

Application Details

Manage Application: Textbook Transformation Grant

Award Cycle: Round 3

Internal Submission Deadline: Sunday, May 31, 2015

Application Title: 132

Submitter First Name: Chrissy

Submitter Last Name: Spencer

Submitter Title: Academic Professional

Submitter Email Address: chrissy.spencer@biology.gatech.edu

Submitter Phone Number: 404-385-0539

Submitter Campus Role: Proposal Investigator (Primary or additional)

Applicant First Name: Chrissy

Applicant Last Name: Spencer

Applicant Email Address: chrissy.spencer@biology.gatech.edu

Applicant Phone Number: 404-385-0539

Primary Appointment Title: Academic Professional

Institution Name(s): Georgia Institute of Technology

Team Members (Name, Title, Department, Institutions if different, and email address for each):

Jung Choi, Associate Professor, School of Biology, Georgia Tech,
jung.choi@biology.gatech.edu

Shana Kerr, Academic Professional, School of Biology, Georgia Institute of Technology,
shana.kerr@biology.gatech.edu

Chrissy Spencer, Academic Professional, School of Biology, Georgia Institute of Technology,
chrissy.spencer@biology.gatech.edu

Digital media/web developer, to be identified

Sponsor (Name, Title, Department, Institution):

Dr. Terry Snell, Chair, School of Biology, Georgia Institute of Technology

Proposal Title: 132

Course Names, Course Numbers and Semesters Offered:

Intro Biological Principles, Biol 1510, offered every Fall, Spring, and Summer semester

Honors Intro Biological Principles, Biol 1511, offered every Fall semester

Final Semester of Instruction: Spring 2017

Average Number of Students per Course Section: Biol 1510 = 220 in Fall/Spring or 50 in Summer; Biol 1511 = 50 in Fall

Number of Course Sections Affected by Implementation in Academic Year: 3; 1

Total Number of Students Affected by Implementation in Academic Year: 540

List the original course materials for students (including title, whether optional or required, & cost for each item): Freeman et al. Biological Science w/ Mastering Biology and Learning Catalytics, required. 3 options available: ebook (\$112), looseleaf, and hardcover (\$102-226)

Proposal Categories: No-Cost-to-Students Learning Materials

Requested Amount of Funding: \$20,800

Original per Student Cost: \$112 (with e-text) to \$226 (with hardcover)

Post-Proposal Projected Student Cost: \$12 for Learning Catalytics subscription to replace online homework platform bundled with textbook cost

Projected Per Student Savings: \$100-\$214

Plan for Hosting Materials: Other

Project Goals:

We will develop and deliver streamlined, on-line, open-source course materials (text, video, interactives, and online homework) that better align to the student learning goals in our introductory biology sequence than current textbooks and at a substantially lower cost to the student. Assessment based on student usage of the web content, comments on the web pages and performance on formative embedded quiz questions will enable instructors to revise and refine the web pages in a just-in-time fashion to facilitate student learning. This project will impact approximately 500 students each academic year.

Statement of Transformation:

The Problem:

Our students pay too much for their course textbook and access to its online homework. While the current textbook is comprehensive, no textbook is well aligned with the course student learning objectives. All textbooks have too much content, which causes information overload for students.

The Solution:

With support from Affordable Learning Georgia, we will

1. Create on-line website content for every learning objective in the course, divided into a webpage for each class session. Building our own website content will allow us to align each learning objective to a required reading on the website, in-class content, homework, and ultimately the graded assessment of student learning (exams). We have already developed some of these webpages. Student representatives we have consulted in course-related focus groups indicated that they strongly prefer these web pages to textbook readings, and that they would not need a textbook once these web pages are completed. Student feedback during the course and on anonymous end-of-semester teaching evaluations both provide evidence that the website improves student learning of certain Biology concepts. To see an example of how these web pages will look, please go to:

<http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/biological-molecules-2/>

2. Create online assessments/quizzes/homeworks for all class sessions using an online system called Learning Catalytics. Currently we use a textbook-associated online homework platform, called Mastering Biology, which students must purchase access to either stand-alone as or part of a textbook bundle. This transformation allows for a deliberate shift away from the textbook's proprietary material. Writing effective assessment questions for this large format course is a significant undertaking that will require release time for the content experts who will develop the questions. The current website does not have any assessment built in.

3. By completing the two items above, we will substantially reduce student cost from \$124-240 per student to \$12 per student. The post-transformation cost to the student is solely for the purchase of access to Learning Catalytics instead of textbook bundle with Mastering Biology.

Stakeholders:

The student constituents who would receive these cost savings are Biology majors, Biology minors, and non-majors. BIOL 1511 is a required course for Biology majors and an option for students in the Georgia Tech Honors Program. BIOL 1510 is a required course for the following majors: Biochemistry, Chemical and Biomolecular Engineering, Chemistry, Environmental Engineering, Materials Science and Engineering Biomaterials concentration, and Psychology. This project will impact approximately 500 students each academic year.

Faculty in the Georgia Tech School of Biology and at other Institutes also gain access to the on-line textbook materials, though not the interactive quizzing/homework features, because the content will be available for anyone on the internet to view and use.

Transformation Action Plan:

Our action plan aligns with the three transformation goals as follows:

1. Create on-line website content for every learning objective in the course

This part of the transformation is well underway, so course construction redesign will not be required. Course Learning Objectives for each class session were developed by committee in the previous academic year. The transformation team of Jung Choi, Shana Kerr, and Chrissy Spencer, who are all experienced instructors in these courses, will continue to build website content on their current lesson plans for the webpages housed at <http://bio1510.biology.gatech.edu>. Each page entails writing a content explanation for each learning objective, identifying open source images and examples to support the explanation, linking to open source video content or creating those videos when content is not freely available, and establishing hyperlinks and keywords to make the site searchable. Part of the funds to support the teams' contributions will be spent on building website content. In cases where no suitable images can be found that are open-source, we will hire a digital media specialist to create new images or, possibly, simple animations. For students who prefer a print version, the website pages export readily to pdf, retaining text, formatting, and images but losing the video interactives.

1. Create online assessments/quizzes/homeworks for all class sessions.

The current website does not have any assessment built in. Because we will use Learning Catalytics for active learning in class, we will also adopt the Learning Catalytics platform for assessments. All questions used in class and in the homework will need to be written by Choi,

Kerr, and Spencer to remove the possibility that the course retains any proprietary questions owned by the textbook publisher. The remainder of the funds to support Choi, Kerr, and Spencer's contributions will be spent to build these assessments and incorporate them into the Learning Catalytics platform as assignments.

3. Reduce cost to students

By completing the two items above, we will substantially reduce student cost from \$124-240 per student to \$12 per student. The post-transformation cost to the student is solely for the purchase of access to Learning Catalytics instead of textbook bundled with Mastering Biology and Learning Catalytics.

Team Members and Roles

Building accurate and complete original website content using pre-existing student learning objectives is more time-consuming than faculty schedules allow for, so we are requesting teaching release time for three content experts to envision, build, and review these materials.

Jung Choi - subject matter expert, instructor and content developer for molecules, cells, bioenergetics, genetics, molecular biology and genomics.

Shana Kerr - subject matter expert, instructor and content developer for cell biology, evolution, genetics and molecular biology. Also has content expertise in the companion courses in Organismal Biology (BIOL 1520/1521) to serve as a continuity expert for a proposed follow-up project to similarly transform BIOL 1520/1521.

Chrissy Spencer - subject matter expert, instructor and content developer for ecology, evolution and genetics. Survey development for qualitative measure of student learning and satisfaction with the content.

These 3 team members will also be co-instructors for the Biol 1510 and 1511 courses in AY 15, and for the foreseeable future, with other faculty rotating in as co-instructors.

All three subject matter experts will review each others' content and work with a digital media expert to create new digital images and interactive quizzing. In the past, we have hired graduate students in Computing and Human-Computer Interactions for programming projects, and we anticipate no difficulty in identifying an appropriate digital media expert.

Open Access Plan: The School of Biology web server hosts these pages and makes them publicly available to the world for viewing. Should we develop quizzing functions directly into the website, those will be restricted to users registered as current students. All content will be open-access and licensed CC-BY (Creative Commons – by attribution).

Quantitative & Qualitative Qualitative Measures:

- Measures:**
- 1) Student comments serve as a strong feedback mechanism to assess and improve specific issues with the website content. During the semester, students can report their questions and confusion in the comments section of each webpage, and we will respond to these by revising the website in real-time.
 - 2) We will formally survey students at the end of each module of instruction (the course is divided into 4 modules) to determine their level of comfort and satisfaction with the web page materials. These qualitative data will be collated with data from the quantitative website usage data to assess if level of satisfaction correlates with engagement with course material.
 - 3) Student anonymous feedback on the website in the end-of-semester Course Instructor Opinion Survey will be used to debrief the transformation team and provide an overview of areas for revision for the website and assessments.

Quantitative Measures:

- 1) We will collect site statistics to monitor page views and student comments, and compare these to student performance on in-class questions and informal quizzes to determine the effectiveness of web page content.
- 2) We will compare course grades and DFW rates pre- and post-transformation to determine if course materials more closely aligned with course learning objectives help students succeed in the course.
- 3) We will use a set of pre-existing common exam questions to compare student performance on exams from the past two years, with the commercial textbook, versus their performance during the 2015-2016 academic year with only the web pages.

Timeline:

Summer 2015

- create web page content

Fall 2015

- offer BIOL 1510 without the textbook, relying only on the web pages
- build a set of questions for interactive quizzes
- hire a web developer to create interactive quizzes

December 2015

- assess student performance
- review student feedback from webpage comments section & focus groups to alter materials as necessary for Spring 2016

Budget:

Release time for Choi - \$5,000

Release time for Kerr - \$5,000

Release time for Spencer - \$5,000

Digital media specialist - \$5,000

Travel to ALG kickoff meeting for 2 - \$800

Total \$20,800

Sustainability Plan:

Biol 1510 is offered every semester, including the summer session, while Biol 1511 is offered every fall. Once the web site, quizzes, and homeworks are fully built, those web materials will be used in all future offerings of the course. We will pursue additional funding to develop web page materials for the second course in the Introductory sequence, Biol 1520/1521, in Academic Year 2016.

Once developed, course materials are easy to correct, alter, and maintain because all web pages are in Wordpress and hosted by the biology department, so any instructors with editorial privileges can modify and update content quickly and easily.



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May 27, 2015

Affordable Learning Georgia
ALG@gatech.edu

To Whom It May Concern:

The School of Biology strongly supports the Transformation-at-Scale proposal for the ALG Textbook Transformation Grant program by Drs. Choi, Kerr and Spencer. These instructors have made excellent progress in developing dedicated course websites with content tailored for our Biol 1510 Biological Principles and Biol 1511 Honors Biological Principles courses. These efforts are an important part of an ongoing transformation of our two-semester introductory biology sequence. The faculty already incorporate active-learning strategies, and are in the process of “flipping” the entirety of both semesters.

The funds from this grant will be used to provide release time and dedicated help from a digital media specialist, so these instructors can complete the web pages and add on-line quizzing functions. These are the final steps necessary for them to be able to rely on these web pages as a suitable replacement for Pearson's textbook and on-line homework system.

Once they have shown that the web pages can successfully replace the commercial textbooks and on-line homework system, the Introductory Biology faculty committee and the Undergraduate Committee will be able to make an informed decision to go ahead with a similar effort for the second semester, Biol 1520 and 1521, and to adopt the web pages for all future offerings of our two-semester Introductory Biology sequence. The School of Biology server system will host these pages and will continue to do so in the future.

These web pages are open and freely available to other institutions in both Georgia and the rest of the world. They will be a highly visible part of Georgia Tech's leadership in the transformation of undergraduate biology education.

Sincerely,

A handwritten signature in black ink that reads "Terry W. Snell". The signature is written in a cursive, flowing style.

Terry W. Snell

Professor and Chair

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