

Spring 2016

Introduction to Biology

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Grants Collection

Albany State University



UNIVERSITY SYSTEM
OF GEORGIA

Shayla Williams, Kenya Lemon

Introduction to Biology





Grants Collection

Affordable Learning Georgia Grants Collections are intended to provide faculty with the frameworks to quickly implement or revise the same materials as a Textbook Transformation Grants team, along with the aims and lessons learned from project teams during the implementation process.

Each collection contains the following materials:

- **Linked Syllabus**
 - The syllabus should provide the framework for both direct implementation of the grant team's selected and created materials and the adaptation/transformation of these materials.
- **Initial Proposal**
 - The initial proposal describes the grant project's aims in detail.
- **Final Report**
 - The final report describes the outcomes of the project and any lessons learned.



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Syllabus

TENTATIVE COURSE OUTLINE Spring 2016

Dates	Tentative Schedule	
	Monday/Wednesday	Friday
Week 1	A View of Life https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	
Week 2	The Chemical Basics of Life https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Online Quiz
Week 3	The Chemical Basics of Life https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Exam 1
Week 4	Organic Molecules of Life https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Worksheet
Week 5	Organic Molecules of Life https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Online Quiz
Week 6	Inside the Cell https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Exam 2
Week 7	The Dynamic Cell https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Worksheet
Week 8	The Dynamic Cell https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Midterm
Week 9	Energy for Life https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Worksheet
Week 10	Energy for Life https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Worksheet
Week 11	Energy for Life/Energy of Cells https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Online Quiz
Week 12	Energy of Cells https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Exam 3
Week 13	Cellular Reproduction https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Online Quiz
Week 14	Sexual Reproduction https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Exam 4
Week 15	Patterns of Inheritance https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Online Quiz

Week 16	Patterns of Inheritance https://openstaxcollege.org/pages/GeorgiaBiology www.GraphicBiology.com	Exam 5
May 10, 2016		Final Exam

Initial Proposal

Application Details

Manage Application: Textbook Transformation Grant

Award Cycle: Round 3

**Internal Submission
Deadline:** Sunday, May 31, 2015

Application Title: 142

Submitter First Name: Shayla

Submitter Last Name: Williams

Submitter Title: Assistant Professor of Biology

Submitter Email Address: Shayla.Williams@asurams.edu

Submitter Phone Number: 7326738508

Submitter Campus Role: Proposal Investigator (Primary or additional)

Applicant First Name: Shayla

Applicant Last Name: Williams

Co-Applicant Name(s): Kenya Lemon

Applicant Email Address: Shayla.Williams@asurams.edu

Applicant Phone Number: 7326738508

Primary Appointment Title: Assistant Professor of Biology

Institution Name(s): Albany State University

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

Shayla D. Williams, Assistant Professor of Biology, Department of Natural and Forensic Sciences, Shayla.Williams@asurams.edu

Kenya Lemon, Instructor, Department of Natural and Forensic Sciences, Kenya.Lemon@asurams.edu

Sponsor (Name, Title, Department, Institution):

Dr. Joyce Johnson, Dean of the College of Sciences and Health Professions is attached.

Proposal Title: 142

Course Names, Course Numbers and Semesters Offered:

Final Semester of Instruction: Spring 2016

Average Number of Students per Course Section: 25

Number of Course Sections Affected by Implementation in Academic Year: 8

Total Number of Students Affected by Implementation in Academic Year: 200

List the original course materials for students (including title, whether optional or required, & cost for each item): Required Textbook: "Essentials of Biology" 4th Edition - \$130

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

Requested Amount of Funding: \$10,800

Original per Student Cost: \$130

Post-Proposal Projected Student Cost: 0

Projected Per Student Savings: 100%

Plan for Hosting Materials: D2L

Project Goals:

To improve comprehension of biology concepts thereby improving retention and passing rates

Specific objectives include:

- 1.Reduce costs associated with printed textbooks by adopting an open source textbook appropriate for the Introduction to Biology non-major course
- 2.Create an open source infographics booklet to complement textbook content
- 3.Use redesigned course to improve student comprehension of biology concepts

Statement of Transformation:

Introduction to Biology is divided into two courses Biology 1111K and Biology 1112K. The two are required for non-biology majors. Both courses use the same textbook with 1111K covering the first half of the required textbook and 1112 covering the latter half. With over 4000 students enrolled, approximately 85% are non-biology majors. Thus, the benefits from our work with the BIOL 1111K course have the potential to be carried over to BIOL 1112 and to affect over 3000 undergraduate students. In the 2013-2014 academic year, approximately students were registered in Introduction to Biology 1111K with a failure rate of approximately 40%. We estimate that at least 1000 non-biology major undergraduates per year will be affected by this transformation resulting in a savings of approximately \$130,000 per year.

Despite the cost-saving advantages of using e-textbooks in the classroom, several issues may decrease learning effectiveness and increase student frustration with the medium. Baek and Monaghan (2013) reported that low readability and limited accessibility were common frustrations in students using e-textbooks. Formatting issues can make reading online textbooks difficult to read and may even contribute to eye strain. In addition, limited accessibility issues occur when students do not have immediate access to campus computers or when students have to wait for a computer to become available. The result is students turning back to a physical textbook even if it is more expensive (Falc, 2013). Therefore, there is a need to minimize any barriers to effective learning with e-textbooks.

If potential barriers are addressed, e-textbooks can improve student learning (Falc, 2013). The transformative effect of an e-textbook may then enhance learning and may improve student retention in Introduction to Biology. Our proposed objective to create an original open source infographics booklet that complements the adopted e-textbook will be used to engage students in learning BIOL 1111K concepts.

Transformation Action Plan:

We will combine 2 potentially effective learning strategies

1. Infographic Booklet- The first strategy is to present biology concepts in graphical format. Hosler and Boomer (2011) compared how major and non-major biology students benefited from graphical texts. Non-majors had the most significant improvement in comprehension and test scores. Indeed, during the Fall 2014 semester, we conducted a pilot study to test students' receptiveness to a graphical textbook format. The PI, Dr. Shayla D. Williams, created a graphical booklet based on the content from chapter 5 of the required textbook, "Essentials of Biology 4th Edition." The booklet was used in five Biology 1111K classes taught by four professors. Preliminary results show that students would like to see more chapters of their textbook converted into graphical formats. When asked what students liked most about our graphical text, the most common response was that the information was easy to understand. Since student academic performance may improve when teachers provide various information formats that cater to different learning styles (Hawk and Shaw, 2007), our first strategy may help students comprehend complex information. Thus, we will create a 45-page infographic booklet.

Infographics have the advantage of visually presenting complex material (Figure 1). As stated, we already have previous experience with converting text information into easy-to-follow graphical formats. We will use online programs such as Infogr.am and Piktochart to streamline the creation process.

1.Education: The second strategy is to educate students about the advantages of using e-textbooks and about methods to maximize effectiveness. Discussing the advantages and disadvantages of using e-textbooks with students has been shown to increase student engagement with the medium. Also, using mini quizzes and printed summaries help to increase student interactions with an e-textbook (Falc, 2013). Our infographic summaries will serve as a method to engage students.

Course Structure Redesign: In addition to providing students with an infographics booklet, the course will be redesigned to actively engage students by assigning them activities to create their own infographics.

Roles of Team Members:

- Dr. Williams has been drawing for 8 years and has worked with professional artists. Combined with her background in environmental microbiology, she has the unique ability to understand narrative art and how to combine it with science. She will create the infographics.
- Dr. Lemon has had experience with using online resources to engage students. The combined use of virtual activities with the printed book has increased student comprehension of basic biology concepts. She will assist with implementing the infographic booklet into the classrooms.

Open Access Plan: The booklet will be submitted to D2L and open source sharing sites such as OpenStat CNX. We will also submit to social media sites such as Instagram and Tumblr.

Quantitative & Qualitative Measures: BIOL1111K uses a departmental pre and a post content test. We will compare the average scores of content tests with test scores from previous semesters. We will calculate the percentage of correct and incorrect responses to questions on each class exam to determine the effectiveness of e-textbook content. For qualitative analysis, we will survey students' initial reactions to the e-textbook, post thoughts, and suggestions for improvement.

Timeline:

June 2015 – Submit surveys, pre-, and post tests for IRB approval

June 2015 – Begin using online software to produce infographics

August 2015 – Survey student initial reactions to the e-textbook to identify potential issues

October 2015 – Mid-term survey

December 2015 – Fall 2015 report

January 2016 – Survey students for Spring semester

March 2016 – Spring Midterm report

May 2016 – Final Report

May 2016 – Prepare manuscript for publication

July 2016 – Submit publication to peer-reviewed journal

August 2016 – Continue implementing e- textbook for future semesters

Budget:

Shayla D. Williams - \$5000 for release time

Kenya Lemon \$5000 for release time

Supplies \$600 Tablet or iPad for graphical work

Travel \$200 Travel for Dr. Williams and Dr. Lemon to the kick-off meeting

Total - \$10,800

Sustainability Plan:

The selected courses are core courses for non-majors and are thus offered every semester. As course teachers, Dr. Williams and Dr. Lemon will be able to access student feedback and make improvements each semester. Assessments and recommendations will be shared with colleagues who also teach these courses.

Figures and References

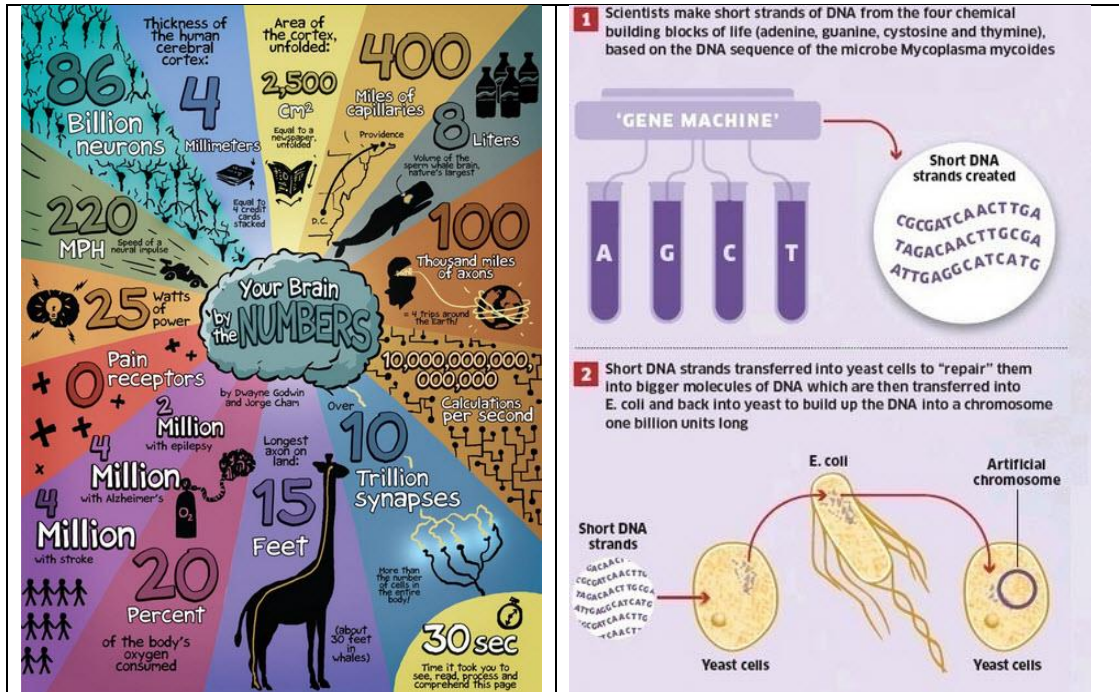


Figure 1. An example of an infographic documenting facts about the brain (Source: [Scientific American](#)) and an infographic about the first two steps in creating a synthetic cell (Source: [Sciblogs](#))

REFERENCES

- Baek, E.-O., & Monaghan, J. (2013). Journey to Textbook Affordability : An Investigation of Students' Use of eTextbooks at Multiple Campuses. [Article]. *International Review of Research in Open & Distance Learning*, 14(3), 1-26.
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- Hawk, T. F., & Shah, A. J. (2007). Using learning style instruments to enhance student learning. *Decision Sciences Journal of Innovative Education*, 5(1), 1-19.
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COLLEGE OF SCIENCES AND HEALTH PROFESSIONS

May 28, 2015

Dr. Shayla D. Williams, Assistant Professor
Dr. Kenya Lemon, Instructor
Department of Natural and Forensic Science
504 College Drive
Albany, GA 31705

Dear Drs. Williams and Lemon:

I am delighted to support your efforts to adopt an open source e-textbook for the Introductory Biology course--BIOL 1111 with the goal of improving retention rates through the Affordable Learning Georgia Textbook Transformation Grant and through redesigning the course to improve student comprehension. This course is enrolled by approximately 800 students annually, therefore the impact could be boundless. The experience you gain from this activity will also benefit the department and college when shared with your peers as they consider the implementation of free e-texts in the near future.

The college and your department will support your efforts, including providing release time and resources as indicated, as you implement this proposal. I look forward to seeing this medium, if successful through your experimentation, adopted by other faculty members to engage our students in improving their academic achievements.

Sincerely yours,

A handwritten signature in cursive script that reads "Joyce Johnson".

Joyce Johnson, PhD.
Dean and Professor
Albany State University
College of Sciences and Health Professions
(229) 430-4725 joyce.johnson@asurams.edu

Final Report

Affordable Learning Georgia Textbook Transformation Grants

Final Report

Date: May 20, 2016

Grant Number: 142

Institution Name(s): Albany State University

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

**Dr. Shayla D. Williams, Assistant Professor of Biology, Albany State University,
Shayla.Williams@asurams.edu**

**Dr. Kenya Lemon, Assistant Professor of Biology, Albany State University,
Kenya.Lemon@asurams.edu**

Project Lead: Dr. Shayla D. Williams

Course Name(s) and Course Numbers: Introduction to Biology BIOL 1111K

Semester Project Began: Fall 2015

Semester(s) of Implementation: Fall 2015, Spring 2016

Average Number of Students Per Course Section: 27

Number of Course Sections Affected by Implementation: 7

Total Number of Students Affected by Implementation: 192

1. Narrative

A. Describe the key outcomes, whether positive, negative, or interesting, of your project. Include:

- There was an increase in final exam grades in Dr. Williams' class sections.
- Students were overwhelmingly in favor of the printed textbook despite the price.
- The most common positive response to infographics was that they complemented visual learners.
- The most common negative response to infographics was that they are too simplistic.
- The most common positive response to the online textbook was the convenience of it.
- The most common positive response to printed textbooks was their tangibility.
- The most common negative response to online textbooks was the price.
- The most significant improvement in fail rate was 34% in Fall 2015 to 4% in Spring 2016

B. Despite the cost-saving nature of the online textbook, students still gravitated toward the printed textbook despite the cost. They preferred to have something tangible in their hands. In the future, we encouraged students to purchase the hardcopy version of the online text which is \$28 on Amazon.com for those who prefer a printed text.

2. Quotes

- Provide three quotes from students evaluating their experience with the no-cost learning materials.

Here are three quotes in favor of online textbooks:

“I would be able to print out certain pages and go through them thoroughly with a highlighter and pen. It is a lot less hassle.”

“They are usually cheaper and easy to maintain.”

“I don't have to carry or worry about damage.”

Here are three quotes against online textbooks:

“I like to physically hold and highlight in my book.”

“The internet does not work all the time”

“I can read and look for my information without the computer or online system crashing”

3. Quantitative and Qualitative Measures

3a. Overall Measurements

Student Opinion of Materials

Was the overall student opinion about the materials used in the course positive, neutral, or negative?

Total number of students affected in this project: 192

Student Opinion of Infographics

- Positive: 100 % of 16 number of respondents
- Neutral: 0 % of 16 number of respondents
- Negative: 0 % of 16 number of respondents

Student Opinion of Online Textbook

- Positive: 32 % of 60 number of respondents
- Neutral: 8 % of 60 number of respondents

- Negative: 60 % of 60 number of respondents

Student Learning Outcomes and Grades

Was the overall comparative impact on student performance in terms of learning outcomes and grades in the semester(s) of implementation over previous semesters positive, neutral, or negative?

Choose One:

- X Positive: Higher performance outcomes measured over previous semester(s)
- Neutral: Same performance outcomes over previous semester(s)
- Negative: Lower performance outcomes over previous semester(s)

Student Drop/Fail/Withdraw (DFW) Rates

Was the overall comparative impact on Drop/Fail/Withdraw (DFW) rates in the semester(s) of implementation over previous semesters positive, neutral, or negative?

The overall impact of the DW was neutral. However, there was significant decrease in the fail rates of Dr. Nathan Woods, Fall and Spring classes from 34% to 4% respectively.

Drop/Fail/Withdraw Rate:

5% of students, out of a total 110 students affected, dropped/failed/withdrew from the course in the final semester of implementation.

Choose One:

- Positive: This is a lower percentage of students with D/F/W than previous semester(s)
- X Neutral: This is the same percentage of students with D/F/W than previous semester(s)
- Negative: This is a higher percentage of students with D/F/W than previous semester(s)

3b. Narrative

Participation in all surveys and pre-tests were voluntary.

Table 1 gives a breakdown of the number of students per section for each semester. Table 2 shows the final exam grades in BIOL 1111K previous semesters and in the semesters of implementation. There was an improvement. We will use SPSS to determine statistical significance. Tables 3 & 4 sum up student responses to online and printed textbook preferences. Tables 5 & 6 show the survey questions and raw responses.

4. Sustainability Plan

- The website will be presented to the Biology Coordinator to be available to all professors teaching BIOL 1111K Introduction to Biology. Additionally, the links to materials will be printed in the syllabus.
- We will incorporate explainer whiteboard videos, which have been proven to be effective, as an aid to the infographics.

5. Future Plans

- We will repeat the experiment in the 2016-2017 school year to obtain a larger sample size before publication.
- We will use SPSS to assess statistical significance of data.

6. Description of Photograph

- (left-right) Dr. Lemon, Co-PI, Assistant Professor of Biology; Dr. Shayla D. Williams, PI, Assistant Professor of Biology