, as well as increased transfer success and higher university graduation rates. The requested funding is for a specific project at Shasta College, but it has great potential for collaboration both within Shasta College and in partnerships with other local and regional institutions. Within Shasta College, the laboratory usage component of this proposal can connect directly with Matt Evans' Electronic Lab Notebook sabbatical project to facilitate and improve data collection and analysis and lab report preparation, and would also integrate seamlessly with having a local classroom server for student group activities (tentative Matt Evans Innovation Grant proposal). Regarding collaboration with other institutions, we have already had preliminary discussions regarding collaboration with science simulation and data analysis experts at UC Davis (Julia Chamberlain, Ozcan Gulacar) and chemistry education researchers at CSU Chico (Erik Wasinger, Lisa Kendhammer), and have contacted several local high schools regarding possible collaboration as well. We anticipate a small expense for the use of UC Davis researchers, and no costs for Shasta College, CSU Chico and local high school participants. We are quite confident about being able to work with both university and high school partners to increase the number of students affected and improve our ability to gather enough data, analyze it properly, and therefore produce some presentable or even publishable results. Discussions are already underway at a higher (administrative) level regarding possible (STEM) pathway collaborations (e.g. Kate Mahar at Shasta College, Elizabeth Bishay at UC Davis) between Shasta College and UC Davis, which could end up dovetailing nicely with and/or providing further support for this proposal. And if funded, this could also offer opportunities to develop better connections between local high school teachers and Shasta College instructors in the STEM disciplines. This project will hopefully be the mechanism that allows Shasta College to host a conference with the above parties to share teaching ideas and discuss other collaborative approaches to enhance student success in the STEM fields.

Future Possibilities

The Shasta College mini-grants initiative provides the testing ground for innovative ideas to determine successful outcomes that may be used on a broader scale. Please discuss if the project is:

- Replicable (easily shared with other campus programs)
- Scalable
- Cost-Effective (e.g., through number of students served; through District efficiencies increasing service to students; or if scaling up will prove cost-effective)

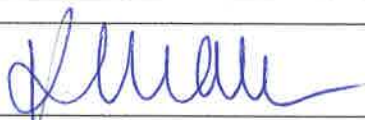
A successful project would help elucidate the benefits of leveraging mobile technology in labs, discussions and lectures in selected chemistry and biology classes at Shasta College, and will hopefully provide incentives to expand to tablet-based data collection, use of interactive simulations, and so on, in all our chemistry and biology classes. Participating instructors, along with a representative student panel, will present results of this project to the Shasta College community. Due to the similarities between what is required to learn chemistry and biology well, and what is needed to do so in the other physical and life sciences, this project could very easily be scaled to our physics, astronomy, geology and geography courses. And in consultation with faculty in other disciplines to compare and contrast their instructional needs with our empirical findings, use of effective tablet-based instruction has the potential to be beneficial in just about any field or course of study. This project would directly affect over 1000 chemistry and biology students during the 2018-2019 academic year, and has the potential to eventually impact (almost) all Shasta College students. If successful, this project will be very cost effective by: increasing course completion success; decreasing rate of students needing to repeat difficult STEM courses; and decreasing the time to completion of transfer coursework and earning a degree. It is also worth noting that throughout Shasta College, significant cost savings can potentially be achieved by replacing desktop computers in laboratories and classrooms with mobile tablets. Tablets are less expensive, require less infrastructure and maintenance, and can be deployed as needed rather than being stuck in a particular location. Ultimately, it is possible we might have thousands of dollars of reduced expenditure per impacted classroom.

Logistics

The mini-grant cycle—to include planning, implementation, and evaluation—is a maximum of 18 months (Fall-Spring-Fall), and all funding sources should be considered. Please confirm that:

- The project phases can be completed within an 18-month cycle
- No other funding sources are available for the project
- A Budget Proposal form has been completed and is attached.

Planning for this project would be completed during summer 2018, with implementation to occur during the 2018-2019 academic year (pending approval and timely purchasing). Data collection would occur over the course of the 2018-2019 school year, and would be followed by (no more than) 6 months of analysis of results and determination of project efficacy. No other funding sources are currently available (though there is at least the possibility of future funding for the potential Shasta College – UC Davis collaboration component of this proposal). The budget form has been completed is attached. Costs are our best estimates at the moment, and are open to discussion depending on available funding.



Research Office Signature

Date



Dean or Supervisor's Signature

Date

2/28/18