Affordable Learning Georgia Textbook Transformation Grants

Interim (Draft) Final Report

To submit your Interim (Draft) Final Report, go to the [Final Report submission page](http://affordablelearninggeorgia.org/site/final_report_submission) on the ALG website: http://affordablelearninggeorgia.org/site/final\_report\_submission

The interim final report submission form allows up to five files:

* This completed narrative document (required)
* Syllabus or syllabi (required)

*If multiple files, compress into one .zip folder*

* Qualitative/Quantitative Measures data files (required)

*If multiple files, compress into one .zip folder*

* Photo of your team or a class of your students for future ALG promotions (optional)

Follow the instructions on the webpage for uploading your documents. Based on receipt of this report, ALG will process the final payment for your grant. ALG will follow up in the future with post-project grantee surveys and may also request your participation in a publication, presentation, or other event.

# General Information

**Date: May 10, 2020**

**Grant Round: 13**

**Grant Number: 403**

**Institution Name(s): Georgia Gwinnett College**

**Project Lead: Hyesung Park**

**Team Members (Name, Title, Department, Institutions if different, and email address for each): Wei Jin, Tacksoo Im, Sonal S. Dekhane, Richard W. Price, Robert Lutz, Na’el Abu halaweh**

**Course Name(s) and Course Numbers: Programming Fundamentals, ITEC 2140 (Java Programming Course)**

**Semester Project Began: Fall 2019**

**Final Semester of Implementation: Spring 2020**

**Total Number of Students Affected During Project: 538**

# Narrative

* 1. *Describe the key outcomes, whether positive, negative, or interesting, of your project. Include:*
* *Summary of your transformation experience, including challenges and accomplishments*

In this project, we created and implemented no/low cost open textbook/materials for ITEC 2140 (Programming Fundamentals Online Textbook: <http://itec2140.ddns.net/> , Exercise Questions, Exam question bank, and Instructor Course PowerPoint Slides) with a success.

By utilizing the created textbook, students had the ability to interact with the programming examples presented in the book, modify, and compile them, and trace their execution. This interactive transformation of the textbook improves the students’ learning experience.

As faculty, we had a more in-depth understanding of the ITEC 2140 outcomes and ensured the developed book along with accompanied resources are aligned to the course outcomes and is relevant, accessible, and engaging. In addition, development process of writing the customized textbook helped us targeting the needs of our students.

Accomplishments:

* + - It was good to be able to create a no/low cost open textbook/material for students that benefitted them so much savings
      * Having the open textbook and instructors’ resource available to faculty members and our students that align with course outcomes of ITE 2140. And make these resources available to our students at no charge and on the first day of the class.
      * Considerably reducing the cost of the class material.
    - Having Interactive examples helped the students to have a better understanding of the presented examples and improved the students’ learning experience.
    - Major accomplishment is to compose an open textbook together with colleagues and update chapters to the best possible based on the feedback.
    - We had a great team that came together and produced something of significant value to our students.

Challenges:

* + - Team was a little too big, so it took a while to be settled but once we have the template, it was quite easy to get the work done.
    - Given the variety, quantity, and quality to resources available, evaluating, selecting, and organizing the open text material to suite our students was major challenge.
    - Maintaining the developed course material.
* *Transformative impacts on your instruction*

Textbook is well organized, so it is very easy to implement to teach and to use to show the syntax and concepts and it is interactive. It can be directly used in class (in lieu of PPT instructor files) and is very convenient for teaching.

* *Transformative impacts on your students and their performance*

Every student has access to the free open textbook anytime that they have Internet access. It is very convenient for learning and they will continually use the open textbook. The benefits of using no/low-cost open textbook/materials are invaluable both in teaching and learning.

Example Learning Outcomes Based on Goals from one of section:

According to assessment data on coding for the section, students in Fall 2019 semester performed better than those in Fall 2019 in every goal that was measured. The coding part measured Goal 3, 4, 5, and 6.

* + - * goal 3: 85% vs 82%
      * goal 4: 52% vs 50%
      * goal 5: 67% vs 41%
      * goal 6: 55% vs 41%

Students appreciated free and easily access the open textbook.

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

We would use the data and feedback more proactively and every comment should be discussed and decided whether a revision is necessary.

Providing a template upfront is necessary: It will be important to establish common expectations and patterns for all of the components at the outset: themes to be consistent in each chapter, in-text examples, quiz questions, exam questions and practice problems.

Utilizing interactive resources improves the learning experience but it takes time to develop an open textbook with interactive resources, and instructor resources, so we should have allowed more time to this process.

# Quotes

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

* Very easy to access and I could access it anywhere, plus very organized I could find what I needed in couple seconds.
* I like that it was written by our professors with their knowledge and experience and that there was no cost to the book.
* Awesome, because it’s not just a textbook, it is a textbook that tells you exactly where to start.

# Quantitative and Qualitative Measures

## Uniform Measurements Questions

*The following are uniform questions asked to all grant teams. Please answer these to the best of your knowledge.*

**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: 538

* Positive: 73 % of 909 (182 \* 4 + 181) number of responses
* Neutral: 15 % of 909 (182 \* 4 + 181) number of responses
* Negative: 12 % of 909 (182 \* 4 + 181) number of responses

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| positive | 661 | 73% |  |  |  |  |
| neutral | 138 | 15% |  |  |  |  |
| negative | 110 | 12% |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  | **Strongly agree** | **Somewhat agree** | **Neither agree nor disagree** | **Somewhat disagree** | **Strongly disagree** | total |
| The textbook fits my learning style | 30 | 62 | 48 | 33 | 9 | 182 |
| The content provided in the textbook was well organized. | 66 | 73 | 25 | 17 | 1 | 182 |
| The explanation, examples and exercises provided in the textbook were sufficient for my learning needs. | 47 | 77 | 36 | 13 | 9 | 182 |
| The content provided in the textbook was easy to read. | 56 | 75 | 29 | 20 | 2 | 182 |
|  | **Extremely useful** | **Very useful** | **Moderately useful** | **Slightly useful** | **Not at all** |  |
| I found the use of videos, online exercises, self-assessment quizzes and other interactive material in the textbook useful for my learning. | 69 | 59 | 36 | 11 | 6 | 181 |

**Table 1. Survey Responses of Students on the Textbook**

**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:

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

**Student Drop/Fail/Withdraw (DFW) Rates**

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

**Drop/Fail/Withdraw Rate:**

*Depending on what you and your institution can measure, this may also be known as a drop/failure rate or a withdraw/failure rate.*

37 % of students, out of a total 256 students affected, dropped/failed/withdrew from the course in the final semester of implementation (Please see Table 2)

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)

## Measures Narrative

*In this section, summarize the supporting impact data that you are submitting, including all quantitative and qualitative measures of impact on student success and experience. Include all measures as described in your proposal, along with any measures developed after the proposal submission.*

*[When submitting your final report, as noted above, you will also need to provide the separate file (or .zip with multiple files) of supporting data on the impact of your Textbook Transformation, such as surveys, analyzed data collected, etc.]*

* *Include measures such as:*
  + *Pre-and post-transformation DFW comparison*

With the pilot run in Fall 2019, overall DFW rate was increased but from Spring 2020 (second implementation), DFW rate dropped down to 37 %.

* + *Course retention and completion rates*

For three semesters between Fall 2018 and Fall 2019, mostly half of students (49 - 51 %) completed the course successfully, but in Spring 2020, 63% of students completed the course

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **A** | **B** | **C** | **D** | **F** | **FN** | **I** | **W** | **WF** | **missing** | **Grand Total** | **DFW rate (including FN, WF)** |
| Fall 2018 | 24% | 17% | 9% | 14% | 11% | 5% | 0% | 18% | 1% | 1% | 100% | 49% |
| Spring 2019 | 30% | 11% | 19% | 11% | 6% | 9% | 0% | 13% | 2% | 0% | 100% | 40% |
| Fall 2019 (first, pilot) | 22% | 15% | 12% | 8% | 18% | 6% | 0% | 17% | 2% | 0% | 100% | 51% |
| Spring 2020  (second implementation) | 26% | 25% | 11% | 9% | 5% | 1% | 1% | 21% | 0% | 0% | 100% | 37% |

**Table 2. Student Grade Distribution Between Fall 2018 and Spring 2020**

* + *Average GPA*

Spring data is based on the midterm because Spring 2020 final grade is not available as of May 10, 2020

Average of class GPA has been increased gradually. This is one of the evidences of student success in learning.

|  |  |  |
| --- | --- | --- |
|  | Average of Class GPA (avg NOT include those earned 0 point) | Improvement Rate (%) Compare to Fall 2018 |
| Fall 2018 | 2.79 | 0.00 |
| Spring 2019 | 2.85 | 2.04 |
| Fall 2019 | 2.88 | 3.31 |
| Spring 2020 | 2.97 | 6.28 |

**Table 3. Student Average of ITEC 2140 (Programming Fundamentals) GPA Between Fall 2018 and Spring 2020 and Improvement Rate Since Fall 2018.**

* + *Surveys, interviews, and other qualitative measures*
    - Student Pre-Post survey (Summer 2019 – Spring 2020)

In ALG project, besides collecting aggregate data on DFW, GPA of students who took ITEC 2140 between Fall 2018 and Spring 2020, we administered student satisfaction survey (pre-post). The survey was using the Likert scale and questions are like “I prefer using online textbook if it is available”,” I used the no cost textbook this semester”, “I was able to access the textbook easily every time I used it,” etc.

Reliability test was conducted with the post-survey and Cronbach’s alpha was 0.862. All items of the survey overall were acceptable with internal consistency reliability.

Mostly students have positive experience of using the textbook we developed.

* + - Faculty Survey (Spring 2020)

We also conducted Faculty Survey in Spring 2020 (11 Questions)

Examples of the Survey questions for faculties: How positive or negative are your use of open resource textbook? How effective or ineffective is the use of the open resource textbook, Number of Years Teaching in a College Environment, etc.

Here are some quotes from faculties who taught ITEC 2140

* + - The free online textbook is a great way to save our students money and have an easier time accessing it than proprietary textbook. As a first version, the online textbook is acceptable, and it is understandable that it is a work-in-progress. Explanations of each concept are very basic with only few examples and the links provided to other online resources are not very useful either. On the other hand, with proper improvements (more detailed explanations, more examples, and exercises, etc.), it has a lot of potential to become a valuable resource to our students.
    - The online textbook initiative is great. It saves money for our students. And it allows open access anywhere for both the instructors and students.
    - Web Site Data Analytics – Audience Overview
    - We compared user (who engaged with the open textbook) data of Fall 2019 semester and Spring 2020. The number of the open textbook user in Spring 2020 is increased by 60.89% overall and Frequency of the Open textbook use is also increased by 52.94%. Average Session duration is 26.57% increased as well   
      (see Table 4).

|  |  |  |  |
| --- | --- | --- | --- |
| User Overview | Users | Frequency of Open Textbook Use (Session) | Average Session Duration |
| Fall 2019  (12 sections) | 606 | 2093 | 0:01:57 |
| Spring 2020  (12 sections) | 975 | 3201 | 0:02:28 |

**Table 4. Open Textbook Audience Overview**

* *Indicate any co-factors that might have influenced the outcomes.* 
  + - *Reduced cost of learning materials: 538 students \* $138.66 (unit price of the textbook) = $74,599.08*

# Sustainability Plan

*Describe how your project team or department will offer the materials in the course(s) in the future, including the maintenance and updating of course materials.*

The learning materials are always available in D2L and open textbook website (<http://itec2140.ddns.net/> ) and shared among all ITEC programming course teaching faculties.

Since we have received a no-cost extension (NCE) on this project for until May 22, 2021, our plan is to continue to implement and improve the ITEC 2140 open textbook during the NCE period. In particular:

The learning materials are updated based on research, publications, and feedback from faculty members and students and from Summer 2020, the materials will be updated periodically by the teaching faculty.

Students who takes ITEC 2140 will use the current ALG project- open Textbook. They will receive the benefit of using the open textbook.

Once the learning materials are available under the Creative Commons for the public access, we will share the information with our library.

# Future Affordable Materials Plans

*Describe any impacts or influences this project has had on your thinking about or selection of learning materials in this and other courses that you will teach in the future.*

Currently, we submitted a proposal for the next level course – ITEC 2150 (Intermediate Programming).

After completing ITEC 2150 low/no cost open textbook/material, we will continue to create the learning materials from ITEC 3150 (advanced programming).

# Future Scholarship Plans

*Describe any planned or actual papers, presentations, publications, or other professional activities that you expect to produce that reflect your work on this project.*

Status of scholarship:

2020 The Impact of Affordable Learning Open Textbook on Computing Education, ACMSE 2020, Tampa, Florida, April 2-4, 2020. (presented and Peer reviewed abstract paper is published).

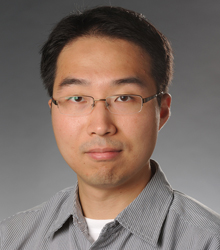
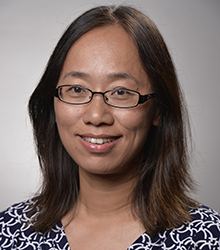
2020 Impact of a Free Textbook on an Introductory Programming Course, IEEE Integrated STEM Education Conference, March 28, 2020, Princeton, NJ (postponed) – Work in progress Paper

We will publish or present our work on this project.

# Description of Photograph (optional)

*This is where a team can list the names of the people shown in this separately uploaded photograph, along with their roles, if applicable.*

Hyesung Park, Sonal S. Dekhane, Robert Lutz, Wei Jin, Richard W. Price, Tacksoo Im, Na’el Abu halaweh

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