

Summer 2017

## Introductory Physics I & II (VSU)

Dereth Jan Drake

*Valdosta State University*, [djdrake@valdosta.edu](mailto:djdrake@valdosta.edu)

Shantanu Chakraborty

*Valdosta State University*, [shchakraborty@valdosta.edu](mailto:shchakraborty@valdosta.edu)

Michael Holt

*Valdosta State University*, [moholt@valdosta.edu](mailto:moholt@valdosta.edu)

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Dereth Jannette Drake, Shantanu Chakraborty,  
Michael Holt

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# Introductory Physics I & II

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## 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

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## Application Details

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### Manage Application: ALG Textbook Transformation Grant

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**Award Cycle:** Round 4

**Internal Submission Deadline:** Monday, September 7, 2015

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**Application Title:** 181

**Submitter First Name:** Dereth

**Submitter Last Name:** Drake

**Submitter Title:** Assistant Professor of Physics

**Submitter Email Address:** djdrake@valdosta.edu

**Submitter Phone Number:** 229-249-4852

**Submitter Campus Role:** Proposal Investigator (Primary or additional)

**Applicant First Name:** Dereth

**Applicant Last Name:** Drake

**Applicant Email Address:** djdrake@valdosta.edu

**Applicant Phone Number:** 229-249-4852

**Primary Appointment Title:** Assistant Professor of Physics

**Institution Name(s):** Valdosta State University

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

Dereth J. Drake, Assistant Professor of Physics, Department of Physics, Astronomy, and Geosciences, djdrake@valdosta.edu

Shantanu Chakraborty, Physics Instructor, Department of Physics, Astronomy, and Geosciences, shchakraborty@valdosta.edu

Michael Holt, Assistant Professor and Reference Librarian, Odum Library, moholt@valdosta.edu

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

Dr. Edward Chatelain, Chair, Department of Physics, Astronomy, and Geosciences, Valdosta State University

**Proposal Title:** 181

**Course Names, Course Numbers and Semesters Offered:**

PHYS 1111K: Introductory Physics I, Fall 2015, Spring 2016, Summer 2016, Fall 2016

PHYS 1112K: Introductory Physics II, Spring 2016, Summer 2016, Spring 2017

**Final Semester of Instruction:** Spring 2017

**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):** Physics by John D. Cutnell & Kenneth W. Johnson, 10<sup>th</sup> Ed. (required); cost: \$214  
Laboratory Manual for 1111K or 1112K (required); cost: \$10 each  
Schaum's Outline for College Physics, 11<sup>th</sup> Ed. (optional); cost: \$22

**Proposal Categories:** OpenStax Textbooks

**Requested Amount of Funding:** \$15,800

**Original per Student Cost:** \$256 if students take both courses; \$246 if students take only one course

**Post-Proposal Projected Student Cost:** \$10, per course

**Projected Per Student Savings:** \$236

**Plan for Hosting Materials:** LibGuides

**Project Goals:**

Our goal is to offer low-cost, high quality learning materials for students in Introductory Physics I & II (PHYS 1111K and 1112K) at Valdosta State University by converting from the current textbook to the OpenStax College Physics textbook. If adopted for all sections of this course, ~12 per year, the projected annual savings for students would be \$70,800.

Our goal is to offer students additional no-cost Open Educational Resources (OERs) to help supplement lecture and textbook material.

By offering this new free, open access textbook and OERs, we anticipate an improvement in enrollment and DFW (Drop, Fail, and Withdraw) rates within these two courses.

We will measure the effectiveness of this transformation by comparing student's course success rates between for the courses taught using the new OERs and those taught using the traditional material as well as through student feedback on surveys provided periodically throughout each semester these courses are taught.

### **Statement of Transformation:**

The main stakeholders affected by this transformation will be the students who will gain access to a free open access textbook and educational resources starting on the first day of the semester. Many of our students come from backgrounds that can hinder the purchase of expensive textbooks and other resource materials. Often times if they are waiting on financial aid payouts, students may not be able to purchase their textbooks until the third week of classes. Since most physics textbooks, like the current required book, cost somewhere between \$140 and \$320, providing these free resources will reduce the financial burden of every student who enrolls in these courses and allow them access to course materials much sooner. Additionally, we project that by offering these resources students will be able to better meet the learning objectives for these courses and thus have greater success in completing the course.

For this transformation, we will be converting from the current purchased textbook to the OpenStax College Physics textbook. Since Biology, Chemistry, and Pre-Med students predominantly take PHYS 1111K and PHYS 1112K, this book seems to be a perfect fit. The text offers student many examples from each of the fields mentioned above, which helps students make the connection between what they are studying in physics to what they are doing within their own major. We will also be providing students open access resources from various online sources in order to give the students extra material so that they can meet the learning objectives for these courses.

Although, only two of the instructors will be using these resources during 2015-2016 academic year, our plan is to implement these changes department wide starting in Fall 2016. The implementation of the OERs and conversion from purchased textbooks will attract more students to taking these courses within our department. Additionally, this will alleviate any discontinuity students have when going from 1111K to 1112K and from one instructor to another.

### **Transformation Action Plan:**

Our action plan will have three parts: Identification and selection of materials, adoption and course redesign, and implementation and evaluation

#### Identification and selection of materials

We have already chosen to adopt the new OpenStax College Physics textbook and are in the process of identifying and locating no-cost, online resources, which can be used as

supplemental materials for instruction in this course. These resources include material found on YouTube, HyperPhysics, GALILEO, and MERLOT.

### Adoption and course redesign

During the Fall 2015 semester, we will be working to design modules on D2L, which correlate with each chapter in the College Physics textbook. Each module will include a study guide, homework set, additional problems for extra practice, quick quizzes for checking knowledge of concepts, PowerPoint slides (if used for lectures), and links or copies of the chosen education resources, which may include demonstration videos and video sample problems.

All students will have access to these resources through D2L and public access will be available through Vtext Intuitional Repository and LibGuides. Thus, students will have access to these materials anywhere they are able to access the internet. All instructors will also have open access to these materials. And since all instructors will be encouraged to use these resources for all sections of these courses, this will create continuity across the different sections of each course and between the two courses themselves.

It will be Dr. Drake's role to lead this project as subject matter expert and instructional designer and will be listed as the instructor of record in Fall 2016. Dr. Chakraborty will also work as an instructional designer helping to develop the D2L modules and will be listed as the instructor of record in Spring 2016. Mr. Holt will organize the materials in LibGuides and Vtext.

### Implementation and evaluation

We plan to implement the new outline for the course in Spring 2016. During this semester, we will be studying which resources students utilize most often through the "Completion Summary" report for each resource. Periodically, surveys will be provided to students to determine their perception of the helpfulness of each resource as well as suggestions from students on additional resources they would like to see added.

At the end of the Spring semester, data will be compiled to determine the students' perception of the course along with the DFW rates for this course. Any suggestions or changes to the modules in D2L will be made at this time. The updated materials will be used during Summer 2016 and Fall 2016 courses, with continuous evaluation throughout both semesters. More information on specific evaluations is discussed in the next section of this application.



**Quantitative & Qualitative Measures:** Throughout the length of this project, we will be using quantitative and qualitative measures to determine the impact of this transformation on student success.

**Quantitative Measures**

We will be examining three different measures throughout the length of this project: DFW rates, course enrollment data, and completion rates.

**DFW rate**

Through the department chair, we have access to the DFW rates for all students enrolled in PHYS 1111K and PHYS 1112K during the last three years. At the end of each semester, we will be comparing the DFW rates for the course taught using the new format to those using the purchased textbook.

**Course enrollment data**

Over the past three years, we have noticed a steady decline of about 15% in our PHYS 1111K and PHYS 1112K courses. Each semester we will be examining the enrollment data for these two courses. Our goal is to see if offering open access materials will increase the enrollment in these courses.

**Completion rates**

The last quantitative measure we are employing is to look at completion rates. As with the DFW rate, we have access to the completion rates for the past three years through our department chair. At the end of each semester, we will be accessing these reports to determine if the completion rate has improved by using these no-cost materials.

**Qualitative Measures**

We will be examining two different qualitative measures throughout the length of this project: student feedback through surveys and completion summary reports through D2L.

**Student feedback through surveys**

Surveys will be randomly distributed throughout each semester to students in order to gauge their perception of how helpful the textbook and the other OERs available to them on D2L appear to be. These surveys will help us to gauge student

interest as well as provide us with information on other resources the students may have found when they were studying for this course.

#### Completion Summary reports

One of the many reports available through D2L is the Completion Summary Report. These reports allow us to determine which students accessed specific materials and when they accessed it. Throughout each semester, we will be examining these reports in order to determine which resources the students utilize the most. Then at the end of the semester, we will replace any resources that students rarely use and add additional resources similar to the ones they use the most.

#### **Timeline:**

June 2015 – July 2015: Select and review OpenStax College Physics Textbook.

August 2015 - September 2015: Identify and located no-cost, online additional course materials

September 2015 - January 2016: Design modules in D2L

Spring 2016: Implement new course materials, Data collection on student achievement begins. Overload for Dr. Chakraborty, if proposal is funded.

May 2016 – June 2016: Compile data from Spring 2016 classes and revise course materials based on student feedback. Upload revised course materials to Vtext and LibGuides.

June 2016 - July 2016: Continue implementation with revisions

Fall 2016: Overload for Dr. Drake, if proposal is funded.

Spring 2017: Co-investigators compile data and revise course materials based on student feedback

#### **Budget:**

Dr. Dereth J. Drake - \$5000 for overload in Fall 2016

Dr. Shantanu Chakraborty - \$5000 for overload in Spring 2016

Mr. Michael Holt - \$5000 for salary/release time

Travel for at least two team members to attend grant kick-off meeting - \$800

**Sustainability Plan:**

The overall goal for this project is to create a master course model, which include corresponding modulus for each section of the textbook. All materials will be available to every instructor prior to the beginning of the semester through D2L and allow each instructor to customize the materials to their own teaching style. The master course and modules will be made available to faculty at all other USG institutions through Vtext Institutional Repository and LibGuides. Dr. Drake and Dr. Chakraborty will be responsible for maintaining the course materials for the foreseeable future. Mr. Holt will be responsible for maintaining the Vtext and LibGuides sites for the PHYS 1111K and 1112K materials for the foreseeable future.

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September 5, 2015

To Whom It May Concern,

This letter is in enthusiastic support of Affordable Learning Georgia Textbook Transformation Grant proposal submitted by Dr. Dereth Drake (Assistant Professor of Physics) and Dr. Shantanu Chakraborty (Physics Instructor) in the Department of Physics, Astronomy, and Geosciences at Valdosta State University. I cannot think of a more vital and timely endeavor at this time of dwindling enrollments and soaring textbook costs in the State of Georgia than the study these fine educators have outlined.

It has been shown that the first three weeks of PHYS 1111 and PHYS 1112 classes are the most important in determining student success in a course, and many students at this stage have yet to purchase their textbook and laboratory materials due to delays in financial aid, putting them at serious risk of failure or being resolved to playing catch-up for the entire semester in that class. Not only does this project eliminate the costs of textbooks, which for Biology and Chemistry majors can be overwhelming, but provides each student with instant access to all course materials from the first day of class. Most of the course drops and withdrawals in the first few weeks of class would be prevented, and the rigor of the course can be embraced by all students equally and immediately. Therefore, the challenges of retention for the university and graduation in a timely fashion for the student are both met.

I am delighted at the clarity and simplicity of the project design, and am certain that its results will yield recommendations for essential change in how Physics course materials are accessed by students in the USG.

Sustainability of this project at Valdosta State University is particularly vital, as enrollment and retention concerns have become especially important to maintaining our Physics program. This project will serve as a pilot for a future transformation in the calculus-based PHYS 2211 and PHYS 2212 courses in the department, taught by Dr. Frank Flaherty and Dr. Dereth Drake, applications to other course series within the department such as in Astronomy and Engineering, as well as to other departments within the College of Arts and Sciences at Valdosta State University. I see this study as an essential key to success of both students and science departments in the USG.

Your consideration on this matter is greatly appreciated. Thank you.

Sincerely,

Edward E Chatelain, Head  
Physics, Astronomy, and Geosciences

# Syllabus

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## Course Outline for Physics 1111K

Week of	Chapters	Materials
8/14	T: Introduction, Ch. 1 R: Ch. 1	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3009710">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3009710</a>
8/21	T: Ch. 2 R: Ch. 2	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3009713">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3009713</a>
8/28	T: Ch. 3 R: Ch. 3	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3009714">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3009714</a>
9/4	T: Ch. 4 <b>R: Test 1 (Ch. 1-3)</b>	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3010094">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3010094</a>
9/11	T: Ch. 4 R: Ch. 5	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3010094">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3010094</a> <a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286121">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286121</a>
9/18	T: Ch. 5 R: Ch. 6	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286121">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286121</a> <a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286122">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286122</a>
9/25	T: Ch. 6 & 7 R: Ch. 7	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286122">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286122</a> <a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286123">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3286123</a>
10/2	T: Ch. 8 <b>R: Test 2 (Ch. 1-7)</b>	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336794">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336794</a>
10/9	T: <i>Fall Break</i> R: Ch. 8 & 9	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336794">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336794</a>
10/16	T: Ch. 9 R: Ch. 10	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336796">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336796</a> <a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336797">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336797</a>

Week of	Chapters	Materials
10/23	T: Ch. 10 & 11 R: Ch. 11	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336797">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336797</a> <a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336799">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336799</a>
10/30	T: Ch. 12 <b>R: Test 3 (Ch. 1-11)</b>	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336800">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336800</a>
11/6	T: Ch. 12 & 16 R: Ch. 16	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336805">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336805</a>
11/13	T: Ch. 16 & 17 R: Ch. 17	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336806">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336806</a>
11/20	T: Ch. 13 R: <i>Thanksgiving Break</i>	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336802">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336802</a>
11/27	T: Ch. 13 & 14 R: Ch. 14	<a href="http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336803">http://libguides.valdosta.edu/c.php?g=441386&amp;p=3336803</a>

## Course Outline for Physics 1112K

Week of	Chapters	Materials
1/9	T: Introduction and Review R: Ch. 18	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674325">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674325</a>
1/16	T: Ch. 18 R: Ch. 19	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674325">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674325</a>
1/23	T: Ch. 19 R: Ch. 19 & 20	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674325">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674325</a>
1/30	T: Ch. 20 <b>R: Test 1 (Ch. 18-19)</b>	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674326">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674326</a>
2/6	T: Ch. 20 R: Ch. 21	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674326">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674326</a>
2/13	T: Ch. 21 R: Ch. 22	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674326">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674326</a> <a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674327">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674327</a>
2/20	T: Ch. 22 R: Ch. 23	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674327">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674327</a>
2/27	T: Ch. 23 <b>R: Test 2 (Ch. 18-22)</b>	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674328">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674328</a>
3/6	T: Ch. 24 R: Ch. 24	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674328">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674328</a>
3/13	T: <i>Spring Break</i> R: <i>Spring Break</i>	



<b>Week of</b>	<b>Chapters</b>	<b>Materials</b>
3/20	T: Ch. 25 R: Ch. 25	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674329">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674329</a>
3/27	T: Ch. 26 R: Ch. 27	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674329">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674329</a>
4/3	T: Ch. 27 <b>R: Test 3 (Ch. 18-26)</b>	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674329">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674329</a>
4/10	T: Ch. 30 & 33 R: Ch. 30 & 33	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674330">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674330</a>
4/17	T: Ch. 30 & 33 R: Ch. 31 & 32	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674330">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674330</a>
4/24	T: Ch. 31 & 32 R: Ch. 34	<a href="http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674330">http://libguides.valdosta.edu/c.php?g=664900&amp;p=4674330</a>

# Final Report

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# **Affordable Learning Georgia Textbook Transformation Grants**

## **Final Report**

**Date:** May 17, 2017

**Grant Number:** 181

**Institution Name(s):** Valdosta State University

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

Dereth J. Drake, Associate Professor of Physics, Department of Physics, Astronomy, and Geosciences, [djdrake@valdosta.edu](mailto:djdrake@valdosta.edu)

Shantanu Chakraborty, Physics Instructor, Department of Physics, Astronomy, and Geosciences, [shchakraborty@valdosta.edu](mailto:shchakraborty@valdosta.edu)

Michael Holt, Assistant Professor and Reference Librarian, Odum Library, [moholt@valdosta.edu](mailto:moholt@valdosta.edu)

**Project Lead:** Dereth Drake

**Course Name(s) and Course Numbers:**

PHYS 1111K: Introductory Physics I

PHYS 1112K: Introductory Physics II

**Semester Project Began:** Fall 2015

**Semester(s) of Implementation:** Fall 2016 / Spring 2017

**Average Number of Students Per Course Section:** 25

**Number of Course Sections Affected by Implementation:** 5

**Total Number of Students Affected by Implementation:** 132

### **1. Narrative**

For this transformation we had three key goals: (1) adopt the OpenStax College Physics textbook, (2) develop supplemental resources for students to use, and (3) organize those resources into a LibGuide for easy on and off campus access by everyone.

The OpenStax College Physics textbook was formatted very similar to the traditional textbook used in this course, which made the transition much easier. The main difference between this book and the previously used text was the addition of more example problems directly related to biology and medical sciences. This was beneficial to our

students since a majority of the students who enroll in these courses tend to be biology and pre-med students. One issue that we noticed was that the text contained some errors. These were submitted to the publisher and all corrections were added to the errata page on the publisher's website.

When a new text is adopted nowadays, many come with multiple additional resources such as power point slides, test banks, and simulations/videos. The OpenStax text only provides a solution manual and slides of the images from the text. This meant that the faculty involved in the transformation had to create many additional resources for the students to use. As such, we worked to develop

1. Study guides for each chapter which students can use to help them determine what and how to study the material.
2. Example problems and recitation worksheets which can be used in either the lecture or recitation to help students practice problem solving techniques.
3. A list of additional resources for each chapter, which includes online videos, simulations, and webpages.
4. Homework sets with more extensive and varied problems.

All of these items were uploaded to the Vtext Repository housed and maintained by the university library. One of our team members worked to create LibGuides for each course. These guides allow for easy access of the material and provide faculty/teachers a chance to download solution sets for the homework, which are only accessible by request.

When we started this project, we did not expect a considerable difference in learning success of students. Previous surveys in these classes suggested that many students are not purchasing the textbook due to the cost. However, research has shown that reduced cost may increase student performance. Our project did not find an increase in student learning by using the OpenStax book compare to before. Students did indicate in surveys taken at the end of the course that they found the text to be useful and liked the fact that it was available free online or at a reduced cost in the bookstore.

We plan to continue with the OpenStax textbook in these courses in the near future. However, we also plan to re-evaluate all the materials we developed over the course of this transformation. Our goal is to find a way to develop more/better tools that will increase student engagement with the content of this course at a deeper level. By doing so, we hope to see an increase in student performance in the future.

## **2. Quotes**

- "I enjoying having free access to the textbook online if I am confused on any concepts in class. I just have not run across that problem yet."

- “I feel like the text book was very helpful, it allowed me to understand the material better after reviewing my notes each day after class. I would encourage any student who will be taking this class to purchase the textbook or use the online version.”
- “The online resources on Blazeview are very helpful with studying for the exam and also helping you to understand the concepts of the things going on in class as well. I like the study guides and the homework sets that are places on there for us. It really helped me with passing the second test. “

### 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: 132

- Positive: 64.5 % of 73 number of respondents
- Neutral: 21.4 % of 73 number of respondents
- Negative: 14.1 % of 73 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?**

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

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:**

8.0% of students, out of a total 50 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**

#### **Survey Responses**

A survey was administered at the end of the Fall 2016 and Spring 2017 semesters in order to determine the students perceptions and opinions about the materials that were used or developed during this transformation. 73 of the 132 students enrolled in these courses participated in the survey. As shown in figure 1, over 80% of students surveyed consider the cost of textbooks prior to buying the book. Considering only 60% of the students said that they then buy all required books, this indicates that some students (~20%) may not purchase a textbook because of the cost of the book. Additionally, less than half the students knew that there was a free version of the textbook available prior to registering for courses.

In addition to using the OpenStax College Physics textbook, we created a variety of new resources and materials for the students. In figure 2, we show the students perceived helpfulness of these materials. It is clear from the data that more than half the students found the new materials and resources very helpful, especially the study guides (75% agreed) and the homework sets (88% agreed). It is interesting that less than half the students thought the textbook over all was very helpful with this course. This could be explained by the fact that only about 37% of the students polled indicated that they used the textbook at least twice a week during the semester, as shown in figure 3.

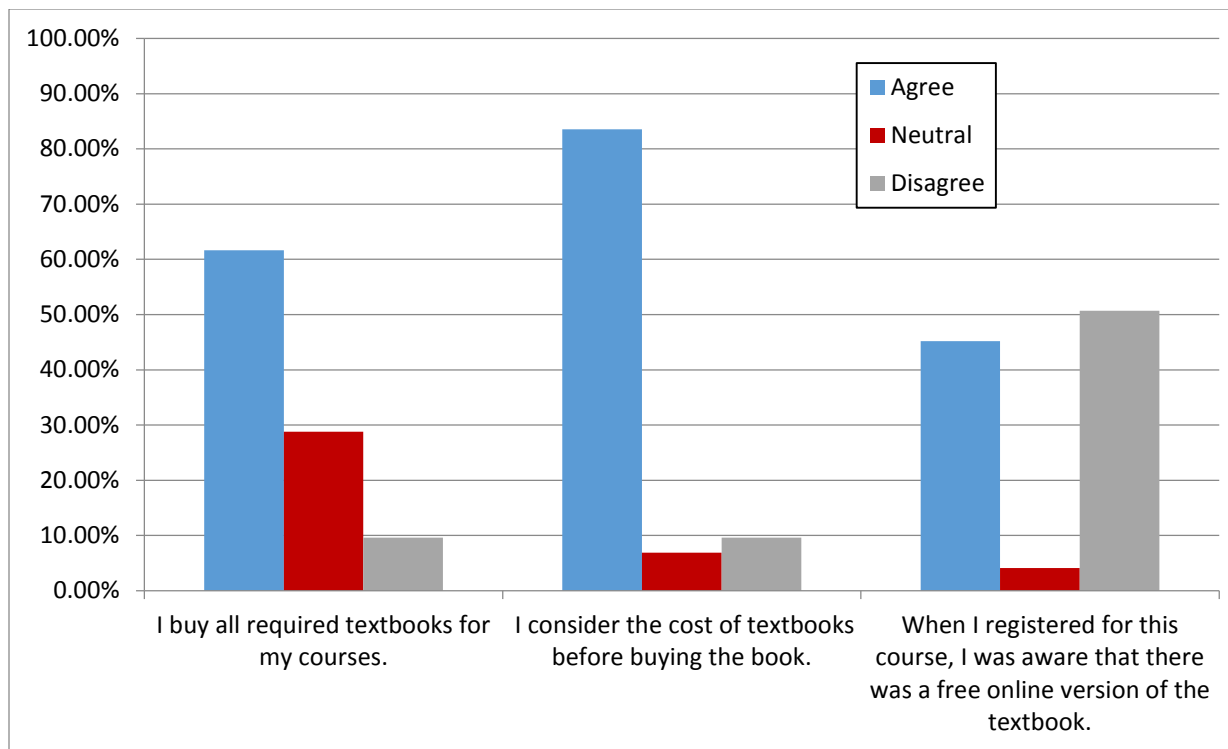


Figure 1: Student responses to questions regarding course textbooks.

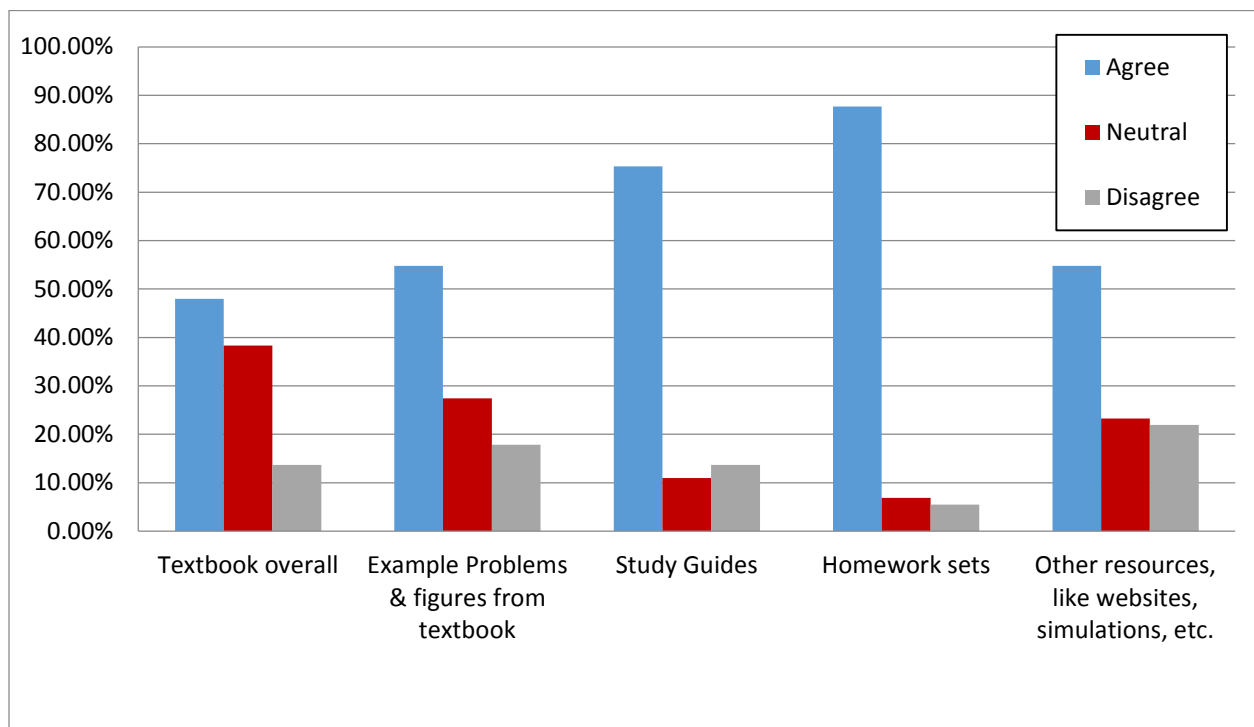


Figure 2: Helpfulness of course materials developed during this transformation.

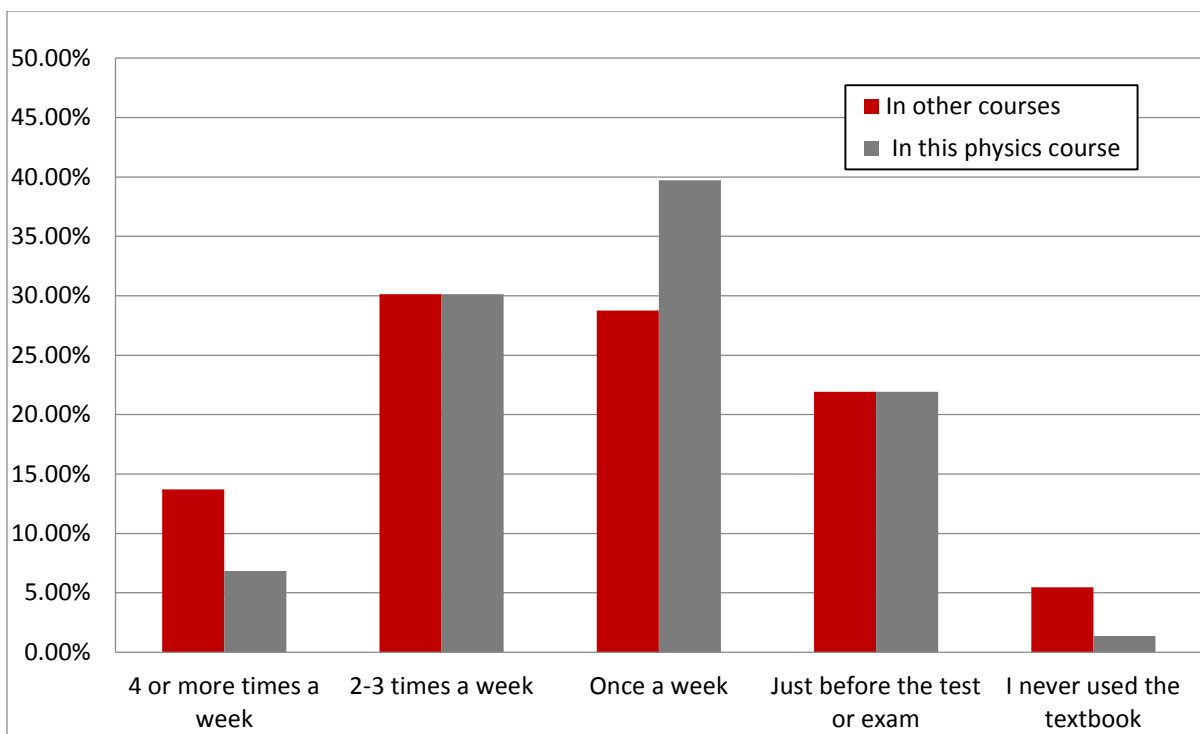


Figure 3: Figure showing how often students use the required textbook in this physics course in comparison to other courses.

### Impact on Student Performance

We examined student performance in this course prior to and after the transformation. Below in Table I, we present the DFW% for each Spring semester of the PHYS 1112K. It appears from the DFW% that we had a large increase from before the transformation (Spring 2014 – Spring 2016) to the after (Spring 2017). However, the raw data does not show a significant change, rising from 2 students in 2014 to 4 students in 2017. While there is a definite change, the increase is not significant enough that we can definitely say whether the new textbook has had a positive/negative impact on the performance of the students.

Additionally, we looked at the average GPA data for each semester. These results show a drop in the average class GPA from 2014 to 2017 of about 6.7%. The instructors have reviewed the data and we found that the reason for this change could be due to multiple faculty teaching this course over the past four years. If there were more consistency with only one or two faculty members teaching this course over this period, a comparison would be more valid. However, with multiple faculty and teaching styles there is a lot of inconsistency between the different semesters. We conclude that a longer study needs to be done where only one faculty member is monitored from before to after the transformation. This would provide more accurate evidence of the usefulness of the textbook and new materials we have developed.



**Table I: DFW% and Course Average GPAs**

<b>Term</b>	<b>Number of students DFW</b>	<b>Total Number of students</b>	<b>DFW%</b>	<b>Class Average GPA</b>
Spring 2014	2	70	2.86%	2.68
Spring 2015	3	60	5.00%	2.78
Spring 2016	3	52	5.77%	3.47
Spring 2017	4	50	8.00%	2.50

#### **4. Sustainability Plan**

The overall goal for this project was to create a master course model for PHYS 1111K and 1112K. For this model, moduli corresponding to each section of the textbook were created along with supporting materials. All materials were uploaded to D2L at the beginning of each semester for students to use. The materials have since been uploaded to the Vtext Institutional Repository and converted into LibGuides for each course. These guides are freely available to any faculty member at the other USG Institutions. We plan to maintain/update all the course materials and the LibGuides for the foreseeable future.

#### **5. Future Plans**

One interesting point that comes from the data is that less than half the students surveyed knew that there was a free version of the book available prior to registering for this course. Our plan is to try to find a way to advertise that there is a free online book available for this course. One suggestion we have is to work with the registrar's office to include an icon or comment on the course registration page that would tell the students about the free book. Another option we are looking at is to put an advertisement in the school newspaper a couple weeks prior to registration.

We recognize from the data that some students do not see how helpful the textbook can be for this course. They also do not seem to use this textbook more than once a week. One plan we have to resolve this issue is to reference the textbook more often during the lecture in order to get the students used to using the text early on in the semester. This should help them to become more familiar with the text and perhaps encourage them to rely more on it when studying for this course. Additionally, the data shows that more than 21% of the student polled found that the other resources were not helpful. These other resources included links to various websites (like Khan Academy and Hyperphysics), simulations, and video sample problems. We plan to revamp these resources by determining which resources were most used and which were least used. We will then find new sources to replace those that were not used very often.

#### **6. Description of Photograph**

- Picture of students in the PHYS 1112K lecture course at VSU.