Development of Online Biology Labs

This is the final report for the 20% Type B leave project approved for Susan Ramones for the Fall 2018 semester. This report is being submitted in accordance with Professional Standards committee requirements.

A. Describe the focus of the work proposed and completed during your leave:

Purpose:
Expand the biology department's distance education offerings by developing rigorous and authentic laboratory activities that can be incorporated into a non-majors general education biology course.

Objectives:
1. Develop Canvas modules for 13 additional online lab activities
2. Continue to research about, share, discuss, and refine the online lab procedures and content to improve the online lab experience for students

Objective 1 - Completed
- Developed and edited modules and associated pages and documents for 18 lab activities:
    - Module 3 (Population Genetics)
    - Module 5 (A. Chemistry of Life and B. Nutrition)
    - Module 6 (A. Diffusion and B. Osmosis)
    - Module 7 (DNA and RNA)
    - Module 8 (A. Bacterial Identification Virtual Lab and B. Gel Electrophoresis)
    - Module 10 (A. Ecosystem & Carbon Cycle Scavenger Hunt and B. Photosynthesis)
    - Module 11 (A. Mitosis and Meiosis and B. Meiosis)
    - Module 12 (A. Mendelian Genetics and B. Fertilization)
    - Module 13 (Human Senses)
    - Module 14 (A. HIV Virtual and B. Immunity)
    - Module 15 (Circulation and Respiration).
- Of these, 7 were based on eScience lab kits and 11 were based on my own developed activities. There were more than the original 13 labs planned because I didn't get as many labs completed during my Spring 2018 Type B leave as originally expected.

Objective 2 - Completed
- Worked with several colleagues (1 in biology, 1 in psychology and 1 in DE design) to "try out" a module lab module in the online setting. Based on feedback, I changed my lab modules to have fewer steps, be more streamlined and reallocated points. Each lab module includes an instructions/overview page, a lab write-up assignment, a small group lab discussion board, and a lab reflection assignment. A sample module is depicted in Attachment A.

- This project has intersected with an interesting time in virtual lab activities. I found many quality online lab activities but most of them are Adobe Flash based and Adobe Flash is being phased out for most internet browsers. The new platform is html5. I did my best to find html5 virtual labs; however, the gel electrophoresis lab will need to be updated. I contacted a number of web site managers and only a few have plans to update materials. One actually asked me to contribute a letter of support to apply for a grant to update his Sea Urchin Fertilization site to html5 (see Attachment B and C).

B. What was accomplished as a result of your leave?

As a result of this leave, I am currently offering ARC's first fully online Biology class with a lab component (Attachment D and E).

C. Explain how the work completed during your leave relates to ARC's goals and focus areas, and to the state's professional development guidelines.

Distance education is an important option to serve a variety of students who, for a variety of reasons, are unable to attend in-person classes. Distance education classes must also maintain the rigor and college-level experience that in-class students receive. The purpose of this project is to expanded access for students needing a general education biology course specifically with a lab, while still ensuring that the lab portion is an authentic lab experience. This supports the goals of student success, teaching and learning effectiveness, and access and growth.

District Goal 1: Student Success

1.2 Establish and publicize clear, efficient, and structured pathways for completion of the student's educational goals.
Currently, the distance education program is advertising 100% online degrees and certificates. Adding a fully online lab component to BIOL 310 adds a path for students to complete both their science general education and science lab requirements entirely online.

District Goal 2: Teaching and Learning Effectiveness

2.1 Increase faculty and staff development activities to improve teaching and learning effectiveness, with particular emphasis on basic skills, distance education, and culturally responsive instruction.
Creating these online lab modules will improve my own expertise and range of skills with the Canvas LMS. It will also allow me to work as a mentor for other department colleagues who may consider similar online or hybrid modalities in the future.

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District Goal 3: Access & Growth

3.2 Maximize access to programs and services by continuing to develop and effectively use facilities and technologies that support the college's enrollment trends. BIOL 310 has been identified as one of the main courses students use to satisfy both their biological science and laboratory science class requirements. This can increase enrollment in the BIOL 310 class by serving our online students above and beyond the in-person student population. Prior to offering this, it was likely that our 100% distance education students were looking outside the district to satisfy the lab science requirement.

D. As a result of your leave, what will you take back with you to your current assignments and/or to the college as a whole (including how you shared or plan to share the results of your project).

The main contribution to the college as a whole is that I am offering the fully online version of BIOL 310, an option for completing the GE life science lab course requirement (Attachment D and E).

I have also uploaded all my lab modules to a Canvas shell dedicated to Online Lab Development (Attachment A). Currently, nine full-time or adjunct faculty members are part of this shell. Anyone who requests can be added to the site and use the provided materials. I continue to welcome informal conversations about online teaching and am encouraging interested Science area faculty to take the OTI course and to look at my current online courses to consider if they would like to try this modality, Finally, I recently demonstrated the details of the site at the recent Spring Convocation Day Biology Department meeting.

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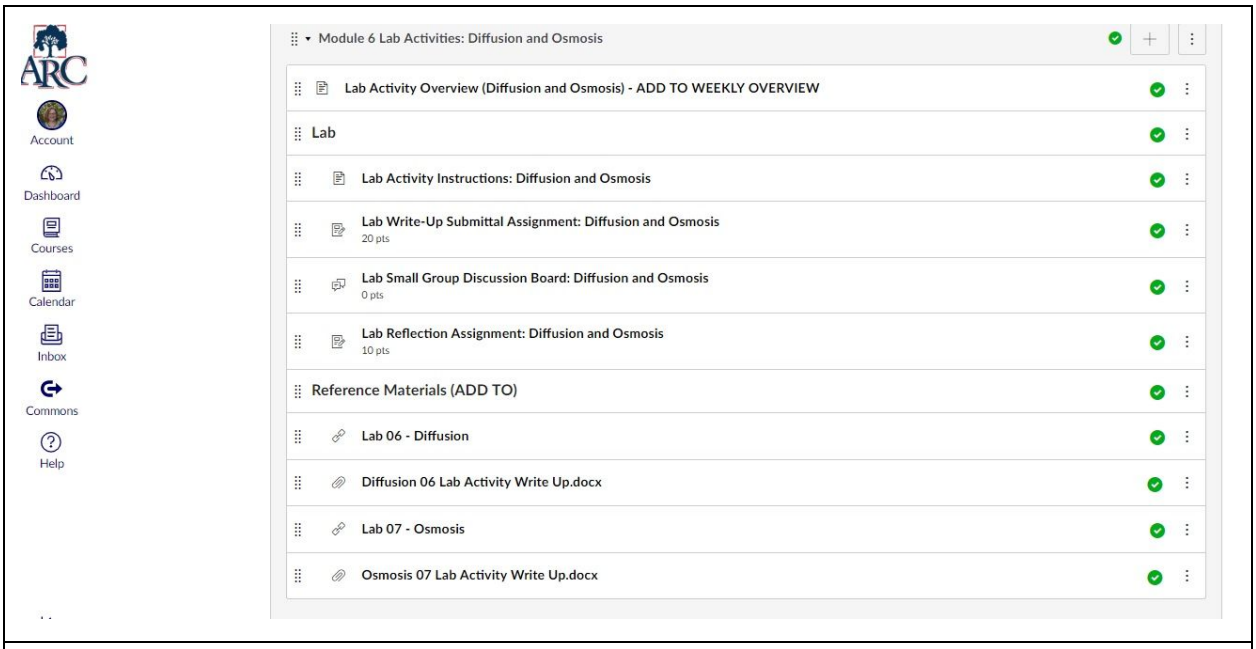
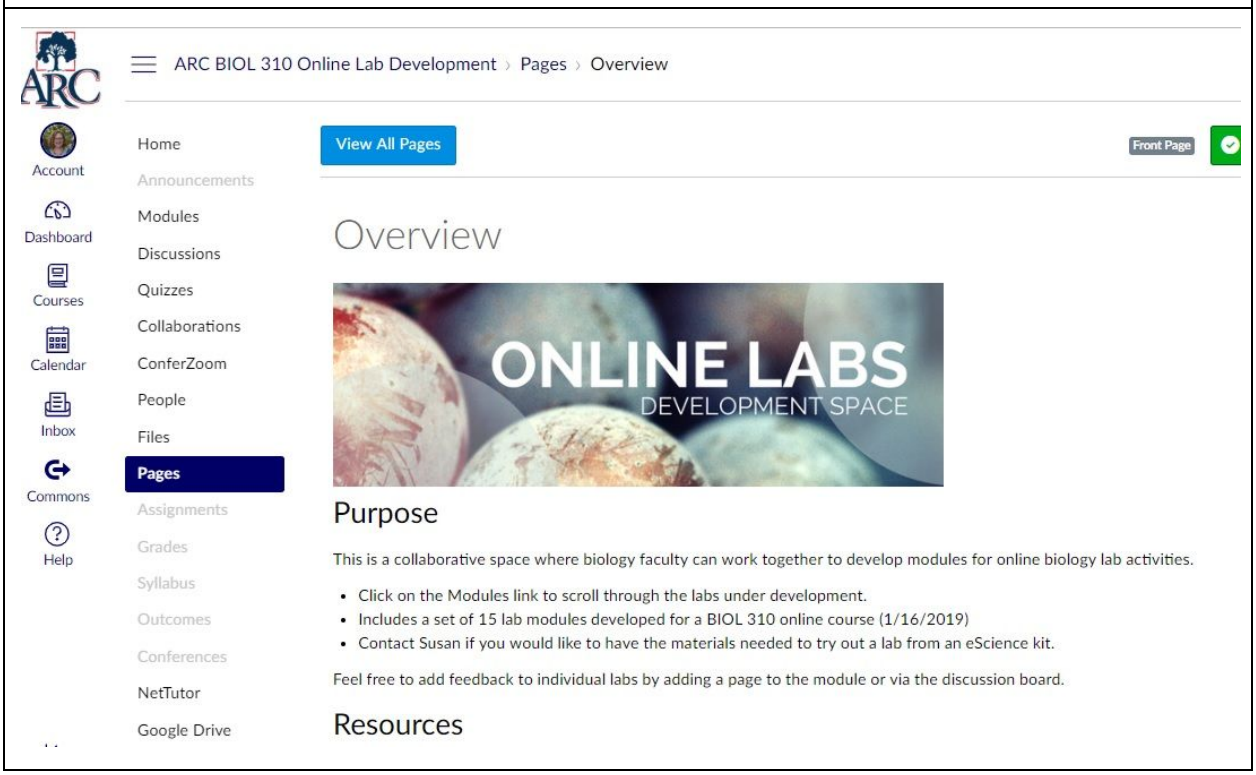
Attachment A. Screenshots of the Canvas Online Lab Development Space including a Sample Module





Attachment B. Sea Urchin Fertilization Virtual Lab hmtl5 Update Email Exchange

Hi Susan

If we got funds to produce a pilot urchin Fertilization Lab in mobile, would you be willing to test it out with your students (probably some time in fall 2019) and provide feedback?

And if so, would you be willing to write a support letter to that effect that I can include in a grant proposal, due (gulp!) Saturday?

Sorry for the late notice! I just found out about this grant opportunity this week!

best
Jason

> On Nov 26, 2018, at 11:03 PM, Ramones, Susan <RamoneS@arc.losrios.edu> wrote:
>
> Hi Jason. Thanks for getting back to me. There is a statewide push/conversation to figure out online options for lab classes that are high quality so maybe there will be some funding coming with that soon? I would be happy to be a "community college" partner if the opportunity arises. We are thankful for the rain and the fires are out; a lot of people are reeling though and it is tough time for so many. Susan
>
> _____
> From: J Hodin [larvador@uw.edu]
> Sent: Tuesday, November 20, 2018 10:30 AM
> To: Ramones, Susan
> Subject: VU in non-flash
>
> Dear Susan
>
> Thanks for your message and kind words about VirtualUrchin.
>
> Yes, I really want to be able to reprogram the virtual lab bench in non-Flash, but we simply don’t have the funds for that right now. Doing so would be a huge step for VU, since we have three different activities on the site that use the lab bench right now, and all of those are hence tied to Flash!
>
> I try to keep my eyes open for small grants (10-20K) that might pay for such a thing. If you ever hear about anything in California that might be a good place to apply, please let me know. I would love to involve motivated teachers like yourself in the process of testing out any new programming with their students. In addition to that making for a better final product, it is something that many funding agencies would find attractive (working directly

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with teachers and students on design and user interface)
>
> I hope you are breathing OK down there!
>
> stay safe
> Jason Hodin
>
> ====
> Virtual Urchin Project Director
> Senior Scientist
> UW Friday Harbor Labs
> Friday Harbor, WA  USA  98250
>
> ph:  + 1 206.543.1484
> fax: + 1 206.543.1273
>
> "Every item of natural history is both a joy to behold and an instrument for
our potential enlightenment."
> -S.J. Gould
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Attachment C. Sea Urchin Fertilization Virtual Lab hmtl5 Update Letter of Support

ARC

American River College

November 29, 2018

To Whom It May Concern,

Please accept this letter of support for funding to support the update of the Virtual Urchin Project.

I am a Biology Professor at American River College in Sacramento, California. We are one of the largest community colleges in California, serving over 35,000 students. Many of our students transfer to Sacramento State University or UC Davis. I specifically teach the general education, non-majors biology classes and am passionate about making biology interesting and accessible to this group of students. I am also the one who has taken on the challenge of creating online opportunities for these general education students. Resources like the Virtual Urchin project are invaluable to help give the fully online students a rigorous and equitable lab experience. Unfortunately, the Fertilization activity, along with many online resources, are Adobe Flash based and need to be updated/reprogrammed in order to be reliably used by my students.

A reprogrammed Fertilization lab module would help elevate my class to the level of excellence I am striving to provide these students. To help that process, I am volunteering my Fall 2019 Online BIOL 310 course to pilot an updated version of the lab. The class has 30-35 students. It would be included within a weekly module with follow-up lab questions, small group discussion, and individual student-generated lab summaries. I can include an additional anonymous student feedback survey and also provide my own feedback from a teaching perspective.

Please feel free to contact me if you have any additional questions about my classes or how this virtual lab could enhance my students' experience with biology.

Sincerely,

Susan Ramones
Professor of Biology
American River College
4700 College Oak Drive
Sacramento, CA 95841
(916)484-8260
Ramones@arc.losrios.edu

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Attachment D. American River College 2019 Spring Schedule

BIOL 310 General Biology 4 Units

Prerequisite: None.
Advisory: MATH 32, MATH 42, or STAT 105 with a grade of "C" or better; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
General Education: AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B; IGETC Area 5C
Course Transferable to UC/CSU
Hours: 54 hours LEC ; 54 hours LAB
Description: This laboratory course for non-science majors covers basic biological principles and how they relate to humans. Concepts include cell chemistry, structure, and physiology; genetics (transmission and molecular); biotechnology; human body systems; evolution; reproduction and development; ecology; and human impacts on the environment.

Schedule: **Full Term, Jan 19-May 22**

MW	07:30AM-08:50AM	LEC	M.Holmes	ARC MAIN Science 412	12774	Textbook
MW	09:00AM-10:20AM	LAB	M.Holmes	ARC MAIN Science 412		
MW	10:30AM-11:50AM	LEC	Z.Penzvalto	ARC MAIN Science 412	10268	Textbook
MW	12:00PM-01:20PM	LAB	Z.Penzvalto	ARC MAIN Science 412		
MW	05:30PM-06:50PM	LEC	K.Pellerin	ARC MAIN Science 412	11417	Textbook
MW	07:00PM-08:20PM	LAB	K.Pellerin	ARC MAIN Science 412		
TTh	09:00AM-10:20AM	LEC	D.Wolfe	ARC MAIN Science 412	10270	Textbook
TTh	10:30AM-11:50AM	LAB	D.Wolfe	ARC MAIN Science 412		
MW	02:00PM-03:20PM	LEC	K.Gerhart	ARC MAIN Science 412	10272	Textbook
MW	03:30PM-04:50PM	LAB	K.Gerhart	ARC MAIN Science 412		
TTh	06:00PM-07:20PM	LEC	K.Perez	ARC MAIN Science 412	12536	Textbook
TTh	07:30PM-08:50PM	LAB	K.Perez	ARC MAIN Science 412		
TBA	TBA	LEC	S.Ramones	ARC MAIN Online	12690	Textbook
TBA	TBA	LAB	S.Ramones	ARC MAIN Online		

Special Note: This course will be taught via the Canvas Learning Management System. It is not a self-paced class and will include weekly online lecture videos, discussions, quizzes, and lab activities, as well as several online exams including the final exam. Quizzes and exams require a webcam and Chrome web browser on a desktop or laptop computer. Lab activities require ability to take and upload pictures to document work and the purchase of an eScience lab kit. Communication prior to the start of class will be sent to student's official ARC Gmail account. For further information about the course requirements, please note the instructor's name above and then visit the website at ARC ONLINE Faculty Directory

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Attachment E. Screenshot of Spring 2019 BIOL 310 Online Course