Ventura College Sabbatical Leave Proposal
Microbiology Lab OER Project for Fall 2020
Submitted by Jennifer Garner
Biology Department
October 2019

Instructor's Sabbatical Leave Status
Full-Time Hire Date: January 2014
Previous Leaves: 0

I. Background of the Project

Science textbooks are notoriously expensive, and publishers release a new edition every other year resulting in a perception that students must purchase the costliest version in order to have the most current resource rather than purchasing or renting a used edition (Robinson, T Jared, et al. "The Impact of Open Textbooks on Secondary Science Learning Outcomes." *Educational Researcher*, SAGE Journals, 1 Oct. 2014, journals.sagepub.com/doi/full/10.3102/0013189X14550275.). Hispanic students have made up 59% of the MICR V01 student population over the past four years and a total student proportion of 81% females to 19% males (Ventura College Course Success Dashboard http://www.venturacollege.edu/departments/administrative/institutional-equity-and-effectiveness/facts-and-dashboards/course). Course completion by female Hispanic students is disproportionately impacted by the challenges presented by the fast pace and technical requirements of the microbiology lab skills that must be acquired in the first few weeks of the semester.

According to the Ventura College Course Success Rate Dashboard, MICR V01 students who received financial aid have a 3.5% lower success rate over the last 5 years than students that did not receive financial aid. Students experience anxiety over purchasing lecture and lab materials, particularly if financial aid is delayed, and will withdraw from the class after attending one or two weeks of lab but are then not identified in college statistics. Students who do not come prepared with a good visual understanding of the expected results of the day's experiment find it more difficult to successfully acquire the necessary lab skills in the first few weeks but continue with the course, lag behind and either withdraw later in the semester or receive a failing grade because they lack the foundation required for success.

Food Microbiology, V39, is a new course designed as part of the new Food Safety Program. It is anticipated that these students will have similar challenges as the Introduction to Microbiology students with being required to observe and make conclusions about data with which they have no previous personal experience. There will be an added challenge in that there are no prerequisites for Food Microbiology. Good resources are critical for the success of these students in this course to be able to complete this program and also to demonstrate that Ventura College is able to offer effective training for our industry partners.

II. Purpose of the Sabbatical Project

This project proposes to produce a digital microbiology atlas containing instructional images for both the MICR V01 Introduction to Microbiology and the brand new MICR V39 Food Microbiology course that will be offered for the first time in Spring 2021. **This sabbatical is requested for Fall**

2020 to ensure this resource is ready for the first offering of this course that is an important component of the new food safety program designed to meet local demand in the agriculture and food industries.

Student success in microbiology is lower than it could be because the current digital laboratory protocols lack the images needed to support visual learning in evaluation of microbiology results. The digital photographs will complete a 3-year long project that I have undertaken to provide microbiology students with a zero-cost laboratory manual that is completely customized for the Ventura College lab activities and is available through the course Canvas page. Currently, MICR V01 students are required to purchase a publisher-produced laboratory atlas which provides the images necessary for students with no microbiology experience to recognize and interpret bacterial results instead of having the images embedded in the lab protocols on Canvas. There are few photographic resources for Food Microbiology courses. Having a library of microbiological photographs can be used in appropriate combinations to serve both MICR V01 and MICR V39 needs.

III. Components of the Sabbatical Project

a. Generation of positive and negative control laboratory results
    i. test tubes and petri plates that show bacterial growth test results
    ii. range of possible results for food industry-standard tests
    iii. photographs of images of bacterial cells through the microscope.
b. Photography of laboratory results
    i. Photographs must be taken to avoid glare and shadow through glass and plastic,
    ii. must be true for color which is critical for accurate evaluation of results, and
    iii. photos must show relative scale for bacterial specimen
c. Annotation of photographs
    i. Scale/size of specimen
    ii. Accurate evaluation of result
    iii. Alternative text for image accessibility
d. Embedding of annotated photos into digital lab protocols

IV. Value of Sabbatical Project to VCCCD and Ventura College

This project will further the Ventura College Mission by providing innovative instruction that enhances visual learners and facilitates kinesthetic learning activities in the laboratory. Use of multiple instruction modes is considered a high impact practice that will provide support for the diverse student population that enrolls in microbiology. Providing zero-cost lab resources that allow students to arrive in the microbiology lab visually prepared and confident in an even playing field that will allow not only underserved students to perform evaluations of tests for the first time but will benefit all microbiology students. Visual instruction resources have little impact if the student does not look at them. By embedding the images in the lab protocols that are already freely available to students on Canvas, we can appeal to a wide range of learning style preferences and aligns with Ventura Educational Master Plan Goals to increase success of our students while closing equity gaps. By providing early support for the success of underserved students in microbiology lab, the rate of withdrawal should decrease resulting in improved course completion for students who frequently do not show up in college data charts.

V. Value of Sabbatical Project to Students

Equity gaps in microbiology course completion are seen for low income students Having access to a visual image of laboratory expected results has a strong correlation with success in microbiology lab.

Low income students typically succeed at a lower rate in MICR V01 than students who have not been identified as BOG waiver recipients (Table 1.)

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Microbiology Course Enrollment and Success by BOG Status*

	Spring 2014		Fall 2014		Spring 2015		Fall 2015		Spring 2016		Fall 2016		Spring 2017		Fall 2017		Total	
Status	Enroll	Success	Enroll	Success	Enroll	Success	Enroll	Success	Enroll	Success	Enroll	Success	Enroll	Success	Enroll	Success	Enroll	Success
BOG	47	80.9%	28	85.7%	28	71.4%	49	87.8%	45	80.0%	57	75.4%	55	83.6%	48	85.4%	357	81.5%
No BOG	40	80.0%	17	64.7%	19	84.2%	22	95.5%	20	80.0%	34	82.4%	21	90.5%	43	95.3%	216	85.2%
Total	87	80.5%	45	77.8%	47	76.6%	71	90.1%	65	80.0%	91	78.0%	76	85.5%	91	90.1%	573	82.9%

*At Jennifer Garner's request, data excludes the following CRNs - 31047 and 31505 in spring semesters, and 71856 and 70985 in fall semesters.

Course Success Rate = % of A, B, C, and P grades out of all grades assigned (including W's).

Table 1: Microbiology Course Enrollment and Success by BOG Status (courtesy of Phillip Briggs.)

Students in my Spring 2018 MICR V01 course sections (68 surveyed) self-report that 57% are currently receiving financial aid. These students tend to purchase the textbook and photographic atlas because of their financial aid benefits, however students do not seem to be using this supplementary resource. This semester, 35% of my current students did not buy the required photographic lab atlas. Only 1/5 of students who do not own the textbook report that they access the lab atlas in other ways (lending library, VC Library reserve, share with a friend.) Compare this to 80% of students who own the lecture textbook. Students are not taking the extra step of purchasing and using the laboratory atlas (even if they own it) to prepare for lab. It is critical for students to have a visual image to evaluate lab results when they have never seen bacteria under a microscope before.

Visual resources that are freely available through the LMS have dramatically increased student success in microbiology lab in the time that I have been at Ventura College. Success in learning the techniques in the first half of the semester is assessed in the first lab practical exam at midterm, and success in learning the techniques in the second half of the semester is assessed in the final lab practical exam. Positive impact from video tutorial use is demonstrated as a comparison of students whose scores improved in the final practical exam as compared to the first practical exam, since microbiology lab techniques are cumulative rather than discrete, unrelated skills.

	S14-S16 (Students without access to late-semester lab tutorial videos)	F16 (Students with access to late-semester lab tutorial videos)
Number of students assessed	232	78
Percentage of Students with Improved Exam Scores (late semester lab technique mastery)	29%	76%

Visual resource accessibility is reducing the withdrawal rate in the first critical weeks of microbiology. The above data does not reflect the numbers of students who withdraw from the course. Frequently students who are struggling with the course will find the lab overwhelming, especially in the first few weeks, before the census date. The proposed tutorial videos would demonstrate techniques introduced to students starting in the first lab meeting of the semester. The data below provides a demographic snapshot of students who withdraw from microbiology after having attended at least one lab session to provide an idea of what populations would be served by making early-techniques tutorial videos available.

	S14-S16 (Students without access to late-semester lab tutorial videos)	F16 (Students with access to late-semester lab tutorial videos)
Number of students withdrawn from course after attending at least one microbiology lab	78	19
Percentage of withdrawn students belonging to underserved populations (Hispanic, black and veteran populations represented.)	51%	79%
Gender demographics of withdrawn students	81% female, 19% male	95% female, 5% male

Completion of the visual learning resources by embedding digital lab images in the Canvas lab manual will increase student success and continue to close the equity gap for underserved students in microbiology.

VI. Value of Sabbatical Project to Instructor

This sabbatical project will allow me to complete an ongoing project to achieve the following:

a. Zero-cost textbook for all lecture and laboratory resources in MICR V01 and laboratory resources in MICR V39.
b. Customize laboratory resources to meet specific criteria for the once-a-week laboratory schedule at Ventura College
c. Prepare course resources for hybrid format
d. Make all course resources available to all VC instructors in an editable form to use and adapt for their students. All resources will also be shared with other VCCCD campuses if those instructors have any interest.

The work that I have done to date to remodel course resources has been done during off contract hours (weekends, holidays, summer). I have benefitted from two campus mini-grants that paid for the filming and editing of 18 tutorial videos for laboratory techniques. I have rewritten every laboratory protocol with the use of openly sourced reference materials to make all instructions available freely to students in a way that can be adapted as lab techniques change in response to student needs.

The time needed to generate the experimental results, obtain quality photographs, and teach myself the photo editing technology to get them document ready is a bigger task than I can do during my college service hour time during a semester. A sabbatical will allow me the time to create a product that will have long term benefits for students, instructors, and the college.

Thank you for your consideration.

Sincerely,

Jennifer Garner
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