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NGLC Wave 1 Pre-Proposal Application Form

Project Title:	Hybrid Lab Courses for Core Mathematics Courses
Project Short Title (25 characters):	Math Hybrid Lab Courses

Principal Investigator Information:

Name:	Katherine F. Stevenson
Title:	Professor of Mathematics, Director of Developmental Mathematics
Institutional/Organizational Affiliation:	California State University, Northridge
Physical Address:	Bayramian Hall 402 California State University, Northridge Northridge CA 91330-8358
Email:	katherine.stevenson@csun.edu
Telephone 1:	818-677-5073
Type:	Office
Telephone 2:	
Type:	
Institutional/Organizational Tax Status	Nonprofit, U.S.-based organization (includes U.S. public postsecondary institutions)
If you selected "other," please specify:	

For U.S.-based nonprofit entities, if you know the tax code designation under which your organization operates (e.g., 501(c)(3), 501(c)(_), U.S. Non-Exempt) , please provide it

Tax Code:

Co-Investigator Information:

Name:	Werner Horn
Title:	Professor of Mathematics, Chair of Mathematics
Institution:	California State University, Northridge
Email:	werner.horn@csun.edu
Telephone:	818-677-2721

Name:

Title:

Institution:

Email:

Telephone:

Name:

Title:

Institution:

Email:

Telephone:

If you have additional co-investigators to list, please upload a Word or PDF document referencing your application and providing the requested information for each.

Attach:

Institutions Committed to Participate

Institution Name:	Humboldt State University
City, State:	Arcata, CA
Type:	U.S. state agency
Country of Operation:	US
Contact Name:	Mark Rizzardi
Contact Email:	mark.rizzardi@humboldt.edu

Institution Name:	Pierce College
City, State:	Woodland Hills, CA
Type:	US local agcy
Country of Operation:	US
Contact Name:	Mark E. Henderson
Contact Email:	henderme@piercecollege.edu

Institution Name:	Moorpark College
City, State:	Moorpark, CA
Type:	US local agcy
Country of Operation:	US
Contact Name:	Ed Knudson
Contact Email:	eknudson@vcccd.edu

If you have additional participating institutions to list, please upload a Word or PDF document referencing your application and providing the requested information for each.

Attach:

Compliance with NGLC Terms and Conditions

Q1. [Please check each and every box to indicate your acceptance] On behalf of myself, my co-investigators, and the institutions that have committed to participate, I warrant that we have each read and understood the following and are committed to abide by their terms and conditions:

In the NGLC Wave 1 request for proposals (RFP) [http://bit.ly/nglc_rfp]:	Application Instructions Selection Process Conditions of Funding Amount and Duration of Grants Reporting Appendix 1: Sample NGLC Grant Agreement Terms and Conditions NGLC Intellectual Property Policy [http://bit.ly/nglc_ipp] NGLC Conflict of Interest Policy [http://bit.ly/nglc_coi]

Challenge Areas

Q2. With which of the four NGLC challenge areas will your proposal engage? [Select all that apply]

Blended Learning
Learner Analytics
Deeper Learning and Engagement
Open Core Courseware

Q3. Which ONE of the four the intended NGLC student outcomes do you consider to be the primary focus of your proposal?

Blended Learning

Project Overview

Q4. Briefly describe your proposed project and how it relates to the intended NGLC student outcomes. (completion, persistence, content mastery, mastery of deeper learning outcomes)

5,000 characters maximum

California State University, Northridge (CSUN) seeks funding to expand the application of an innovative technology-enhanced hybrid course model that has significantly improved completion and content mastery outcomes in a general education (GE) Math class where it has been implemented. Funding will be used to adapt the model to other introductory math classes and facilitate the adoption of the model by our partners Pierce College, Moorpark College and Humboldt State University (HSU).

Cal State's 100-level math classes serve as both GE requirements and prerequisites for a range of higher level courses in math and other subjects. Historically, the completion rate for these classes has been low. For example in many CSUN GE requirement courses, an average of 66% of students receive a grade of C and below, while 33% receive a grade over C. Failure to pass GE requirements negatively impacts retention rates and delays degree completion at the University overall.

Part of the problem originates with inadequate math preparation in K-12, which the CSU system will be addressing starting in summer 2012 with an "Early Start" program. At the same time, we are confronting the issues surrounding math course completion and content mastery on our own campuses with technology-enhanced solutions that create individualized instructional pathways and enable focused and efficient learning with multiple opportunities for support and remediation.

The most successful of these has been the development of a course model that incorporates in-class interactive lectures, group-work in supplemental instruction, and "just-in-time" remediation of prerequisites. The course model couples a parent course (e.g., College Algebra) with a 1-unit hybrid lab. The course includes common lecture notes, practice exams, and online homework assignments with instant grading and feedback capabilities. The hybrid lab has two components: (1) a contact hour for group-work on the content of the parent course; (2) tailored and individualized online remediation for each student. This course model was implemented in the gateway course Math 103 (Mathematical Methods for Business) in spring 2008, and the results have been dramatic—essentially reversing the 66%/33% split seen in student success rates so that now, on average, 66% of students complete the class with a grade over C.

The idea behind the model is to create a flow from classroom to homework to exams. Students should:
• arrive in class with solid prerequisites allowing them to attend to concepts introduced in class,
• practice this new concept in facilitated group work,
• practice it independently in homework with instant feedback,
• return to class ready for testing or the next topic.

To accomplish this we coordinate the activities of graduate assistants, undergraduate student assistants, and instructors. All students are expected to attend the parent course lectures, while the group-work and online components are for those students in need of remediation. Placement is determined by testing (the Math Placement Test). The remedial component of the lab is an online self-paced course that is tailored to the prerequisite knowledge necessary to succeed in the parent course. Students work only on their personal areas of weakness and are given incentives to finish the online program within the first eight weeks of term. The student's work is monitored by a graduate assistant (GA), and the same GA meets these students weekly for one hour in groups of 30-40 to facilitate their work in groups on exercises that directly support the content of the parent course. Students currently submit their solutions to group work in written form. Part of the current proposal would be to build up the technology to allow them to submit their answers electronically in addition to their written work. These would then be automatically graded, giving the working group instant feedback. The hard copy of the students' solutions would continue to be

Scaling Potential

Q5. NGLC seeks proposals for solutions that have already been investigated in at least some meaningful way and shown to generate some relevant benefits. What is the current reach of the primary solution that you propose to scale? Be brief and numeric: numbers of students currently served, numbers of courses, numbers of institutions/campuses, etc.

500 characters maximum

The Math 103 course in which the hybrid-lab course model has been applied enrolls 600 students per semester. This hybrid model was also successfully transferred to Cal State University, Long Beach in Fall 2008, which enroll an additional 300 students per semester.

Q6. If your proposal is funded, by how much do you intend to increase the reach and dissemination of the solution? Again, be numeric, using the same measures as for your previous answer:

500 characters maximum

With funding, we will adapt this model for the basic pre-calculus classes at Cal State Northridge: College Algebra (Math 102, 600 students/semester), Trigonometry (Math 104, 300 students/semester), and Pre-calculus (Math 105, 100 students/semester). We also plan on disseminating the model for adoption by other campuses, including 250 pre-calculus students per semester at Humboldt State University and appropriate courses at Pierce and Moorpark Colleges.

Q7. Briefly, please discuss the immediate (i.e., within the term of the NGLC Wave 1 grant) and longer-term scaling potential of your proposed solution. What is the potential upside? What are the primary obstacles to be overcome or risks to be mitigated?

2,000 characters maximum

This project has the potential to scale to a wide range of introductory math courses at CSUN and partner campuses, particularly those designed for STEM majors. Among the first to be adapted will be College Algebra, Pre-calculus, and Trigonometry. The challenge will be to develop relevant content to be used in classroom examples, lab exercises, online questions, and exams. For STEM prerequisites, we will work in close collaboration with the various departments, so that questions will reflect material student will encounter within their majors.

In the medium term, HSU will consider expanding this to other introductory Math and Statistics courses: Contemporary Mathematics (150 students/semester), Mathematics as a Liberal Art (100 students/semester), and perhaps Elementary Statistics (150 students/semester).

Over the longer term, the model can be scaled to provide greater reach beyond partner campuses to broaden its impact. Our project team is well positioned to provide consultation and training in support of these efforts. Our two-fold plan for disseminating the instructional methods and materials developed in the project is:

1. Instructional methods
• Publication: The instructional models and data supporting their success will be submitted for publication in the Mathematics Digital Library (MDL), Mathematics Association of America
(MAA) Focus, and National Center for Academic Transformation (NCAT).
• Presentation: Joint MAA-AMS (American Mathematical Society) meetings in 2013. Sectional meetings of AMS, MAA, and NCAT in 2011-2013.
2. Instructional materials
• Materials developed for pre-calculus will be programmed into Webwork and made available by the National Webwork Library. All other workbooks and course materials developed through the project will be submitted for publication in the MDL.
• Train-the-trainer events—Periodic train-the-trainer events at CSUN and through online forums to facilitate adoption of the hybrid course model at other institutions.

NGLC Objectives

Q8. Which of the following descriptions best fits your proposal?

Our proposal targets primarily young adult learners under the age of 26 (i.e., such learners will be a majority of the population served).

Q9. Please check 'Yes' if your proposed solution will target high-enrollment, low-success developmental and/or general education courses—core, so-called "gatekeeper" courses—or similar courses in high-demand occupational programs such as business, criminal justice, information technology, and/or nursing and allied health.

Yes

Q10. If you checked 'Yes' in the last question, list the course(s) you will target.

300 characters maximum

College Algebra
Business Mathematics
Pre-Calculus
Trigonometry
Contemporary Mathematics
Mathematics as a Liberal Art
Elementary Statistics

Q11. Briefly discuss the outcomes you anticipate achieving by the end of the grant, and how they align with the NGLC outcomes of interest: scaling outcomes; student outcomes (completion, persistence, content mastery, mastery of learning outcomes); and cost-effectiveness outcomes. If your project receives NGLC funding, what would be the maximum (realistic, not theoretical) level of success you would expect to accomplish with NGLC funds? What would be your minimum expectations for success? What would be your most likely level of success? Please bear in mind that, if your application is selected, your answers here may be used to inform your project's eventual evaluation.

2,000 characters maximum

CSUN has projected that by implementing the hybrid lab model into their pre-calculus sequence they will increase the number of STEM majors significantly. This is summarized in the following:

By Academic Year 2012-2013 there will be 14 additional STEM bachelor's degrees awarded due to introduction of the hybrid labs. By 2014-2015, this number will be 55. Overall, between 2010 and 2015, we expect an additional 107 additional STEM bachelor's degrees to be awarded due to introduction of the hybrid labs.

We anticipate that by the end of this grant, the other partner institutions will have adopted this hybrid course model in at least one high failure class. At HSU, the proposal is to first implement the model in the pre-calculus sequence (enrolling 500 students per year). The current success rate is 60%. The expectation is that the success rate would increase to approximately 75%.

Q12. Briefly discuss how your proposed plans, procedures, and activities align with the objectives and criteria detailed in the "Core Values and Criteria" and "Challenge Areas" sections of the NGLC Wave 1 RFP (i.e., both general objectives criteria and those specific to the challenge area to which you are applying). Address explicitly any objectives or criteria to which you cannot or will not conform, or that you believe do not apply.

2,000 characters maximum

The Math Hybrid Lab Courses project proposed here addresses the following NGLC Wave 1 objectives and criteria for the all four challenge areas: Blended Learning (BL), Deeper Learning & Engagement (DLE), Leaner Analytics (LA), and Open Core Courseware (OCC).
• It targets a high-enrollment, low-success gatekeeper general education Math course (BL).
• It has demonstrated success in significantly improving student outcomes (persistence and completion) in the time in which it has been implemented at CSUN and CSULB (BL, DLE).
• The homework and group work problem sets developed to date use Webwork (open source) and will be made freely available (OCC).
• Its successful adoption at our partner campuses demonstrates its adoption potential at additional campuses within the CSU and community college systems and its overall scalability to a wide range of course types and institutions (BL).
• Its pre-assessment tool provides a precisely customized and efficient pathway to success for students, focusing them on activities and assignments for the subject areas in which they specifically need remediation (LA, DLE).
• It is truly a hybrid, blended-learning solution, combining a flexible online learning environment with a more traditional, structured lecture course, while also offering a group online lab component that combines the real-time feedback advantages of online courseware with the benefits of face-to-face instructor and peer-based interactions (BL, DLE).
• It has demonstrated significant cost-effectiveness in allowing us to reach greater numbers of students more effectively with fewer instructor and TA hours (BL).
• This cost-effectiveness factor will result in project sustainability at an institutional level after the grant funding period has concluded (BL).

Evidentiary Support

Q13. In order to help us to evaluate your proposal fairly, please select the letter corresponding to the phrase below that best describes your primary proposed solution:

A demonstrably effective learning solution, already widely applied and tested in the domain in which you intend to apply it, and ready for scaling to the next level.

Q14. What evidence do you have—direct or indirect, formal or informal—that your solution has the potential to achieve the transformative outcomes sought by NGLC? What evidence, if any, is still lacking, and how would you propose to acquire it in the process of scaling your solution using NGLC funds?

2,000 characters maximum

Results achieved through this hybrid model are remarkable. The average score for 12 sections of Math 103 in Spring 2008 on the common final was 70%, representing improvement of more than 20 points over Fall 2007. In Fall 2007, the section-to-section averages on the Math 103 common final ranged from 23% to 70%, whereas in Spring 2008 the range was from 60% to 81%. Thus, greatly improved homogeneity was also achieved across sections of 103. Finally, we saw that the mean for finals of students in the two large sections (100-120 students) were 67% and 70% (up from 53% in Fall 2007). This is on par with students in the smaller sections, showing that our model is cost-effective without sacrificing student learning.

It is worth noting that in Fall 2007, CSUN tried implementing the online remediation without the group-work labs and also supplemental instruction without online remediation. While there was minor improvement in the passage rates, there was no significant improvement in common final scores. The combination of group-work labs and remediation is fundamental to improving passing rates.

Data from Math 103 indicate that the hybrid model reduces the number of students repeating classes, realizing substantial savings. The Math 103 classes enroll on average 680 students a term. Three years ago, when CSUN implemented a hybrid lab to support student learning in these courses, the DFW rate went from 60-65% to 30-34%. As a result, in Spring 2010, we had approximately 240 fewer repeating students than would expected. This represents a decrease of 4 sections of Math 103 at a savings of $20K. If we can achieve the same success in other math courses, we could eliminate 5 to 6 classes at a savings of $45K-$50K per term. This savings will contribute to the sustainability of the hybrid project. Successful evaluation of its components will foster its institutionalization as part of the CSU's broader initiative to improve student progress through remedial and lower-division math.

"Adoption, not Reinvention"

Q15. As noted in the NGLC Wave 1 RFP, a primary objective of this wave of funding is the elimination of redundancy and unnecessary reinvention through the wide-scale adoption of proven solutions. Briefly, discuss how your proposed solution and scaling plan will leverage existing resources—created by you and/or others—to avoid duplicating previous efforts and to break the grip of "not invented here." What interoperability standards or protocols will you observe, if any? How will you overcome formal and informal resistance to "outside" innovation in your target institution(s)? How will you make it easier for others to adopt, in turn, the solution(s) that you deliver?

2,000 characters maximum

The project will work with students from all majors in their first year of GE Math. It will focus on those who need additional remediation and supplemental instruction to be successful. It will create clearly defined paths for these students through lower division math course work. This strategy will increase the number of students who are eligible to declare majors in STEM subjects and other subjects requiring algebra and statistics.

Humboldt and the other participating CSU's would not develop the model or tools, but would participate primarily in implementation of this proven model to pre-calculus. The project's proven impact on improving student success and expanding the STEM pipeline, as well as its instructional cost savings, make this a compelling solution for CSU and community college campuses facing significant student achievement and budget challenges, which is part of why the project is meeting little resistance as an "outside innovation" and is being positively embraced by our partner campuses.

At CSUN, students going on into STEM majors will be passed seamlessly into another CSUN program called STEPS (Students Targeting Engineering and Physical Science, NSF-funded grant). STEPS works to boost retention rates of Calculus-ready first-year and transfer students in STEM majors by creating a support network, a summer interdisciplinary team experience, and career education (seminars plus a website with information on STEM careers). This is thus a critical link between high school and college-level math for students who are not calculus-ready as entering freshmen.

Q16. If your project plans to make use of already established, open-licensed technology projects or platforms, please list the relevant project(s) here, along with the project's primary Web site and an authoritative URL at which NGLC staff can review the project's licensing information.

Project Name:

Main Project Website:

Project Licensing Info URL:

Project Name:

Main Project Website:

Project Licensing Info URL:

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