

Fall 2015

Principles of Biology I (Valdosta State University)

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Grants Collection

Valdosta State University



UNIVERSITY SYSTEM
OF GEORGIA

Joshua Reece, John Elder, Emily Cantonwine,
Mark Blackmore, Eric Chambers

Principles of Biology I





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

Valdosta State University, BIOL 1107K, Sections H-N (4 Credit Hours)
Principles of Biology I – FALL 2015
Syllabus & Course Policies

Instructor: Joshua S. Reece

Welcome to Principles of Biology I. This is the first course in a series designed to help you develop a strong foundation in the biological sciences to build on throughout your studies at VSU and beyond. This syllabus is subject to modification at the discretion of the instructor.

BIOL 1107 Course Description. An introduction to the principles of biology for science majors, with an emphasis on the cellular nature of life. Concepts covered include the origin and early evolution of cellular life; cell structure, function, metabolism, and reproduction; cell signaling; and gene regulation in bacteria and eukaryotes. There are no prerequisites for this course. BIOL 1100 is a co-requisite for Freshman Biology majors.

A Note from Dr. Reece: I wrote a grant and secured \$30,000 from the University of Georgia to be able to provide you with free textbooks. You are welcome. In exchange, I want your pledge to come to class prepared, this means reading the chapters in your free book, and doing the practice questions in your book and on Blazeview.

Required Resources:

- **Lucky you! Your e-textbook is free and a print version is available at very low cost! The book is available in a wide variety of free online formats via the website listed below. You can use the book in whichever format(s) you want; we recommend that you download the entire .pdf so that you always have access to your book. Biology from OpenStax College, ISBN 1-938168-09-7, <https://openstaxcollege.org/textbooks/biology>**
 - **Printed copies at a significantly reduced textbook rate are also for sale via your college bookstore or <http://www.openstaxcollege.org>**
- Turning Technologies Clicker QT
- R.H. Goddard. 2011. Methods and Investigations in Basic Biology. Sixth Edition. Hayden-McNeil Publishing, Plymouth, MI. (Lab manual)

Learning Goal

Students will demonstrate understanding of the physical universe and the nature of science, and they will use scientific methods and/or mathematical reasoning and concepts to solve problems.

Course Objectives and Outcomes (refer to Outcome section at end of syllabus for more information)

By the end of this course, students will be able to

- 1) answer questions that demonstrate an understanding of fundamental concepts of biology, including the scientific method and experimental design; cellular structure, function, metabolism, and reproduction; the nature of the gene and its action; and the mechanisms of evolution (GEO 5; BEO 1-4)
- 2) perform a variety of standard lab techniques used in biological research (GEO 5)
- 3) use critical thinking skills and written communication skills to present the results and conclusions of data collected in the lab in standard scientific writing format (GEO 4 & 7; BEO 1)

Explanation of Lecture Assessments:

Unit Exams. A percentage score will be determined for each unit exam. There are no make-up exams, regardless of excuse. If you miss an exam, this will be the grade that is dropped. Students may not take exams early, with the exception of students with a university-related or religious excuse. The unit exams are not cumulative.

Primary Literature. Primary literature will be used throughout the course. Two scientific papers will be given out as assignments. The rubric for reading and summarizing/critiquing these papers will be provided to you (about a 1 page summary/critique).

Blazeview Quizzes. Blazeview quizzes will be available for completion prior to class. With the exception of the first few lectures, they will not be available after lecture, so you **MUST** read the chapters and complete the quizzes prior to that material being covered in class. Quizzes are typically 10 multiple choice questions.

Final Exam. The final exam will be cumulative, and is weighed the same as the unit exams. Students may choose to not take the final, but in this case, none of the previous exam grades will be dropped.

Pooled Clicker Grade. Beginning in the second week of class, lectures will include an assessment using clicker questions. Each correct answer will count 2 points, incorrect answers will count 1 point, and questions that are not answered will count 0 points. *Individual clicker assessments* will be posted to Blazeview immediately following the lecture.

Tentative Lecture Schedule, BIOL 1107K, Sections H-N, Fall 2015

Date	Subject	Chapters
Aug 17	Introduction and first Chapter: What is Biology?	Chapter 1
Aug 19	The chemical foundation of life	Chapter 2
Aug 24	Biological macromolecules	Chapter 3
Aug 26	Biological macromolecules (cont.)	Chapter 3
Aug 31	Cell structure	Chapter 4
Sept 2	Exam 1 (Chapters 1-3)	-
Sept 7	<i>Labor day, no class</i>	-
Sept 9	Structure and function of plasma membranes	Chapter 5
Sept 14	Metabolism	Chapter 6
Sept 16	Cellular respiration	Chapter 7
Sept 21	Photosynthesis	Chapter 8
Sept 23	Cell communication	Chapter 9
Sept 28	Cell reproduction	Chapter 10
Sept 30	Exam 2 (Chapters 4-10)	-
Oct 5	Meiosis and sexual reproduction	Chapter 11
Oct 7	Mendel and Heredity/ Modern inheritance	Chapter 12 Chapter 13
Oct 12	<i>Fall Break, no class</i>	-
Oct 14	DNA structure and function	Chapter 14

Oct 19	Genes and protein	Chapter 15
Oct 21	Gene expression	Chapter 16
Oct 26	Biotechnology and genomics	Chapter 17
Oct 28	Dr. Reece out of town – no class –	-
Nov 2	Review	-
Nov 4	Review	-
Nov 9	Exam 3 (Chapters 11-17)	-
Nov 11	Evolution and origin of species	Chapter 18
Nov 16	Evolution of populations	Chapter 19
Nov 18	Evolution (cont.)	Chapter 18-19
Nov 23	Thanksgiving week – no class	-
Nov 25	Thanksgiving week – no class	-
Nov 30	Review	-
Dec 2	Exam 4 (Chapters 18-19)	-
Dec 7	Final Exam (Dec 7)	-

Valdosta State University General Educational Outcomes (GEO)

1. Students will demonstrate understanding of the society of the United States and its ideals.
2. Students will demonstrate cross-cultural perspectives and knowledge of other societies.
3. Students will use computer and information technology when appropriate.
4. Students will express themselves clearly, logically and precisely in writing and in speaking, and they will demonstrate competence in reading and listening.
5. Students will demonstrate knowledge of scientific and mathematical principles and proficiency in laboratory practices.
6. Students will demonstrate knowledge of diverse cultural heritages in the arts, the humanities, and the social sciences.
7. Students will demonstrate the ability to analyze, to evaluate, and to make inferences from oral, written and visual materials.
8. Students will demonstrate knowledge of principles of ethics and their employment in the analysis and resolution of moral problems.

Department of Biology Educational Outcomes (BEO)

1. Develop and test hypotheses, collect and analyze data, and present the results and conclusions in both written and oral format used in peer-reviewed journals and at scientific meetings.

2. Describe the evolutionary process responsible for biological diversity, explain the phylogenetic relationships among the other taxa of life, and provide illustrative examples.
3. Demonstrate an understanding of the cellular basis of life.
4. Relate the structure and function of DNA/RNA to the development of form and function of the organism and to heredity
5. Interpret ecological data pertaining to the behavior of the individual organism in its natural environment; to the structure and function of populations, communities, and ecosystems; and to human impacts on these systems and the environment.

Rubric for Primary Literature Assignments

Read the assigned paper. Type up a 500 word paper that addressing the following five components:

- 1) What did the authors' study, or what was the question being addressed?
- 2) How was the study conducted, or how did they address their question?
- 3) What was their major finding?
- 4) What is the significance of the finding?
- 5) How is this paper relevant to the material we have covered in class?

There is a maximum of 5 points available for each of the five components listed above, for a maximum of 25 points for each 500 word paper. There will be two of these throughout the semester.

Links to materials:

Lecture Powerpoints: <https://www.dropbox.com/sh/d40kly8tbn6fkg6/AAC7xC5JX4mEBwUvvRgIIX6oa?dl=0>

Primary papers: <https://www.dropbox.com/sh/fsua1a2t8n0s72s/AAD9hsdG37DvMovj1vFwnu5ta?dl=0>

Assessments: https://www.dropbox.com/sh/Obvyd31tp1lahvg/AADW8gupYnmqLKfwhd_QI8fTa?dl=0

Initial Proposal

**Affordable Learning Georgia Textbook Transformation Grants
Round 2
Summer 2015, Fall 2015, Spring 2016
Proposal Form and Narrative**

Institution Name	Valdosta State University				
Team Members	Joshua S. Reece, Assist. Prof. of Biology, jreece@valdosta.edu John Elder, Prof. of Biology, jfelder@valdosta.edu Emily Cantonwine, Prof. of Biology, egcantonwine@valdosta.edu Mark Blackmore, Prof. of Biology, mblackmo@valdosta.edu Eric Chambers, Assist. Prof. Biology, ewchambers@valdosta.edu				
Sponsor, Title, Department, Institution	Robert Gannon, Professor and Head of Department of Biology				
Course Names, Numbers and Semesters Offered	BIOL 1107K, Principles of Biology I, offered Fall, Spring and Summer, grant implementation for Fall 2015.				
Average Number of Students Per Course Section	25	Number of Course Sections Affected by Implementation in Academic Year 2016	21	Total Number of Students Affected by Implementation in Academic Year 2016	525
Award Category	<input type="checkbox"/> No-Cost-to-Students Learning Materials <input type="checkbox"/> OpenStax Textbooks <input type="checkbox"/> Course Pack Pilots <input checked="" type="checkbox"/> Transformations-at-Scale				
Original course materials for students	<i>Life: The Science of Biology 10th ed. By Sadava et al, Required</i>			<i>\$198 Total Cost per student; a total savings of \$103,950</i>	
Plan for Hosting Materials	<input checked="" type="checkbox"/> OpenStax CNX <input type="checkbox"/> D2L <input checked="" type="checkbox"/> LibGuides				
Projected Per Student Cost	\$0		Projected Per Student Savings (%)	100%	

PROJECT GOALS

1. Replace existing for-profit textbook with free, OpenStax majors biology textbook (Biology, Avissar et al. 2014) in BIOL 1107K.
2. Develop learning outcomes (Kennedy et al. 2007) and lecture guides that complement OpenStax textbook and align with existing BIOL 1107K course goals.
3. Develop formative and summative assessments that complement OpenStax textbook and align with existing BIOL 1107K course goals.
4. Pilot an integrative free individualized online learning tools to enhance student success.
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 VSU Library to ensure the long-term sustainability of these modifications.
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.

1.1 STATEMENT OF TRANSFORMATION

Introduction to Biology I (BIOL 1107K) is one of the largest enrollment courses at Valdosta State University (VSU), and it also has one of the highest DFW rates (up to 70% in some years). Our transformation is to replace existing course materials with a free textbook and primary literature. Our stakeholders are the approximately 525 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 1107K 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 course more affordable, standardized, applicable, and interesting. We also hope that our innovations will correct the historically high DFW rate for this course.**

1.2 TRANSFORMATION ACTION PLAN

We will describe our transformational action plan relative to our six goals, leaving the seventh goal of assessment for section 1.3. 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 BIOL 1107K. 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 1107K at VSU or the equivalent course at another institution. Jointly, the PIs have over 60 years of experience teaching Introductory

Biology at VSU, and all 14 sections of the course will be taught by the PIs in the Fall of 2015 to pilot the new textbook.

The PIs will work on the **second and third goals** during Spring and Summer 2015 to allow for modifications in the Fall. The PIs will meet bi-weekly as a committee to combine and modify the current syllabi, learning outcomes, lecture notes, lecture guides, quizzes and exams so the content, verbiage, diagrams, and photos align with the OpenStax textbook.

The **fourth goal** is to integrate Wiley Plus Learning Space into the BIOL 1107K course. Wiley Plus Learning Space a free pilot of Wiley's integrative individualized online learning tool created to compliment the OpenStax Biology textbook. The PIs that are teaching BIOL 1107K during the Fall of 2015 will meet with the grant committee throughout the semester to discuss success and challenges with the implementation. Our **fifth goal** will be accomplished during the Summer of 2015, during which PI Reece will identify and present to Co-PIs two key primary literature articles that address concepts relevant to the course and are aligned with the textbook. 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 VSU IT to warehouse all resources for future BIOL 1107K 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 Co-PIs will work together as a committee on all project goals, 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 Summer 2015; **Co-PI Emily Cantonwine**- modify learning outcomes and develop textbook assessment questionnaire for students; **Co-PI Eric Chambers**- develop standardized lecture materials and assessment tools; **Co-PI Mark Blackmore**- make lecture guides and clicker assessments; **Co-PI John Elder**- evaluate changes in end-of-course assessment performance across sections with and without the textbook transformation, develop standardized lecture materials.

1.3 QUANTITATIVE AND QUALITATIVE MEASURES

We have identified **three quantitative measures** of student success. First, the PIs will use the end-of-course assessment that was developed (by the PIs) previous to this proposal, and will allow for comparison of performance over five years prior to the transition to OpenStax using simple ANOVA and t-test statistics. Second, we will assess before and after performance on midterms and final exams (i.e., learning objective success). Third, we will compare DFW rates for transformed section with those from previous years and from non-transformed sections taught contemporaneously. Notably, many of the PIs on this proposal have taught this course for more than ten 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.

1.4 TIMELINE

- February 2015: PIs meet and outline goals, allocation of duties, submit IRB application
- April 2015: Completion of lecture guides, clicker questions, and textbook questionnaire
- June 2015: Completion of formative and summative assessments; choose primary literature
- August 2015: Pre-semester meeting to finalize plan and coordinate implementation; give pre-course Motivation to Learn Biology survey to students
- October 2015: Analysis of pre-course Motivation survey; meeting to assess issues among PIs implementing new textbook
- November 2015: Coordinate final exam and end-of-course assessment,
- December 2015: give post-course Motivation 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

1.5 BUDGET

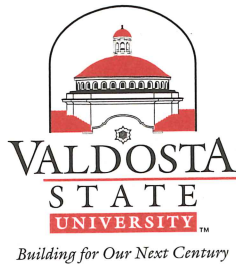
Salary for one PI (Reece) Summer 2015 (final prep work and coordination for Fall implementation): \$4200; Salary for each PI Fall 2015: \$5000 x 5 = \$25,000; Travel for grant kick-off meeting: \$800. Total of \$30,000.

1.6 SUSTAINABILITY PLAN

Our goal is a permanent transformation to OpenStax textbooks for all 1107K Introductory 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 on a password-protected file on the VSU V-Drive. We will also keep our analysis of contemporaneous and historical data on student performance pre-transformation to facilitate future instructors' ability to analyze their students' performance using the OpenStax textbook.

1.7 REFERENCES & ATTACHMENTS

- Avissar et al. 2014. OpenStax Biology textbook available at www.openstaxcollege.org.
- College Board 2013, accessed November 2014 at www.trends.collegeboard.org
- Gillen, C.M., J. Vaughan, B.R. Lye. 2004. An online tutorial for helping nonscience majors read primary research literature in biology. *Advances in Physiology Education* 28: 95-99.
- Glynn, S. M., P. Brickman, N. Armstrong, and G. Taasobshirazi, 2011. Science Motivation Questionnaire II: Validation with science majors and nonscience majors. *Journal of Research in Science Teaching* 48: 1159-1176.
- Kennedy, D., A. Hyland, and N. Ryan. 2007. *Writing and using learning outcomes: a practical guide*. Cork: University College Cork, Ireland.
- Kingsbury, A. and G. Galloway, 2006. "Textbooks enter the digital era," *U.S. News & World Report* (8 October), at www.usnews.com/usnews/edu/articles/061008/16books_2.htm.
- OpenStax College, 2014. Accessed November 2014 at www.openstaxcollege.org
- Textbook Survey Report, 2012. Available at www.msusa.org



Affordable Learning Georgia
Textbook Transformation Grants

December 3, 2014

Letter of support for proposal submitted by Joshua Reece, John Elder, Emily Cantonwine, Mark Blackmore and Eric Chambers

Dear Committee:

I am writing to offer my enthusiastic support for the development of OpenStax and no-cost library materials to be used in teaching BIOL 1107K Principles of Biology I beginning in fall 2015. More than 500 students will take this course in AY 16 and the textbook currently used is quite expensive so many of the students refrain from purchasing the text. As a consequence of that, the passing rate for this class can be quite low. The strategy outlined in this proposal will not only remove the obstacle of purchasing an expensive text to our students' success but the development of customized testing and ancillary lecture materials will also transform the learning experience in this course.

Multiple sections of BIOL 1107K are taught each fall, spring and summer semesters and this will continue indefinitely here at VSU . This course is also taught throughout the University System of Georgia so we will be able to share best practices with our sister institutions. Finally, a particular strength of this proposal is that we have many years of assessment data for this course using current pedagogy and we will be able to statistically compare that with the results of the newer approach proposed herein to generate a true quantitative evaluation of the usefulness of this transformation.

Thank you for your consideration of this transformative proposal.

Sincerely,

Robert L. Gannon, PhD
Professor and Head of Biology

Department of Biology
College of Arts & Sciences

Address 1500 N. Patterson St. • Valdosta, GA 31698-0015
Phone 229.333.5759 • **Fax** 229.245.6585

Final Report

Affordable Learning Georgia Textbook Transformation Grants

Final Report

Instructions:

A. Your final report submission must include four separate component files:

1. Completed report form. Please complete per inline instructions. The italicized text is provided for your assistance; please delete the italicized text before submitting your report.
2. Syllabus, organized chronologically (day and/or week and unit), with links to materials as used per assignment. For each resource, give the title, author, Creative Commons licenses (if appropriate), and freely accessible URL to the material. Include all open-access links to all adopted, adapted, and newly created course materials.
3. Supporting data on the impact of your Textbook Transformation (survey, analyzed data collected, etc.)
4. A photograph of your team and/or your students for use in ALG website and materials.
 - a. Photograph must be 800x600 pixels at minimum (length x height).
 - b. Photograph must be taken together: individual team member photographs and website headshots not accepted.

B. Go to http://affordablelearninggeorgia.org/site/final_report_submission to submit these four components of your final report. Follow the instructions on the webpage for uploading your documents. You will receive a confirmation email. Based on receipt of this report, ALG will process the final payment for your grant. ALG may follow up with additional questions or to request your participation in a publication, presentation, or other event.

Date:

Grant Number: proposal 122

Institution Name(s): Valdosta State University

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

Joshua Reece, Assistant Professor of Biology, jreece@valdosta.edu

Mark Blackmore, Professor of Biology, mblackmo@valdosta.edu

Eric Chambers, Assistant Professor of Biology, ewchambers@valdosta.edu

Emily Cantonwine, Professor of Biology, egcantonwine@valdosta.edu

John Elder, Professor of Biology, jfelder@valdosta.edu

Project Lead: Joshua Reece

Course Name(s) and Course Numbers: Principles of Biology I BIOL 1107K

Semester Project Began: Summer 2015

Semester(s) of Implementation: Fall 2015

Average Number of Students Per Course Section: 25

Number of Course Sections Affected by Implementation: 14

Total Number of Students Affected by Implementation: 298

1. Narrative

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

The key outcomes of our project include the successful implementation of a free textbook and generation of lecture and assessment materials for the new text. Our DFW rates are the same or lower than previous years, and student performance on assessments was unchanged or slightly improved over previous years, all at a huge cost savings to students. Our experience in this transformation was positive, and we are pleased with the new textbook. This project impacted my instruction by demonstrating that free texts and the use of primary literature is no different than or even better than forcing students to purchase for-profit texts. Students greatly appreciated the availability of the text, and they enjoyed reading about real-world examples of application of knowledge from the primary literature.

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

We learned that standardizing materials across sections is not necessary to ensure similar performance. We used identical texts and PowerPoints across different sections, but the materials was taught in different order by each instructor, with little to no difference in student performance. We were perhaps expecting that our innovations would substantially reduce DFW rates, but that is unrealistic for introductory “weed-out” courses in the sciences. High DFW rates are universal, and perhaps necessary for these types of courses.

2. Quotes

“The free textbook was a HUGE help, thanks Dr. Reece!”

“I enjoyed being able to access the book on my ipad, computer, or printed versions.”

“The textbook was free, which was nice, but I still wanted to see more application like the papers we read.”

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: 298

- Positive: 82 % of 284 number of respondents
- Neutral: 14 % of 284 number of respondents
- Negative: 4 % of 284 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?

The impact on student performance was positive, with a slight decrease in DFW rates, and an increase in student performance on end of year assessment exams.

Student outcomes should be described in detail in Section 3b.

Choose One:

- 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?

Slightly positive

Drop/Fail/Withdraw Rate:

44% of students, out of a total 298 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)
- 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

DFW rate was 44%.

Average GPA was 71% C

Pre-transformation DFW rate was 65%

Student success in learning objectives measured as performance on end of year assessment, including 74% average on assessment, an improvement over previous years.

4. Sustainability Plan

All future instructors of this course will be able to choose the OpenStax textbook and make sure of lecture and assessment tools generated as a part of this grant.

5. Future Plans

I am convinced that for-profit textbooks can be avoided in all of my classes. I also plan on presenting this work at upcoming pedagogical conferences, although I have not yet identified specific meetings.

6. Description of Photograph

Emily Cantonwine, left, and Joshua Reece, right. Dr. Cantonwine and Dr. Reece were the two instructors who implemented our textbook transformation grant.