Table of Contents

Application Summary

Competition Details

Competition Title:	Textbook Transformation Grants, Round Fourteen (2019-2020)
Category:	University System of Georgia
Award Cycle:	Round 14
Submission Deadline:	04/09/2019 at 11:59 PM

Application Information

Submitted By:	Michael Cotterell
Appplication ID:	3393
Application Title:	464
Date Submitted:	04/09/2019 at 8:25 AM

Personal Details

Institution Name(s):	University of Georgia
Applicant First Name:	Michael
Applicant Last Name:	Cotterell
Applicant Email Address:	mepcott@uga.edu
Applicant Phone Number:	706-542-4799
Primary Appointment Title:	Lecturer
Submitter First Name:	
Submitter Last Name:	
Submitter Email Address:	
Submitter Phone Number:	
Submitter Title:	

Application Details

Proposal Title

464

Final Semester of Project

Summer 2020

Requested Amount of Funding

10,800

Type of Grant

Specific Core Curriculum Courses

Course Title(s)
Software Development

Course Number(s)
CSCI 1302

Team Member 1 Name
Michael Cotterell

Team Member 1 Email
mepcott@uga.edu

Team Member 2 Name
Bradley Barnes

Team Member 2 Email
bjb211@uga.edu

Team Member 3 Name

Team Member 3 Email

Team Member 4 Name

Team Member 4 Email

Additional Team Members (Name and email address for each)

Sponsor Name
Thiab Taha

Sponsor Title
Professor and Head

Sponsor Department
Computer Science

Original Required Commercial Materials (title, author, price)
Java Foundations: Introduction to Program Design and Data Structures (5th Edition), John Lewis, Peter DePasquale, Joe Chase, $173.32

Average Number of Students per Course Section Affected by Project in One Academic Year
74

Average Number of Sections Affected by Project in One Academic Year
8

Total Number of Students Affected by Project in One Academic Year

634

Average Number of Students Affected per Summer Semester
48

Average Number of Students Affected per Fall Semester
293

Average Number of Students Affected per Spring Semester
293

Original Total Cost per Student
173.32

Post-Project Cost per Student
0.00

Post-Project Savings per Student
173.32

Projected Total Annual Student Savings per Academic Year
109,884.88

Using OpenStax Textbook?
No

Project Goals

The main goal of this proposal is to provide a guided reading-based textbook replacement for CSCI 1302 Software Development at the University of Georgia. This course is UGA's Computer Science II in the set of USG Core Curriculum courses. We envision a full, active-learning, tutorial-based implementation of Software Development (CSCI 1302) beginning in Fall 2019. Instead of reading a textbook, the students will work through interactive tutorials to fully engage with new concepts. These tutorials will consist of hands-on, relevant examples on each topic in the course. They will provide the necessary background information and explain the importance of each topic. The tutorials guide the students through the topics using hands-on activities where they can implement, create, and test their implementations of new computer science topics. In other words, they are practicing the skill of computer programming while they are learning the concept.

Computer Science course enrollments continue to increase. In Spring 2019, we currently have over 300 students enrolled in CSCI 1302. Based on projected numbers for Fall 2019 and Spring 2020, providing a free alternative to a textbook will save our students at least $109,884.88 per year and aid in the continuation of active learning course offerings for CSCI 1302 at UGA. If other institutions of higher education adopt these resources, then the impact would be even larger.

Statement of Transformation

Currently, students are required to purchase a textbook for the course, and readings are assigned from the book to supplement the in-class exercises and course projects. The authors of this proposal recognize the value in adopting a course textbook so that students have a readily available set of reference material. However, the current textbook is expensive ($173.32) and the examples it provides, while well written, do not directly fit well with our active learning pedagogical approach. The students are currently reading a combination of instructor written tutorials, textbook pages, and websites on course topics.

For this proposal, the intent is that the tutorials that students do at home will replace the current textbook as the main source of learning new topics. The tutorials prepare the students to work on tougher problem-solving challenges in the classroom. The in-class group activities will require the students to use what they learned in the tutorials to solve complex computer science problems. We propose replacing our current textbook with interactive tutorials and in-class activities to make sure students are fully engaged in the topics both at home and in the classroom.

Literature on active learning and guided practice techniques in computer science shows a lot of promise. Dr. Barnes recently published work done on CSCI 1301 (i.e., UGA's Computer Science I in the set of USG Core Curriculum courses) which showed that students in active learning sections outperformed students in a traditional lecture setting.

Additional Measures of Impact: The impact of this work extends beyond the University of Georgia. We plan to license this work under the Creative Commons License. We hope to publish our materials for free online to be used by other institutions or individuals. We will also publish our findings in computer science education conferences.

Transformation Action Plan

Summary of Expertise:

- Dr. Michael Cotterell is a Lecturer of Computer Science at UGA who has taught Computer Science courses at UGA since 2012. In that time, he has taught 19 sections of the affected course, CSCI 1302.
- Dr. Bradley Barnes is a Senior Lecturer of Computer Science at UGA who has taught Computer Science courses at UGA since 2008. In that time, he has taught numerous sections of the prerequisite course, CSCI 1301.

For this proposal, both team members will work together to revise existing open course materials authored by the team members and create new tutorials and exercises. For improvements to existing work, the team members will incorporate direct student feedback and will draw on the results of an ongoing research study [ID#STUDY00006734] the team members are involved in related to the impact of peer learning in computer science.

In addition to hosting the material on GALILEO Open Learning Materials, all materials will be published on GitHub under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) license to students and the general public and a Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) license to instructors at institutions of higher education (IHE).

[ID#STUDY00006734] Michael Cotterell, Bradley Barnes, Delaram Yazdansepas. 11/20/2018--11/19/2023. "Impact of Active Learning in CS" UGA IRB Protocol ID#STUDY00006734.

Quantitative & Qualitative Measures

We propose the incorporation of an ongoing research study [ID#STUDY00006734] as a natural way to evaluate this textbook transformation process. Data collected from the study will help us evaluate and improve multiple aspects of the course over time, including the proposed open course material. The study explores whether peer-based active learning pedagogies result in a statistically significant increase in course-level retention, grade statistics, and opinion statistics, including confidence, engagement, motivation, ambition, question asking ability, and interest in computer science for some of the surveyed demographics while not resulting in a statistically significant decrease in most of the demographics. The current protocol involves the use of multiple surveys, at least one entry survey and one exit survey, as well as data collected by UGA's Office of Institutional Research as the sources for the dataset. Students' scores will also be collected for analysis. Following IRB protocol, the surveys will not be a part of students' course work, and only those students who agree to participate in the study will be requested to fill the surveys.

Since the four sections of the Spring 2019 offering of CSCI 1302 at UGA utilizes the non-free textbook offering, the data collected from the study can be used as a control. The features of the dataset lend themselves well to the family of statistical models known as analysis of covariance (ANCOVA). The goal is to use the models to determine the statistical significance of treatments. In this case, the adoption and use of the proposed works will be interpreted as a treatment.

[ID#STUDY00006734] Michael Cotterell, Bradley Barnes, Delaram Yazdansepas. 11/20/2018--11/19/2023. "Impact of Active Learning in CS" UGA IRB Protocol ID#STUDY00006734.

Timeline

Spring 2019

- January 14, 2019 -- April 8, 2019: Application Submitted
- April 25, 2019: Notification Date
- April 26, 2019 -- May 15, 2019: Institutional sign-off on Service Level Agreement (SLA) provided by the University System Office, using the project proposal as a statement of work
- May 16, 2019 -- May 20, 2019: Institutional invoice to USG along with the signed SLA

Summer 2019

- May 20, 2019: Kickoff Meeting, Middle Georgia State University Hatcher Conference Center -- Dr. Cotterell and Dr. Barnes will both attend
- June 6, 2019 -- July 3, 2019: Identify remaining dependencies on the existing textbook and begin removing them through the creation of new tutorials and class exercises.
- July 8, 2019 -- July 31, 2019: Continue to remove dependencies on the existing textbook and begin removing them through the creation of new tutorials and class exercises.
- July 31, 2019: All dependencies on the existing textbook removed.
- August 1, 2019: Submit Project Status Report

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- [Ongoing] August 14, 2019 -- December 4, 2019: Assess and revise materials based on direct student feedback collected throughout the semester.
- August 14, 2019 -- August 28, 2019: Entry Survey
- August 23, 2019: Submit abstract to SIGCSE
- August 30, 2019: Submit preliminary results to SIGCSE
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- .June 5, 2020 -- July 29, 2020: Assess and revise materials based on direct student feedback collected throughout the various semesters of implementation, then submit any updated materials to GALILEO Open Learning Materials
- July 30, 2020: Submit Final Project Status Report, including provision of data on the impact on student success and a course schedule with resource links.

Budget

Michael Cotterell

- Salary: $4,150.00
- Benefits: $850.00
- Travel: $400.00
- Total: $5,400.00

Bradley Barnes

- Salary: $4,150.00
- Benefits: $850.00
- Travel: $400.00
- Total: $5,400.00

Overall Total

- Total: $10,800.00

Sustainability Plan

We anticipate the continued use of the generated course materials at the University of Georgia for many semesters to come. Each semester, the set of materials will be revised and extended as instructors observe student interactions and performance. Additionally, updates and additions from instructors of other institutions of higher education are welcome as per the open licensing for the material. As the material is hosted on GitHub, pull requests can be used by others to initiate a process to review and incorporate updates to the overall corpus of material in an open and transparent fashion. We also plan to present a subset of the course materials at the ACM conference on Computer Science Education (SIGCSE) along with evaluation metrics derived from our associated research study.

Acknowledgment

Grant Acceptance

[Acknowledged] I understand and acknowledge that acceptance of Affordable Learning Georgia grant funding constitutes a commitment to comply with the required activities listed in the RFP and that my submitted proposal will serve as the statement of work that must be completed by my project team. I further understand and acknowledge that failure to complete the deliverables in the statement of work may result in termination of the agreement and funding.

UNIVERSITY OF GEORGIA

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415 Boyd Graduate Studies Research Center
200 D.W. Brooks Drive
University of Georgia
Athens, Georgia 30602-7404
TEL 706-542-2911 | FAX 706-542-2966
www.cs.uga.edu

Franklin College of Arts & Sciences
Department of Computer Science

To: Affordable Learning Georgia's Textbook Transformation Grant

This is my support letter to the proposal by Dr. Michael Cotterell entitled "Open & Active Course Materials for Software Development" for the Affordable Learning Georgia's Textbook Transformation Grant.

If the submitted proposal is selected for funding, it is my intent to provide the support of the Department of Computer Science at the University of Georgia. The department will be responsible for receipt and distribution of funding, and it will aid in the sustainability of the project by encouraging the authors of proposed works to maintain and use the works in active learning courses offered by the department.

Sincerely,

Thiab R. Taha
Professor and Head

Affordable Learning Georgia

Textbook Transformation Grants, Round Fourteen
(Summer 2019 –Summer 2020)
Proposal Form and Narrative

Notes
- The proposal form and narrative .docx file is for offline drafting and review. Submitters must use the InfoReady Review online form for proposal submission.
- The only way to submit the official proposal is through the online form in Georgia Tech's InfoReady Review. The link to the online application is on the Round 14 RFP Page.
- The italic text we provide is meant for clarifications and can be deleted.

Applicant, Team, and Sponsor Information
The **applicant** is the proposed Project Lead for the grant project. The **submitter** is the person submitting the application (which may be a Grants Officer or Administrator). The submitter will often be the applicant – if so, leave the submitter fields blank.

Institution(s)	University of Georgia
Applicant Name	Open & Active Course Materials for Software Development
Applicant Email	mepcott@uga.edu
Applicant Phone #	706-542-4799
Applicant Position/Title	Lecturer
Submitter Name	
Submitter Email	
Submitter Phone #	
Submitter Position	

Please provide the first/last names and email addresses of all team members within the proposed project. Include the applicant (Project Lead) in this list. Do not include prefixes or suffixes such as Ms., Dr., Ph.D., etc.

	Name	Email Address
Team Member 1	Michael Cotterell	mepcott@ug.edu
Team Member 2	Bradley Barnes	bjb211@uga.edu

Team Member 3		
Team Member 4		
Team Member 5		
Team Member 6		
Team Member 7		
Team Member 8		

If you have any more team members to add, please enter their names and email addresses in the text box below.

N/A

Please provide the sponsor's name, title, department, and institution. The sponsor is the provider of your Letter of Support.

Dr. Thiab Taha, Professor and Department Head, Department of Computer Science, University of Georgia

Project Information and Impact Data

Title of Grant Project	Open & Active Course Materials for Software Development
Type of Grant	Specific Core Curriculum Courses
Requested Amount of Funding	$10,800
Course Names and Course Numbers	Software Development - CSCI 1302
Final Semester of Project	Spring 2020
Average Number of Students Per Course Section Affected by Project	74
Average Number of Sections Affected	8

by Project in One Academic Year	
Total Number of Students Affected by Project in One Academic Year	586 + 48 = 634
Average Number of Students Affected per Summer Semester	*48*
Average Number of Students Affected per Fall Semester	293
Average Number of Students Affected per Spring Semester	293
Title/Author of Original Required Materials	John Lewis, Peter DePasquale, Joe Chase. Java Foundations: Introduction to Program Design and Data Structures (5th Edition) $173.32
Original Total Cost Per Student	$173.32
Post-Project Cost Per Student	$0
Post-Project Savings Per Student	$173.32
Projected Total Annual Student Savings Per Academic Year	$109,884.88
Using OpenStax Textbook?	No

Narrative Section

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Note: Letter of Support

See attached, a letter of support from Dr. Thiab Taha, Professor and Head of the Department of Computer Science at the University of Georgia.