

Spring 2018

Principles of Biology (EGSC)

Martiana Segal

East Georgia State College, msegal@ega.edu

David Chevalier

East Georgia State College, dchevalier@ega.edu

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Grants Collection

East Georgia State College



UNIVERSITY SYSTEM
OF GEORGIA

Martiana Segal and David Chevalier

Principles of 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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Initial Proposal

Application Details

Manage Application: ALG Textbook Transformation Grants

Award Cycle: Round 6

Internal Submission Deadline: Monday, August 1, 2016

Application Title: 245

Application ID: #001137

Submitter First Name: Martiana

Submitter Last Name: Sega

Submitter Title: Assistant Professor

Submitter Email Address: msega@ega.edu

Submitter Phone Number: 7067292246

Submitter Campus Role: Proposal Investigator (Primary or additional)

Applicant First Name: Martiana

Applicant Last Name: Sega

Applicant Email Address: msega@ega.edu

Applicant Phone Number: 7067292246

Primary Appointment Title: Assistant Professor

Institution Name(s): East Georgia State College

Submission Date: Monday, August 1, 2016

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

Dr. David Chevalier, Assistant Professor, Biology Department, dchevalier@ega.edu

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

Dr. Jimmy Wedincamp, Professor, Dean of School of Math and Science, EGSC

Proposal Title: 245

Course Names, Course Numbers and Semesters Offered:

Principles of Biology, BIOL 1107, offered Spring, Summer, Fall

| | |
|---|--|
| Final Semester of Instruction: | Fall 2017 |
| Average Number of Students per Course Section: | 28 |
| Number of Course Sections Affected by Implementation in Academic Year: | 7 |
| Total Number of Students Affected by Implementation in Academic Year: | 196 |
| List the original course materials for students (including title, whether optional or required, & cost for each item): | Campbell Biology, 10th edition, Reece et. al, \$237 (at EGSC online bookstore), required |
| Proposal Category: | OpenStax Textbooks |
| Requested Amount of Funding: | \$10,800 |
| Original per Student Cost: | \$237 |
| Post-Proposal Projected Student Cost: | 0 |
| Projected Per Student Savings: | \$237 |
| Projected Total Annual Student Savings: | \$46,452 |

Creation and Hosting Platforms Used ("n/a" if none):

D2L & LibGuides

Project Goals:

1.1 PROJECT GOALS

1. Replace the for-profit textbook for BIOL 1107 at East Georgia State College Augusta with a free electronic textbook: OpenStax – Biology (Avisar Y. et al., 2012), available at <https://openstax.org/details/biology>
2. Identify OERs to supplement the information not covered by the adopted OpenStax textbook.
3. Identify additional supportive OERs in the form of online videos to accompany each face-to-face lecture.
4. Replace all the visual materials from the current PPT slides with the ones provided by the

OpenStax textbook.

5. Redesign the syllabus to include all the links to the new textbook and online videos for each lecture.

6. Implement a protocol to inform the students before the start of the semester about adopting a new free OpenStax textbook.

7. Create a master course in Georgia View - Brightspace (D2L) with the new materials: syllabus, the links to the online textbook and videos for each lecture.

8. Create a video library (with the videos corresponding to each chapter of the OpenStax textbook) in the LibGuides (Library-Specific Springshare Product) and make it available to all faculty. This is an opportunity for the faculty to adopt different pedagogical approaches, such as online or blended learning.

9. Develop assessment tools to measure the impact of these changes on student success, engagement and experience.

Statement of Transformation:

1.2 STATEMENT OF TRANSFORMATION

EGSC-Augusta, as an access institution, prepares the students for transferring to Augusta University (AU). Most of our students enroll in the BIOL-1107 (Principles of Biology I) course wanting to transfer to the nursing program at AU. It is my goal to improve their experience here but also to make sure they will be successful at AU. Our data indicates that 70% of the students enrolled in the Fall 2015 semester are low-income undergraduates and have received need-based financial aid (297 students received Pell (60%) and 48 received GI Bill grants (10%), EGSC-Augusta Annual Report). Currently, 92.8% of my students would prefer a free online textbook instead of buying/renting a textbook. Moreover, each semester the question that I always hear is “do we have to buy the textbook?”. This grant is an opportunity for all my students to have free access to textbook, the supplemental explanations through the video component, and all necessary materials to succeed.

The total amount of savings to the students will be \$46.452 over the course of three semesters of the implementation. As a result of this transformation, the students will be able to use their financial aid for others school-related expenses, have access to the material for later use (the upper level biology classes), have a less stressful college experience and a different learning environment through the blending of face-to-face lectures and individual study. Based on my survey, most students (78.6%) prefer an online (electronic) book instead of a “hands-on” textbook, which should not hinder their success. Moreover, all students surveyed (100%) agree on having at least one gadget with online access and 92.85% of them have online access at least on one location (home, school, library, other public spaces). To make this learning experience successful, and since the textbook could be downloaded and used offline, the students will have the ability to review their materials and do their homework at any time and place.

Since most of our students have jobs, in addition to being a full-time student (12 credit hours),

they often miss classes; this grant will allow them to have access to the explanations through the videos embedded in their syllabus and D2L. Based on a short survey, 78.5% of my students thought that having videos that accompany face-to-face lecture would be a great tool for individual study. The videos will be carefully selected following the guidelines in a recent article (Guo et al., 2014). Based on this, the most engaging movies were short, Khan-style, or talking-head. Studies showed that in the beginning of the lectures there is a 20 minutes time period until the students become engaged in activities other than passive listening (Middendorf & Kalish, 1996). For the students attending the class, I intend to break the pattern in their attention span by changing from listening to watching and actively reviewing a short movie. In face-to-face lectures another alternative is to guide students through the process of self-learning using the videos and the textbook, followed by discussions on the topic (my personal experience). This makes students aware of their own learning process and increases their metacognition, a crucial ability for student success (Bransford et al., 2000). Moreover, reading the material in the textbook, watching the videos and discussing the topic will allow for repeated retrieval, another important cognitive process that has been shown to increase long-term learning (Karpicke, 2012). I expect that, through the implementation of both the free textbook and the video library, we will increase the retention, graduation and success rates of our students.

Another positive impact of this transformation is the open access of other institutions to the newly organized materials. All course materials will be stored within two different platforms: a master course in D2L and LibGuides. The unique aspect of this proposal is the great opportunity for other faculty to use our video library in designing their traditional, online or hybrid courses. Recent research shows that more students prefer online classes and they achieved better results than those in the traditional lectures (U.S. Department of Education, 2010). Also, a hot topic in today's teaching is "flipping" the class, which allows students to watch the videos before the lecture and the class time is used for different engaging activities (Tucker, 2012). In today's world, with the high demand on transforming the traditional lectures into online or flipped classes, there is a enormous benefit to have these videos already organized.

Transformation Action Plan:

1.3 TRANSFORMATION ACTION PLAN

Dr. Martiana - Florenta Segá, subject matter expert, will be responsible for the following:

- * Review of the free electronic OpenStax – "Biology" to conform to the learning objectives of the Biology Department at EGSC.
- * Identification, review, selection and adoption of videos that accompanies each face-to-face lecture.
- * Redesign of the course syllabus to include access to all the new course materials.
- * Redesign all the PPT slides with new updated images and information corresponding to the new adopted OpenStax – "Biology" textbook.
- * Design the assessment tools.
- * Collect and analyze the data.

Dr. David Chevalier, subject matter expert, will be responsible for the following:

- * Identification, review and adoption of new resources to supplement the new OpenStax – "Biology" textbook.
- * Curate all the course materials into LibGuide (Library-Specific Springshare Product) to serve as an open access source to all faculties and students.
- * Design a master course in D2L and incorporate all the course materials (syllabus, textbook, videos, other OERs) that will serve as an easily accessible resource for other EGSC faculties.

Additional personnel are available to support our efforts with the following:

- * Dr. Jimmy Wedincamp, Dean of the School of Mathematics and Natural Sciences
 - o Subject matter expert.
- * We will work with EGSC Information Technology personnel to add a master course in D2L.
- * Ms. Katie Shepard:
 - o Librarian, LibGuides expert

Quantitative & Qualitative Measures: 1.4 QUANTITATIVE AND QUALITATIVE MEASURES

Quantitative:

- * Compare the results in a standardized assessment questionnaire used in BIOL 1107 since Fall 2015 at the beginning and the end of the semester to assess for learning gain;
 - * Assess the success of attaining specific learning objectives by comparing the results for specific questions included in the exams to the ones in the past exams (where the textbook and videos were not used as a learning tool in the classroom);
 - * All the data collected in the above assessments will be analyzed using t-Test.
 - * Collect usage statistics of the videos and the textbook (however, the book can be used offline) from D2L;
 - * Compare the drop, fail, withdraw (DFW) rates; the data will be analyzed using a z-test (comparing proportions).
- Qualitative:
- * A survey will be developed to receive students' feedback on their learning experience using the new textbook and video library. The survey will be administrated at midterm and again at the end of each term.

Timeline:

1.5 TIMELINE

- * August 2016:
 - o Review of the free electronic OpenStax – "Biology" to conform to the learning objectives of the Biology Department at EGSC.

- * September 2016:
 - o Identification, review and adoption of new resources to supplement the new OpenStax – “Biology” textbook.
 - o Identification, review, selection and adoption of videos that accompanies each face-to-face lecture.
- * October 2016:
 - o Redesign lecture slides to align with the OpenStax – “Biology” textbook.
 - o Announcement of adopting a new textbook for BIOL 1107 on EGSC website.
 - o Redesign the course syllabus to include access to all the new course materials.
- * November 2016:
 - o Design a master course in D2L and incorporate all the course materials (syllabus, textbook, videos, other OERs) that will serve as an easily accessible resource for other EGSC faculty.
 - o Design the assessment tools.
- * December 2016:
 - o Check all the links in the master course (D2L).
- * January, March, May 2017:
 - o Implementation Spring 2017
 - o Assess students and analyze data from Spring 2017 semester.
- * May 2017:
 - o Complete the project status report for the Spring 2017 semester.
 - o Curate all the course materials into LibGuide to serve as an open access source to all faculty and students.
 - o Based on the feedback from students and personal experience, redesign the master course in D2L. Additionally, check and repair any broken links in the master course and make the master course an open accessible resource for other EGSC faculty.
- * June, July, August 2017:
 - o Implementation Summer 2017
 - o Collect and analyze data from Summer 2017 semester.
 - o Complete the project status report for Summer 2017 semester.
- * August, October, December 2017:
 - o Implementation Fall 2017 semester
 - o Collect final data and complete the final project report.
 - o Provide data on impact on student success and a course schedule with resource links.
- * Spring 2018:
 - o Participate in professional meetings and report our data on the results of the transformation.

Budget:

1.6 BUDGET

Personnel: \$10,000 – salary for Primary Investigator and Team Member

Travel: \$800 – the amount required to attend the required kickoff meeting.

Total amount required: \$10,800.

Sustainability Plan:

1.7 SUSTAINABILITY PLAN

I will continue to use the same materials for my future classes if the results of this implementation are similar or better than the previous semesters (where the for-profit textbooks were used). In the future, any EGSC faculty teaching BIOL 1107 course will be able to use our OERs stored in the master course in D2L. The website links will be checked by me at the beginning of each semester to ensure their availability. Any additional feedback on improving the master course from my colleagues will be reviewed and accounted for. Any changes in the master course will be followed by an update of the LibGuide.



East Georgia State College

THE UNIVERSITY SYSTEM OF GEORGIA
Office of the Dean, School of Mathematics and Natural Sciences
131 College Circle
Swainsboro, Georgia 30401-2699
Phone (478) 289-2166 • Fax (478) 289-2080
Email • wedincamp@ega.edu

July 26, 2016

Affordable Learning Georgia Textbook Transformation Grants

GALILEO

University System of Georgia

270 Washington Street, S.W.

Atlanta, GA 30334

Dear ALG members,

It is my pleasure to write this letter of support for the ALG Open Mathematics in Action Project submitted by Florenta Segal and David Chevalier. The ALG project will provide an ideal solution to the rising costs of textbooks and will result in significant savings for students. The faculty teaching the courses targeted in this proposal have significant experience and a willingness to participate. The goal of providing less expensive learning materials for our students is noble and has my full support. I believe this project will be sustainable long term and hopefully the knowledge acquired here will be applied to other courses at EGSC.

The EGSC Business Affairs Office will be responsible for the receipt and distribution of award funds. If the project is successful, EGSC School of Mathematics and Natural Sciences will act to encourage the project in other academic areas.

Thank you for this opportunity to assist our students in obtaining an affordable learning opportunity through participation in the ALG project.

Sincerely,

Jimmy Wedincamp

Dean and Professor



East Georgia State College

East Georgia State College

THE UNIVERSITY SYSTEM OF GEORGIA
Office of the Dean, School of Mathematics and Natural Sciences
131 College Circle
Swainsboro, Georgia 30401-2699
Phone (478) 289-2166 • Fax (478) 289-2080
Email • wedincamp@ega.edu

Syllabus

| Week | Date | Topics | Chapters |
|------|------|---|---|
| 1 | | Lecture 1: Introduction & The study of life | Chapter 1 Openstax.org |
| | | Lecture 2: Atoms & Molecules | Chapter 2 Openstax.org |
| 2 | | Lecture 2: Water & Carbon | Chapter 2 Openstax.org |
| | | Lecture 3: Proteins & Carbohydrates | Chapter 3 Openstax.org |
| 3 | | Lecture 3: Lipids & Nucleic Acids | Chapter 3 Openstax.org |
| | | Exam 1 (Lectures 1-3) | |
| 4 | | Lecture 4: The cell | Chapter 4 Openstax.org |
| | | Lecture 5: Plasma membranes | Chapter 5 Openstax.org |
| 5 | | Lecture 6: Metabolism | Chapter 6 Openstax.org |
| | | Lecture 7: Cellular respiration | Chapter 7 Openstax.org |
| 6 | | Lecture 7: Cellular respiration (cont.) | |
| | | Exam 2 (Lectures 4-7) | |
| 7 | | Lecture 8: Photosynthesis | Chapter 8 Openstax.org |
| | | Lecture 8: Photosynthesis (cont.) | |
| 8 | | Lecture 9: Cell communication | Chapter 9 Openstax.org |
| | | Lecture 10: Mitosis and Cell Cycle | Chapter 10 Openstax.org |
| 9 | | Lecture 11: Meiosis and sexual reproduction | Chapter 11 Openstax.org |
| | | Lecture 12: Mendel | Chapter 12 Openstax.org |
| 10 | | Lecture 12: Mendel (cont.) | |
| | | Lecture 13: Non-Mendelian inheritance | Chapter 13 Openstax.org |
| 11 | | Lecture 13: Non-Mendelian inheritance (cont.) | |
| | | Exam 3 (Lectures 10-13) | |
| 12 | | Lecture 14: DNA structure and function | Chapter 14 Openstax.org |
| | | Lecture 15: Genes & proteins | Chapter 15 Openstax.org |

| | | | |
|----|--|---|---|
| 13 | | Lecture 15: Genes & Proteins (cont.) | |
| | | Lecture 16: Gene expression | Chapter 16 Openstax.org |
| 14 | | Lecture 16: Gene expression (cont.) | |
| | | Exam 4 (Lectures 14-16) | |
| 15 | | Lecture 17: Evolution and origin of species | Chapter 18 Openstax.org |
| | | Lecture 18: Evolution of populations | Chapter 19 Openstax.org |
| 16 | | Lecture 18: Evolution (cont.) | |
| | | Final Exam Review | |
| | | Final Exam (TBA) | |
| | | | |

Final Report

Affordable Learning Georgia Textbook Transformation Grants

Final Report

Date: 12/21/2017

Grant Number: 245

Institution Name(s): East Georgia State College

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

Martiana Segal, Assistant Professor, Biology Department, EGSC, msegal@ega.edu

David Chevalier, Chair Biology Department, EGSC, dchevalier@ega.edu

Project Lead: Martiana Segal

Course Name(s) and Course Numbers: Principals of Biology I, BIOL 1107

Semester Project Began: Fall 2016

Semester(s) of Implementation: Fall 2016, Spring, Summer and Fall 2017

Average Number of Students Per Course Section: 28

Number of Course Sections Affected by Implementation: 7

Total Number of Students Affected by Implementation: 196

1. Narrative

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

- Summary of your transformation experience, including challenges and accomplishments
 - The primary goal of the project was to replace the for-profit textbook with a free electronic textbook and complement each lecture with free accessible videos.
 - Some of the challenges faced were: finding the supplemental videos that match the learning objectives; creation of the lecture slides; not finding OERs in the form of drawings or pictures to accompany the lectures.
 - The lecture slides were created using the ones provided by the Openstax.org. The main challenge was to find a balance between using the perfect amount of information on the slides and having enough details to reach our learning goals. These slides are worldwide accessible on LibGuides and can be

adopted and modified to match one's teaching style. The videos found on Khanacademy.com and YouTube are also available on LibGuides.

- Transformative impacts on your instruction
 - With the help of the free textbook and videos some independent work was requested from the students either before or after the face-to-face lectures.
- Transformative impacts on your students and their performance
 - The students' performance was similar to the one in the semesters preceding free textbook adoption.

B. Describe lessons learned, including any things you would do differently next time.

- Based on the number of students that accessed the videos and textbook in D2L, another strategy to improve their experience might be required. Additional materials for the students' independent study are necessary (and this will be created as part of the next project, ALG minigrant).

2. Quotes

- Provide three quotes from students evaluating their experience with the no-cost learning materials.
 - "Using the free text book has saved me a lot of money that I can use towards other things like: paying rent, buying groceries, buying other supplies for school, etc. My favorite experience from using the free textbook would be when I am unable to answer a question that I have for my professor, I can go online and find my answer in the text book. Having a free online text book is extremely convenient because I can use the text book on-the-go, instead of carrying around a giant hard back around with me in my bookbag. Therefore, the advantage of having a free online textbook helped me save money, time, and pain from carrying it around all the time".
 - "I shared with my roommate my free text book. She had to pay for her biology book, however, I did not. The material was very helpful throughout the school year and helped me on many quizzes. My favorite experience with the online textbook was that it was free, and available on-the-go. I could pull it up on my phone if I needed to and had the luxury of not having to carry around a big paper hard back book with me around everywhere. I chose the money I saved from buying the book to pay my rent which helped me not stress and helped me to focus more on my school work than worrying about money".
 - "I loved having access to a free textbook online. It saved me a lot of money that I was able to put to other classes. If anyone asked me about my Biology class I made sure to let them know the textbook was free online and it was a huge plus. The only drawback I have is that I personally don't like reading online and would rather have a paper version to read. If I needed it, it was there but my eyes would get very tired from looking at a screen and I didn't read as much of the chapter as

I would've if it were paper. But other than that, it was a huge relief to not pay for a book, and everything was very easily accessible”.

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: 102

- Positive: 87 % of number of respondents
- Neutral: 0 % of number of respondents
- Negative: 9 % of 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:

- Positive: Higher performance outcomes measured over previous semester(s)
- X 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?

Drop/Fail/Withdraw Rate:

 39 % of students, out of a total 156 students affected, dropped/failed/withdrew from the course in all the semesters of implementation.

Choose One:

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

- ___ 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

Affordable Learning Georgia grant provided us the opportunity to implement open educational resources for Principles of Biology or BIOL1107 course. This offered our students reduced expenses, free online anytime-accessible textbook, lecture slides and videos.

The students received this transformation very well as illustrated by their results on the survey administered at midterm and end of the semester. The survey results at midterm showed a positive impact, 59% of the students taking the survey (126 total number of students) selected “excellent” and 27% selected “very good” at all six questions of the survey. This result repeated at the end of the semester when 67% of 102 total number of students taking the survey chose “excellent” while 20% chose “very good”. The results for “excellent” and “very good” were pooled together and reported above (see (3a)) to show the positive effect of the transformation. On the last question of the survey (an essay) they explained the main reasons why this experience is positive for them and this can be seen in the three quotes used above at (2). The main aspect discussed by the students was saving money that could be used for other expenses.

The impact on the students’ performance was neutral as demonstrated by the results on the exam questions, DFW rate, pre-/posttest. On the exam, the focus of the comparison was on three lectures included on the lecture exam II: the cell membrane, introduction to metabolism and cellular respiration. These were also the lectures where short videos were used to review some main points of the topic discussed during the face-to-face lecture. The percentage of the students that had the wrong answers was compared for each question (24 total questions) between the control – without implementation (year 2016) and the treatment – with implementation (year 2017). Out of the seven questions that were found statistically different only 3 questions were found to be worse in 2017 compared to 4 questions in 2016. A chi-squared test to compare proportions was used in this context and a p-value of less than 0.05 was chosen as significant.

DFW rate was slightly lower, 39%, when compared to the control 42%. When compared, the difference was not found statistically different with a P-value of 0.58.

At the end of the semester following the implementation, the students were found to improve at the same level as the ones before the free textbook project. The improvement was calculated as the difference between post- and pretest administered at the end and the

beginning of each semester. The means were compared using a t-test and the difference was not found statistically different with a p-value of 0.18.

4. Sustainability Plan

- The materials adopted, adapted or created (lecture slides, videos, course schedule, links to each chapter of the free Biology textbook from Openstax) are made available on D2L in a master course.
- These materials will be used in my biology classes in the future.
- The materials will be updated every semester.

5. Future Plans

- Any measures that will eliminate the financial burden and allow for more student independent study will be considered in the future courses I will teach.
- This work will be presented to one of the learning and teaching conference.

6. Description of Photograph

- (Left to right) Dr. David Chevalier, subject matter expert; Dr. Martiana Segal, team lead and instructor of record.