Reform of Introductory Science Courses for Non-Majors
This consortial program is supported by the W.M. Keck Foundation of Los Angeles
2006-2007 Proposal Cover Sheet

Project Title: *Incorporating Technology and Assessment into Superscience*

Faculty Names: Kristy Stensaas, Robert Nevins, Stan Galicki

Institution: Millsaps College

Faculty Departments: Biology, Chemistry, Geology

Faculty Address: 1701 North State Street, Jackson, MS 39210

Phone: (601) 974-1402 Fax: (601) 974-1401 E-mail: stenskl@millsaps.edu

Amount requested: $1500

Date grant submitted: December 1, 2006

Proposed grant period: January 1, 2007 – May 1, 2007

Type of project: Implementation of technology and assessment into an existing course

Signatures of faculty submitting proposal: _____
Date:_____ _____

_____ _____
Name of Science Division Chair Name of Chief Academic Officer

_____ _____
Signature of Division Chair Title of Chief Academic Officer

_____
Signature of Chief Academic Officer

Date_____ Date_____

Evidence of institutional support is required for each mini-grant proposal in the form of a letter of support from the proposal author's Department/Division Chair or Dean of Science. The approval of the Chief Academic Dean also is required.

For ACS Office use only
Date received_____ By_____
Date sent to review Committee_____
Action_____ Notification sent_____

This ACS program is supported by the W.M. Keck Foundation of Los Angeles.

Addendum for Awarded Mini-Grant from 2005-2006:

The Superscience Program at Millsaps College requests an additional $1500 of funding which will allow us to purchase the Questionmark Perception for Web Authoring Software and Server Software previously funded at an amount of $2500 (the previously accepted grant follows) and the accompanying software support plan. We originally requested $2500 for the purchase of the QuestionMark Perception for Web Authoring Software and Server Software; we arrived at this figure by connecting to: http://www.questionmark.com/us/pricing/academic/#Perception%20for%20Web. However, this Fall we found out that the support plan must be purchased separately. The support plan *includes upgrades and technical support for one year*. Because we didn't realize this in our original purchase we did not request the support plan. For this to be feasible and to be used by multiple instructors across departments who are unfamiliar with the software (it is internet compatible), we feel it is crucial to purchase the support plan as well as the software. The company informed us that if we call for technical support and do not have the support plan, each call will cost hundreds of dollars.

Thanks for considering our request.

2. Summary

A major challenge of today's liberal arts curriculum lies in the development of a scientific understanding for the undergraduate non-science major. Traditional courses often do not meet the needs of today's student, and many students express a fear or dislike of science that is difficult to overcome. In order to surmount these obstacles our course design team has re-designed and is currently implementing a two-semester non-science majors course that provides students with a unique and interesting opportunity to learn about science. We have developed a thematic approach incorporating modules which include classroom discussions, guided-inquiry laboratory exercises, the use of computers in the field and lab, examinations of the impact of science on popular culture through discussions of recent movies, videos, and news items, and an overall emphasis on real-world applications.

The first course in the series, *Human and Natural Disasters,* includes modules that cover the following topics: Introduction to the Earth, Origin of Life and Evolution, Social and Cultural Disasters, Plagues: Past and Present, Hazards and Risk Analysis, Biological and Chemical Warfare, and Climatic and Geologic Disasters. The second course in the series, *How Things Work,* incorporates modules on The Universe, Kitchen Chemistry, Dissecting Small Electrical Appliances, Sports Physics, and Forensic Science. The overall goal of this proposal is to complement and build upon our previous successful proposals by adding computerized student assessments and reporting software that allows us to track student improvement.

The anticipated outcomes and benefits to our non-major science students include: (1) an interactive, computerized method that allows review materials, homework, pre-lab

assignments, and pre- and post-course assessments to be administered through the internet with immediate feedback and; (2) a method for instructors to monitor student progress and continually improve course content based on reports that can be generated through the software.

3. Project Description

Background, Significance, and Prior Activities

Millsaps College is in the process of implementing two re-designed non-majors science courses (*Human & Natural Disasters* and *How Things Work*) which were funded by a previous ACS mini-grant. The objective of that grant was to devise interdisciplinary courses interesting to non-science majors, determine the best manner in which to teach the courses, and develop modules and activities to accomplish the course goals. One of the problems we have encountered in implementing these courses has been a lack of mathematical review problems for students to brush up on basic algebra and graphing skills. Since the courses are composed of mainly freshmen and sophomore students who haven't yet completed their core math requirements, we have had to devote lecture and lab time reviewing basic algebra and graphing skills.

A second complication we have encountered is a consistent way to provide relevant homework problems covering material from each module. These students really need repetition and immediate feedback on homework problems to get a good understanding of the material.

A third problem involves student preparation for laboratory and post-lab assignments. In our experience, the non-science major does not spend enough time reading through lab procedures nor spending time working on post-lab questions which test understanding.

Instead, labs are often conducted by the student as quickly as possible so he/she can leave! We think that each of these problems can be solved by developing interactive, computerized assignments that can be administered over the web.

Goals and Objectives

The goal of this proposal is to write and administer computerized mathematical review materials, homework assignments, and pre- and post-lab assignments for both *Human & Natural Disasters* and *How Things Work*. We plan to develop these materials over the summer and during the Fall semester. We propose the purchase of QuestionMark Perception for Web Authoring Software and Server Software which will enable us to write and deliver these materials. This software is particularly appealing because it reports student grades, the time tests were taken, and allows the administrator to generate reports that indicate trends within the student answers. For example, we can generate a report that indicates the number of students who missed question #5.

This software will also allow us to deliver pre- and post-course assessments (both attitudinal and academic) and generate reports in an efficient manner. Therefore, we request $2500 for the purchase of QuestionMark Perception for Web Authoring Software and Server Software. We arrived at this figure by connecting to the following link: http://www.questionmark.com/us/pricing/academic/#Perception%20for%20Web.

Context of Course in the Millsaps Curriculum/Institutional Support

The two-semester course sequence fulfills two of the ten core courses required for graduation (core 7 and core 9 in the Millsaps Curriculum). These courses are an option for students who enter college and know they will not be science majors. Rather than taking introductory classes designed for science majors, this option allows these students

to cover at least two different disciplines each semester in an integrated manner that helps them see the relevance of the science they are studying to their world. We expect approximately 50 students per year to be enrolled. Millsaps College is supporting this effort by providing a total of four faculty members to team teach the course (normally one faculty member would be assigned to a single course), by providing funds for a laboratory assistant, and by providing a budget for the course.

4. Evaluation, Dissemination, and Continued Support

Millsaps College is committed to fully staffing and funding this course with instructors from multiple disciplines, to evaluating the success of the course, and to supporting the proper advising of non-science major students to take the course. The course will be evaluated in several different ways, to allow a more thorough understanding of its impact and success: (1) we will continue using the SAM-VI science attitudinal survey as a pre- and post-course assessment. An improvement of attitudes will be used as an indication of course success; (2) we will continue using a basic science skills/awareness assessment as a pre- and post-test and it will be delivered through the proposed software. An improvement in scores will be taken as an indication of course success; (3) and we will use the existing Millsaps student course evaluation process, with the goal of having the course attain a rating which is commensurate with other courses offered within the science division.

Dissemination of course design including pedagogy and our findings on the success of the course will be through presentations at local, regional, and national meetings and publication in national journals. We plan to present our results at the annual meeting of the Mississippi Academy of Sciences, which has a significant Science Education

Division, to the Associated Colleges of the South, and at the annual meeting of the National Science Teachers Association. We will target the Journal of the National Science Teachers Association and general education journals for publication.

7. Disclosure Statement

Currently we are completing the implementation of our re-designed non-majors science courses funded by a previous ACS mini-grant. This grant was budgeted to purchase supplies and materials. We will completely expend these funds by May 30, 2006.