Application Details

Manage Application: ALG Textbook Transformation Grant

Award Cycle:	Round 4
Internal Submission Deadline:	Monday, September 7, 2015

Application Title:	165
Submitter First Name:	Joshua
Submitter Last Name:	Reece
Submitter Title:	Assistant Professor of Biology
Submitter Email Address:	jreece@valdosta.edu
Submitter Phone Number:	229-219-3293
Submitter Campus Role:	Proposal Investigator (Primary or additional)
Applicant First Name:	Joshua
Applicant Last Name:	Reece
Co-Applicant Name(s):	Theresa Grove, John Elder, Gretchen Bielmyer
Applicant Email Address:	jreece@valdosta.edu
Applicant Phone Number:	229-219-3293
Primary Appointment Title:	Assistant Professor of Biology
Institution Name(s):	Valdosta State University

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

Joshua Reece, Assistant Professor, Biology, Valdosta State University jreece@valdosta.edu

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Sponsor, (Name, Title, Department, Institution):

Robert Gannon, Department Chair, Biology, Valdosta State University

Proposal Title:	165

Course Names, Course Numbers and Semesters Offered:

Principles of Biology II; BIOL 1108 offered Fall, Spring, and Summer

Final Semester of Instruction:	Fall 2016
Average Number of Students per Course Section:	25
Number of Course Sections Affected by Implementation in Academic Year:	12
Total Number of Students Affected by Implementation in Academic Year:	300
List the original course materials for students (including title, whether optional or required, & cost for each item):	Life: The Science of Biology 10th Edition, required, $175
Proposal Categories:	OpenStax Textbooks
Requested Amount of Funding:	24,800
Original per Student Cost:	175
Post-Proposal Projected Student Cost:	0
Projected Per Student Savings:	52,500
Plan for Hosting Materials:	OpenStax CNX

Project Goals:

1. Replace existing for-profit textbook with free, OpenStax majors biology textbook (Biology, Avissar et al. 2014) in BIOL 1108.

2. Develop learning outcomes (Kennedy et al. 2007) and lecture guides that complement OpenStax textbook and align with existing BIOL 1108 course goals.

3. Develop formative and summative assessments that complement OpenStax textbook and align with existing BIOL 1108 course goals.

4. Integrate OpenStax textbook material with BIOL 1108 laboratory exercises to ensure

that material complements lab exercises.

5. Identify at least two primary literature articles that cover topics central to the course and can be used as case studies integrated with lectures.

6. Curate OpenStax text, lecture guides, assessment tools, online learning tools, and primary literature with the OpenStax CNX database.

7. Assess student a) performance, b) engagement, and c) perception of the course relative to sections taught with for-profit texts to ensure neutral or positive impacts on student success.

Statement of Transformation:

Principles of Biology II (BIOL 1108) is a large enrollment course at Valdosta State University (VSU) and a required course for many Science, Technology, Engineering and Mathematics (STEM) majors. Like many introductory STEM courses, BIOL 1108 experiences a relatively high DFW rate, on average 33% (2011-2015). The prerequisite to this course at VSU, BIOL 1107, has already been transformed to the OpenStax Biology textbook, and our transformation for this proposal is to replace existing course materials for BIOL 1108 with a free OpenStax Biology textbook and supplements from primary literature. Our stakeholders are the approximately 300 students who take this course every year, and the faculty who teach it. Currently, 94% of students agree that the cost of textbooks and course materials affect their ability to afford college (Textbook Survey Report 2012). Textbook costs reached $1200 on average during the 2013-2014 academic year (College Board 2013). Our analysis of the current BIOL 1108 text and the OpenStax materials confirms that their coverage of material and concepts is virtually identical (as found in Kingsbury and Galloway 2006). The impact of this transformation on stakeholders and course success will be to save students money and to engage them with primary literature, which has been shown to improve student performance by making the material relevant (Gillen et al. 2004). The transformative impact of this proposal will be to make this large enrollment introductory course more affordable (saving students over $50,000 per year!), standardized, applicable, and interesting. We also hope that our innovations will lower the DFW rate for this course and improve student motivation to learn biology.

Transformation Action Plan:

We will describe our transformational action plan relative to our six goals. Given the high cost of textbooks and the burden these costs place on students, our first goal is to transition the course to a free text. We have already identified a widely used and validated OpenStax textbook, Biology (Avissar et al. 2014) for the prerequisite for this course (BIOL 1107); at VSU the first four units of OpenStax Biology are used for BIOL 1107K, and we have identified 3 of the remaining units for BIOL 1108. This book was chosen because OpenStax, initiated by Rice University, is one of the premier open textbook systems available, currently used at over 500 institutions across the US (OpenStax College 2014). All of the PIs have taught BIOL 1108 at VSU or the equivalent course at another institution. Jointly, the PIs have over 40 years of experience teaching

Introductory Biology at VSU, and all sections of the course will be taught by a subset of the PIs in the Fall of 2016 to pilot the new textbook.

The PIs will work on the second and third goals during Spring and Summer 2016 to allow for implementation in Fall 2016. The PIs will meet bi-weekly as a committee to combine and modify the current syllabi, lecture notes, lecture guides, quizzes and exams so the content, verbiage, diagrams, and photos from the OpenStax textbook align with the learning goals and outcomes of BIOL1108. Additional content will also be developed in particular areas that are lacking in the OpenStax textbook, but that are part of the learning goals for BIOL1108. Formative and summative assessments of student writing will be developed to provide constructive criticism following an explicit rubric on drafts of written assignments prior to students receiving a summative assessment and grade for those assignments.

The fourth goal will be accomplished during Spring and Summer 2016, during which PIs will coordinate to integrate textbook material and the order in which chapters are covered with laboratory exercises so that the lab complements the lecture material in a timely fashion. To meet our fifth goal, PI Reece will identify and present to Co-PIs seven key primary literature articles (of which two will be chosen) that address concepts relevant to the course and are aligned with the textbook. Our plan to implement these two studies involves having students read the introductions and methods sections of a paper and to use the raw data to graph, analyze, and draw conclusions. We will then provide students with the rest of the paper and ask directed questions comparing the conclusions of the students to the conclusions of the paper's authors. Our focus will be on identifying papers that have simple analyses and manageable datasets, but still ask interesting questions. We will consult with the VSU library to ensure that these materials are used in accordance with copyright laws, that they are made properly available to students, and that links to the articles, which may vary by instructor or semester, will remain updated for future instructors to use. To meet our sixth goal, we will work with OpenStax CNX to warehouse all resources for future BIOL 1108 instructors to use and modify for their own classrooms. This approach will ensure that these resources are available as an open resource beyond the life of the grant.

The course and syllabus modifications necessary for this transformation include ordering the material covered in OpenStax Biology to reflect the order material is traditionally covered in the course, and aligning the timing laboratory exercises (see goal #4 above).

The Co-PIs will work together as a committee on all project goals, sharing the duties of developing lecture material and assessment tools, but with each leading the following roles: PI Joshua S. Reece- organizer and coauthor of formative assessments, will propose and ensure copyright compliance of primary literature articles and do the bulk of the organizational and prep work during Fall 2015 and Spring 2016; Co-PI Theresa Grove- instructor of record for the course Fall 2016, author of lab manual- will oversee integration with labs and choose order of chapters to be covered; Co-PI John Elder- textbook survey development and analyses, analyses of exam performance; Co-PI Gretchen Bielmyer- IRB materials and analyses of Motivation to Learn Biology assessment; A graduate teaching assistant will assist with implementation in the

lecture portion of the course during Fall 2016. The graduate assistant will be extremely important both for providing a teaching opportunity to a developing graduate student and for offering students another point of contact in the course.

Quantitative & Qualitative Measures:	We have identified three quantitative measures of student success. First, the PIs will use the end-of-course assessment (developed by Co-PI Grove) that was developed previous to this proposal, and will allow for comparison of performance over 3 semesters prior to the transition to OpenStax using simple ANOVA and t-test statistics. Second, we will assess before and after performance on exams (i.e., learning objective success). Third, we will compare DFW rates for transformed sections with those from previous years. Notably, some of the PIs on this proposal have taught this course for 7 years and thus our comparisons can control for variation in instructor. Our qualitative assessments will include 1) SOIs, controlled for variation among instructors, 2) a textbook questionnaire that will be developed as a component of this grant, and 3) pre and post-course changes in the Motivation to Learn Biology survey (Glynn et al. 2011), under the assumption that integration of primary literature and real-world applications will increase student motivation to learn.

Timeline:

- **December 2015: PIs meet and outline goals, allocation of duties, submit IRB application**
- **January 2016: Begin lecture guides, clicker questions, and textbook questionnaire**
- **March: Initial drafts of lecture guides, clicker questions, and textbook questionnaire, formative and summative assessments; propose primary literature**
- **May 2016: Finalize primary literature and linked assignments**
- **July 2016: Final drafts of lecture guides, clicker questions, and textbook questionnaire, formative and summative assessments**
- **August 2016: Pre-semester meeting to finalize plan and coordinate implementation; give pre-course Motivation to Learn Biology survey to students**
- **October 2016: Analysis of pre-course Motivation to Learn Biology survey; meeting to assess issues among PIs implementing new textbook**
- **November 2016: Coordinate final exam and end-of-course assessment,**
- **December 2016: Give post-course Motivation to Learn Biology survey; analyze exam, end-of-course assessment, and survey results; disseminate results to faculty and**

evaluate potential to publish results; ensure all materials are updated and available for future semesters

Budget:

Multiple Sections/Courses/Department-Wide awards: Salary for PI Reece ($5000), Salary for PI Grove ($5000), salary for PI Elder ($5000), salary for PI Bielmyer ($5000), salary for graduate teaching assistant ($4000), travel ($800); total: $24,800.

Sustainability Plan:

Our goal is a permanent transformation to OpenStax textbooks for all 1108 Principles of Biology instructors at VSU. To that end, the textbook is available to anyone online, and our course materials (lecture guides, clicker-questions, formative and summative assessments) will all be made available to faculty at any institution through OpenStax CNX. We will also make available within our own institution the results of our analysis of historical data on student performance pre-transformation to facilitate future instructors' ability to analyze their students' performance using the OpenStax textbook.

Letter of support for proposal submitted by Joshua Reece

Dear Committee:

I am writing this letter to offer my complete support for this proposal to use an OpenStax textbook in BIOL 1108 Principles of Biology II. This is the second semester course for the introductory biology sequence for science and mathematics students at Valdosta State University. Affordable Learning Georgia is currently funding an OpenStax textbook transition in the first semester BIOL 1107 Principles of Biology I course here at Valdosta State so this request is a natural follow-up to work currently in progress. Our goal, then, is to have the entire introductory biology sequence taught using OpenStax textbooks. This will be a significant cost-saving for our students.

Dr. Reece and his team of three other biology faculty have extensive experience in teaching introductory biology courses. Multiple sections of BIOL 1108 are taught each fall and spring semesters and typically one section of the course is offered each summer. This pattern of course offerings will continue indefinitely. In addition, BIOL 1108 is the same course taught to biology majors throughout the USG system so any findings from this proposal will certainly be disseminated to our sister institutions for their use.

Sincerely,

Robert L. Gannon, PhD
Professor and Head of Biology

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References

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