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Application Summary

Competition Details

Competition Title:	Textbook Transformation Grants, Round Seventeen (Summer 2020 - Summer 2021)
Category:	University System of Georgia
Award Cycle:	Round 17
Submission Deadline:	04/20/2020 at 11:59 PM

Application Information

Submitted By:	Cathy Hakes
Appplication ID:	4756
Application Title:	524
Date Submitted:	04/21/2020 at 8:17 AM

Personal Details

Institution Name(s):	Georgia Gwinnett College
Applicant First Name:	Hyesung
Applicant Last Name:	Park
Applicant Email Address:	hpark7@ggc.edu
Applicant Phone Number:	678-526-4436
Primary Appointment Title:	Assistant Professor of IT
Submitter First Name:	Cathy
Submitter Last Name:	Hakes
Submitter Email Address:	chakes@ggc.edu
Submitter Phone Number:	678-507-5875
Submitter Title:	Executive Director, ORSP and Accreditation

Application Details

Proposal Title
524

Requested Amount of Funding
$30,000

Priority Category (if applicable)
Scaling Up OER

Course Title(s)
Intermediate Programming (Java II)

Course Number(s)
ITEC 2150

Team Member 1 Name
Hyesung Park

Team Member 1 Email
hpark7@ggc.edu

Team Member 2 Name
Sonal Dekhane

Team Member 2 Email
sdekhane@ggc.edu

Team Member 3 Name
Cynthia Johnson

Team Member 3 Email
cjohn25@ggc.edu

Team Member 4 Name
Yan Zong Ding

Team Member 4 Email
yding@ggc.edu

Additional Team Members (Name and email address for each)
Tacksoo Im, tim@ggc.edu

Wei Jin, wjin@ggc.edu

Sponsor Name
Joseph Sloop

Sponsor Title
Interim Dean

Sponsor Department
School of Science and Technology

Total Number of Student Section Enrollments Affected by Project in One Academic Year
504

Average Number of Student Section Enrollments Affected per Summer Semester
48

Average Number of Student Section Enrollments Affected per Fall Semester

216

Average Number of Student Section Enrollments Affected per Spring Semester
240

Original Required Commercial Materials (title, author, price, and bookstore or retailer URL showing price)
Title: Introduction to Java Programming and Data Structures, Comprehensive Version, 11th Edition
ISBN-13: 9780134670942

Author: Y. Daniel Liang, Georgia Southern University

Online purchase price : $173.32

URL:https://www.pearson.com/us/higher-education/product/Liang-Introduction-to-Java-Programming-and-Data-Structures-Comprehensive-Version-11th-Edition/9780134670942.html

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
$87,353.28

Using OpenStax Textbook?
No

Project Goals

The project goals are described as follows:

A. Student success - Improve students' academic performance through open course materials that are readily accessible and no-cost.

ITEC 2150, Intermediate Programming, is a required course for IT students to progress through their major. This course is the second of three in the series of courses, which includes ITEC 2140 (Programming Fundamentals) and ITEC 3150 (Advanced Programming). Typically, we offer between 8 and 10 sections of this course in fall and spring. This is fewer than ITEC 2140 because we also have non-majors taking ITEC 2140: ITEC minor students and REPP (Regents Engineering Pathway Program) both take ITEC 2140, but rarely move on to ITEC 2150 and 3150.

To the ITEC majors who do continue to their majors, providing multiple types of no-cost learning materials on the very first day of class will likely lead to improved student performance or decrease the number receiving Ds and Fs. Moreover, the improved, up-to-date, and industry-relevant materials will greatly improve the programming skills of ITEC students.

B. Student Retention – Decrease the dropout and withdrawal rates of students by providing students with no-cost solution to textbook purchase.

It is well documented that students who are unable to afford course materials do poorly in class [2] [5]. Because of poor academic performance, students may choose to drop out of a class or even withdraw entirely from school. Through this project, the team aspires to keep over 500 students to stay in class by lifting some of the financial burden to help keep them on track with their academic progress.

As noted in goal 1, ITEC 2150 is part of the programming course sequence. It must be noted that the project team has completed the **development of its recently ALG-funded textbook for ITEC 2140 and started its utilization in GGC**. The ITEC 2150 marks an important continuation of free online textbooks in the programming series. Improvements to this course will be reflected in subsequent ITEC courses in that such enhancements will likely lead to a lower number of students switching from an ITEC major to other majors.

C. Student satisfaction – Enhance ITEC 2150 by improving instructional practices and introducing relevant, engaging learning experience.

Understanding student experience and satisfaction are critical to the continued use of the proposed materials and of any OER materials. Through this project, the team plans to create materials that not only provide valid content, but also are engaging, skill-based, and industry-appropriate. The traditional textbook looks at the learner as more of a passive receiver of information. As this project moves away from that, our expectation is that today's technology-driven educational landscape (such as our use of OER) will enable our students to become active in their learning and even create knowledge, leading to a more enriching academic experience.

Statement of Transformation

Overview of the Transformation

The cost of textbooks has steadily increased since the 70s so that today one book alone may cost as much as $400 [9]. The response to the ever-increasing costs of textbooks has resulted in cheaper [5] alternatives such as rental, digital textbooks, and OER [3]. The National Repository of Online Courses (NROC) [11] Project is an initiative whose organizational mission is to develop, distribute, and sustain high-quality OER using its web-based tools Hippo Campus and EdReady. Even traditional booksellers are now innovating because the continued skyrocketing costs of textbooks is just not sustainable as a business model. Barnes & Noble [7] and Amazon, for example, provide physical and digital book rentals, while Yuzu [13] is a digital app that replaces multiple textbooks and course materials in one app. A quick survey of institutions of higher education now feature several OERs often in each discipline/subject, rather just per course [12].

The move to create OER **for a course sequence or even an entire degree program** is an even more welcomed trend. In 2019, California implemented the Zero Textbook Cost (ZTC) Degree Program, an initiative of the Community College Chancellor's office [4]. This program allowed 23 community colleges to implement 34 degrees or certificate pathways that did not carry any textbook costs. With the project team's effort to provide **a similar seamless offering** of no-cost textbooks to IT students taking the programming gateway courses, GGC can expect to have a transformative effect on student savings across the IT major.

The project team's first endeavor to transform ITEC programming gateway courses was when we applied for the ALG Textbook Transformation grant for ITEC 2140 in spring 2019. We have since piloted the textbook and its resources in 24 sections for fall 2019 and spring 2020, affecting 624 students to date. Our preliminary evaluation results show that students are incredibly enthusiastic about open textbooks used in the classroom and that open textbook results in increased access for students. Some of the comments are:

"That it is free and actually useful"

"It was well organized"

"It was easy to access"

"I liked that the book was free and accessible and that it provided practice and resources directly from the source material."

Aside from the student feedback to date, the faculty team members found that the project helped them enhance the content of the course, create innovative/creative and appropriate exercises, and enhance learning because of up-to-date information. We conducted a study on using open textbook of the ALG ITEC 2140 project, presented at the annual ACM Southeast conference on April 04, 2020 [8], and are planning to do a presentation at the 10th IEEE Integrated STEM Education Conference [6] (both proceedings will be published). This study shows that accessibility to the textbook increases dramatically with a free and open source textbook [7] [12]. **Because of these positive outcomes, it made sense for us to continue our efforts onto the next course in the programming sequence, ITEC 2150.**

About 500 students take ITEC 2150 during the academic year. Like ITEC 2140 which is prerequisite course of ITEC 2150, students struggle to afford the ~$173 textbook. Faculty estimate that about 30% of the students are not purchasing the textbook. Rather than purchase the book, the faculty report that students are likely coping by borrowing textbooks from the library and borrowing their classmate's textbook and taking pictures of the exercise/homework page in order to complete the required work and pass the tests. The results are higher failure rates in the course, less likelihood to proceed to the next programming sequence, or (worst) even dropping out of the program or college. Therefore, a free and open source textbook in ITEC 2150 is also much needed to address the issue of access.

The primary goal of the proposed project is to create an open textbook that student can access online and on the first day of class. We will also create a common course shell that can accompany the textbook, which contains quizzes, assignments, exams, slides and other relevant course materials. The textbook for ITEC 2150 costs more than a hundred dollars. The inclusion of a transformed ITEC 2150 course will continue this tradition of helping lessen the financial burden on students so that they may stay in school and graduate.

Project's transformative impact on course and department

Rising textbook cost has made students reluctant to purchase textbooks. Textbook prices have risen faster than inflation and the rate of its increase has been greater than tuition. Among students who are registered for ITEC 2150 each year, it was estimated that approximately 30% of our students do not buy or delay buying the current textbook due to its cost until they realize that they need the textbook. In GGC, half of our students are from low-income background and 51% of GGC undergraduate students and 52% of IT major students are Federal Pell Grant recipients. The no-cost textbook is necessary for our students at GGC since delaying the

purchase of or not purchasing the book at all often lead to class underachievement in in many cases [6] [8].

Since we have started adopting online open text for ITEC 2140 (Programming Fundamentals) as part of ALG round 13 projects, most of students do not buy the textbook for ITEC 2150 anymore because they expect to have an open text. They neglect to purchase the book even after they realize that they needed to buy the textbook for ITEC 2150. Therefore, we still observed a high number of students giving up purchasing the textbook for ITEC 2150.

The lack of textbook has negatively affected student performance and retention in our ITEC 2150 classes. It is our aspiration that having a no-cost alternative will allow students to have access to the textbook on the first day of class. This will hopefully decrease the percentage of IT students failing or withdrawing from the class and spur our student to continue to improve in their academic performance in the course. In addition, many students do not use the current textbook since it is either heavy to carry around or difficult to use as an e-text format. The current textbook, either online or in hardcopy form, is external to Desire to Learn (D2L), the learning environment that they are in most of the times. Assembling resources in one place and embedding it with interactive components will improve the utilization. The interactive components can also be utilized in the classroom, increasing student engagement with the material. In other words, we would like to make the "textbook" alive and more integrated with student learning in and outside of the classroom.

During the development of the open text, we plan to use our insights about our students from our prior experiences and add the best practices that work for our students into the choosing, adapting, and arrangement of learning materials and resources. These resources will be tailored to our ITEC 2150 Intermediate students and may be very useful for similar courses at other institutions.

These efforts will lead to better student experiences and learning outcomes. They may lead to other positive outcomes. Since we have successfully piloted OER in ITEC 2140, this new ITEC 2150 with Intermediate level of programming enhanced curriculum will positively impact the performance of these students and lead to better performance in subsequent ITEC courses. The result is improved knowledge retention and student success; higher retention among IT students; and better learning outcomes for the entire IT program/discipline/department.

Project's transformative impact on institution

GGC and the USG effort to provide OER resources in place of expensive textbooks is now becoming part a national movement, such as the 2019 ZTC initiative and the 2016 Open Educational Resources (OER) Degree Initiative [10].

The OER Degree Initiative [10] now has 38 U.S. community colleges in 13 states involved in the project, with these institutions developing no-cost OER textbooks for a total of 53 degrees and certificates in mostly General Studies AA/AS or liberal arts degrees. This is exciting news. Georgia Gwinnett College has also been involved in the movement since ALG launched its Textbook Transformation Grant completion in 2015. Since then, GGC has provided over $2M of savings to 18,605 GGC students. Moreover, MyDashboard has shown that GGC's OER are utilized in and impacting other parts of the country and the world. As a colleague in Geography stated, their ALG-funded textbook has had 2,000 downloads and is a required text at a few schools now [1].

Advantages of using OERs include:

- Expanded access to learning
- Lead to better scalability
- Better opportunity of augmentation of class materials.
- Better enhancement of regular course contents
- Quick circulation and adoption
- Showcasing of innovation
- Capability of resource improvement.

As stated earlier, the inclusion of a transformed ITEC 2150 course will continue this tradition of helping lessen the financial burden on students so that they may stay in school and graduate. The College will also be able to add 500 more students who will benefit from the savings. We expect the number of students and cost saving to increase as other ITEC faculty adopt the transformed textbook and as interest grows through Banner registration marking both the ITEC 2140 and ITEC 2150 as requiring our no-cost textbook and materials.

The project team will begin work on the project in summer 2020.

The schedule for our project is the following:

Summer 2020

June: Evaluate current instructional material, identify existing material and select appropriate existing material. All team members.

July 2020: Write chapters of the textbook and organize appropriate OER content

- The team will refine and structure the material collection to make it easy to access and use.
- The team will use ASCIIDOC and ASCIIDOCFX book editor to create the open resource materials and other supporting materials such as PowerPoint slides, assignments, pool of exam questions and two projects.

August 2020:

- The team members will create quizzes for the chapters they create.
- The team will create a questionnaire to evaluate the content created and used in classes.

The collection and organization of material is expected to be complete before all 2020.

Fall 2020 (Pilot Test)

- Use all the material in classes in fall 2020.
- Make minor changes to the collection on a regular basis and as needed, although the main content is not expected to change drastically. Quiz and exam questions and projects are expected to change frequently to maintain the integrity of these activities.
- Revise content as new materials are added to the open education resources or as new members are added to the teaching community at GGC.

Spring 2021

- Deploy textbook and organize the materials in the learning management system D2L.
- Analyze fall 2020 and spring 2021 survey data sometime in late spring 2021.

Summer 2021

- Submit final report will be submitted.
- Teach ITEC 2150 courses using the transformed textbook, and analyze the data after conducting the evaluation.
- Prepare for the final report with the result analyzed.
- Update the materials based on evaluation.
- Prepare for another ALG grant for the Advanced Programming Course (ITEC 3150).

Team members' roles

Broadly, there will be three tasks that each team member will be expected to perform:

1. Create online learning materials for ITEC 2150 (Intermediate Programming).
2. Create Quizzes, Assignments and projects to be used with the learning materials.
3. Create Assessment (midterm and final exam) material.

We expect each team member to go through the following phases in gathering materials for the project:

- Evaluate current instructional materials.

- Gather and identify existing online educational resources.
- Select from collected materials.
- Create and/or adapt new course materials.
- Adopt new course materials.

Textbook Transformation

The textbook will consist of the following chapters. Each chapter will contain newly created material, but it will also contain adapted material that are freely available. The author of each chapter is identified, as well as links to examples of resources.

Chapter 1: Memory Model (primitive and objects in memory)

- Faculty Assigned: Sonal Dekhane, author, instructional designer, course instructor
- Examples of online resources: https://books.trinket.io/thinkjava/http://dept.cs.williams.edu/~bailey/JavaStructures/Book_files/JavaStructures.pdfhttp://people.cs.vt.edu/~shaffer/Book/JAVA3e20130328.pdf

Chapter 2: Inheritance/Composition

- Faculty Assigned: Sonal Dekhane, author, instructional designer, course instructor
- Examples of online resources: https://www.javaworld.com/article/2987426/java-101-inheritance-in-java-part-1.html
- http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 8)
- http://enos.itcollege.ee/~jpoial/algorithms/GT/Data%20Structures%20and%20Algorithms%20in%20Java%20Fourth%20Edition.pdf

Chapter 3: Polymorphism/Abstract

- Faculty Assigned: Hyesung Park, author, instructional designer, course instructor
- Examples of online resource: http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 8)
- https://www.w3schools.com/java/java_polymorphism.asp

Chapter 4: Exceptions

- Faculty Assigned: Cynthia Johnson, author, instructional designer, course instructor
- Examples of online resources:
- http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 10)
- http://enos.itcollege.ee/~jpoial/algorithms/GT/Data%20Structures%20and%20Algorithms%20in%20Java%20Fourth%20Edition.pdf
- https://www.w3schools.com/java/java_try_catch.asp

Chapter 5: File Input/Output

- Faculty Assigned: Cynthia Johnson, author, instructional designer, course instructor
- Examples of online resources: http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 4)https://www.w3schools.com/java/java_files.asp

Chapter 6: Generic classes / Objective-Oriented Programming (OOP) design

- Faculty Assigned: Wei Jin, author, instructional designer, course instructor
- Examples of online resources:

http://dept.cs.williams.edu/~bailey/JavaStructures/Book_files/JavaStructures.pdf (Chapter 4)http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdfhttp://enos.itcollege.ee/~jpoial/algorithms/GT/Data%20Structures%20and%20Algorithms%20in%20Java%20Fourth%20Edition.pdf

Chapter 7: Recursion

- Faculty Assigned: Tacksoo Im, Yan Zong Ding, authors, instructional designer, course instructor
- Examples of online resources: http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 12)https://introcs.cs.princeton.edu/java/23recursion/https://codingbat.com/java/Recursion-1

Chapter 8: Basic Data Structures (stacks, queues, lists)

- Faculty Assigned: Yan Zong Ding, Tacksoo Im, author, instructional designer, course instructor
- Examples of online resources: http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 16)https://algs4.cs.princeton.edu/30searching/http://dept.cs.williams.edu/~bailey/JavaStructures/Book_files/JavaStructures.pdfhttp://people.cs.vt.edu/~shaffer/Book/JAVA3e20130328.pdf

Ancillary Materials

- Instructor resources including assessment items and PowerPoint slides will be created by the authors of this open textbook.

- Quizzes (Resource examples): The instructors will create their own quizzes. These online quizzes are used only for review purposes.
- http://www.sarmaroof.com/exercise-intermediate-java-abstract-classes/
- https://quizlet.com/102961120/intermediate-java-final-flash-cards/
- https://quizlet.com/78083932/22-intermediate-java-concepts-review-flash-cards/

Quantitative & Qualitative Measures

The team will request for IRB approval prior to starting the grant. Hyesung Park will take the lead in ensuring that the evaluation plan is completed.

Goal A. Student success - Improve students' academic performance through open course materials that are readily accessible and no-cost.

Evaluation:

Impact of the open course materials on students' academic performance will be evaluated by:

- Comparing students' performance on common assessment questions on the final exam in spring 2021 with control sections from fall 2020. This will provide information about course learning outcomes accomplished. The minimum measure of success is that student performance does not degrade. If student performance improves, it is a clear sign of success for the project.
- Comparing the number of A, B, C grades in spring 2021 as compared to prior semesters.
- Historical cost of the textbook will be obtained from the bookstore and compared with the cost of the learning materials created during this project.
- Students will self-report the frequency of usage of learning materials in an end-of-semester survey. Survey results from prior semesters using the high-cost textbook can be compared with survey results from fall 2020 and spring 2021.
- Web analytics tool, such as Google Analytics will be used to track data usage of the open- ended materials to validate self-reported student data regarding frequency of usage.

Goal B. Student Retention – Decrease the dropout and withdrawal rates of students by providing students with no-cost solution to textbook purchase.

Evaluation:

Impact of the open course materials on the dropout and withdrawal rates of students will be evaluated by:

- Comparing DFW rates in fall 2020 and spring 2021 with past semester rates.

This data along with the open material usage data can tell us if the open course materials had an impact on the DFW rate.

Goal C. Student satisfaction – Enhance ITEC 2150 by improving instructional practices and introducing relevant, engaging learning experience.

Evaluation:

Quality of the open learning materials and student satisfaction will be evaluated using a survey administered to students at the end of the semester. Survey results from prior semesters using current high-cost textbook will be compared with survey results from semesters in Fall 2020 and spring 2021 using open learning materials. To assess students' satisfaction, a Likert scale will be used. Examples of questions are:

- How easy is it to access the learning materials?
- How often do you use the learning materials?
- How easy is it to understand the learning materials?
- How organized are the learning materials?
- Are the provided materials enough for studying and reviewing?

There are several ways to evaluate instructional practices that go beyond student ratings. For this project, we will be focused on process and summative evaluation as they pertain to pedagogical transformation.

- Questionnaires will be administered to each team member to assess (1) success or challenges that they may have encountered in the process of developing the curriculum; (2) challenges or successes in teaching

the transformed curriculum; and (3) effectiveness of the curriculum in general.

- The team will meet also to discuss the success of the overall project. The Project lead will ask each member to share what worked and what did not work and to suggest plans moving forward to accomplish our sustainability plan.

Timeline

For the full implementation in the Spring Semester 2021

Summer 2020

June 2020: the team will identify open educational resources for ITEC 2150 and complete the pilot version of the open resource materials

- Evaluate current instructional materials, identify existing materials and select appropriate existing material.

July 2020: Write chapters of the textbook and organize appropriate OER content

- The team will refine and structure the material collection to make it easy to access and use.
- The team will use ASCIIDOC and ASCIIDOCFX book editor to create the open resource materials and other supporting materials such as PowerPoint slides, assignments, pool of exam questions and two projects.

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- Deploy textbook and organize the materials in the learning management system D2L.
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- Final report will be submitted.
- Teach ITEC 2150 courses using the transformed textbook, and analyze the data after conducting the evaluation.
- Prepare for the final report with the result analyzed.
- Update the materials based on evaluation.
- Prepare for another ALG grant for the Advanced Programming Course (ITEC 3150).

Budget

1. Type of Grant: Large Scale Transformation and Scaling UP OER
2. Budget Request: $30,000.00
3. Budget Justification. Funds are requested for the following direct costs:

(a) Personnel: $29,200.00

Project Lead, Hyesung Park. Park will serve as chapter author and instructional designer. She will also be responsible for teaching one section of the transformed ITEC 2150 textbook and course materials. In addition, Park will oversee the project evaluation and analysis of the survey results. She will also take the lead in submitting the semester and annual reports. Total Request for compensation and fringe: $4,870.00.

Project Team Members, Wei Jin, Tacksoo Im, Sonal S. Dekhane, Cynthia Johnson, and Yan Zong Ding request $4,866.00 each to cover their pay and fringe.

Each project team member will be responsible for and assigned to a specific chapter (Chapter 1 and 2: Sonal S. Dekhane, Chapter 3: Hyesung Park, Chapter 4 and 5: Cynthia Johnson, Chapter 6: Wei Jin, Chapter 7 and 8 (Tacksoo Im, and Yan Zong Ding). The team member will serve as that chapter's author and instructional designer. In addition, each will be responsible for teaching one section of the transformed ITEC 2150 learning materials. The member will also be expected to administer and collect course evaluation forms. Finally, the member will assist in compiling the semester and final reports; and participate in the project evaluation design, collection, and, if required, its analysis.

(b) Travel: $800

$800 will be used among the team members to support dissemination of our work. The funds will be used to partially cover the registration fees to disseminate ALG information at the Association for Computing Machinery, Special Interest Group on Computer Science Education conference (April 2021) or the Institute of Electrical and Electronics Engineers, Integrated STEM Education Conference (ISEC) (March 2021)

(c) Total Request: $30,000 ($29,200 + $800)

Sustainability Plan

Our sustainability plan falls into three categories:

Plans for maintenance and updating of course materials

After the completion of this project, no additional costs are required for the maintenance and updating of the course materials. However, we will keep maintaining and updating the materials. The learning materials will be updated every semester and periodically (three times per an academic year: January, May, September) by the team members. Any needed updates will be made based on research, publications, and feedback from faculty members and students.

Plans for any possible expansion of the project to more course sections in the future

The learning materials will be available in D2L and will be shared with all ITEC programming course-teaching faculties: We will make an announcement of its availability during the all-ITEC-faculty discipline meetings. We are very encouraged by our experience with ALG for ITEC 2140: When the free and open textbook and the companion exercises and PPTs were made available, all the instructors for ITEC 2140 adopted the ALG materials. We expect the same for the materials that we will develop in this ALG project.

In addition, we have strong support from the dean of the School of Science and Technology (SST) to pilot and sustain the project. Moreover, our team members serve in capacities that will help promote the course materials developed in this ALG project. Dr. Sonal Dekhane serves as an IT chair in SST and Dr. Cynthia Johnson serves as the course coordinator for ITEC 2150. Their participation in and commitment to the project ensure the sustainability of our transformation efforts.

After ITEC 2150 project is completed, current instructors of Advanced Programming course (ITEC 3150) are planning to write the open textbook as part of the expansion of the current project.

Future plans for sharing this work with others through presentations, articles, or other scholarly activities

We will share the information with our library so that they can share the information with others and make the materials accessible under the Creative Commons license for public access and usage. The team members will also disseminate information regarding the online learning materials and its impact on student learning at regional and national conferences.

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.

Georgia Gwinnett
COLLEGE

School of Science & Technology

1000 University Center Lane
Lawrenceville, GA 30043
Phone: 678-407-5602
www.ggc.edu

17 March 2020

To: Grant Review Committee

Affordable Learning Georgia, University System of Georgia

Re: Textbook Transformation Grant

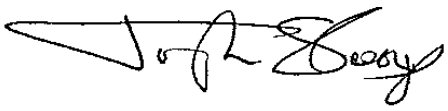
Dear Committee:

I am pleased to write this letter to support Drs. Hyesung Park, Wei Jin, Tacksoo Im, Sonal S. Dekhane, and Cynthia Johnson's application for the ALG Textbook Transformation Grant.

The proposal focuses on the creating of no-cost-to-students learning materials to replace current textbook for out IT required course Intermediate Programming (ITEC 2150). Over 500 IT majors will take this course. This grant will help lower costs of students taking this course and will most likely increase our retention and success rates in the course.

Each project team member has been teaching ITEC 2150 and upper level programming courses for several semesters. They have the knowledge, skills and experiences needed to successfully perform the action plan and meet the obligations of the grant. If awarded the grant, I will work with them to coordinate the distribution of their award and provide necessary resources to facilitate their activities in developing the proposed learning materials.

Please let me know if you have any questions or need additional information.



Joseph C. Sloop
Interim Dean
School of Science & Technology
Georgia Gwinnett College

Affordable Learning Georgia

Textbook Transformation Grants, Round Seventeen
(Summer 2020 – Summer 2021)
Proposal Form and Narrative

Applicant, Team, and Sponsor Information

Institution(s)	Georgia Gwinnett College
Applicant Name	Hyesung Park
Applicant Email	Hpark7@ggc.edu
Applicant Phone #	678-526-4436
Applicant Position/Title	Assistant Professor
Submitter Name	Cathy Hakes
Submitter Email	chakes@ggc.edu
Submitter Phone #	678-407-5875
Submitter Position	Executive Director, Office of Research and Sponsored Programs

The first/last names and email addresses of all team members within the proposed project.

	Name	Email Address
Team Member 1	Hyesung Park	Hpark7@ggc.edu
Team Member 2	Wei Jin	wjin@ggc.edu
Team Member 3	Tacksoo Im	tim@ggc.edu
Team Member 4	Sonal Dekhane	sdekhane@ggc.edu
Team Member 5	Cynthia Johnson	Cjohn25@ggc.edu
Team Member 6	Yan Zong Ding	Yding@ggc.edu

Team members to add, please enter their names and email addresses in the text box below.

Sponsor's name, title, department, and institution.

Joseph Sloop, Dean of School of Science and Technology, Georgia Gwinnett College

Project Information and Impact Data

Project Title: Programming with Java II (Intermediate Programming)

Priority Category / Categories	Scaling UP OER (Large-Scale Transformation)
Requested Amount of Funding	$30,000
Course Names and Course Numbers	ITEC 2150 Intermediate Programming (Java II)
Final Semester of Project	Summer 2021
Total Number of Student Section Enrollments Affected by Project in One Academic Year	504
Average Number of Student Section Enrollments Affected per Summer Semester	48
Average Number of Student Section Enrollments Affected per Fall Semester	216
Average Number of Student Section Enrollments Affected per Spring Semester	240
Original Required Commercial Materials	Title: Introduction to Java Programming and Data Structures, Comprehensive Version, 11th Edition ISBN-13: 9780134670942 Author: Y. Daniel Liang, Georgia Southern University Online purchase price : $173.32 URL:https://www.pearson.com/us/higher-education/product/Liang-Introduction-to-Java-Programming-and-Data-Structures-Comprehensive-Version-11th-Edition/9780134670942.html
Average Price of Original Required Materials Per Student Section Enrollment	$173.32
Average Post-Project Cost Per Student Section Enrollment	0
Average Post-Project Savings Per Student Section Enrollment	$173.32
Projected Total Annual Student Savings Per Academic Year	$87,353.28
Using OpenStax Textbook?	No

Narrative Section

1. PROJECT GOALS

The project goals are described as follows:

A. Student success - Improve students' academic performance through open course materials that are readily accessible and no-cost.

ITEC 2150, Intermediate Programming, is a required course for IT students to progress through their major. This course is the second of three in the series of courses, which includes ITEC 2140 (Programming Fundamentals) and ITEC 3150 (Advanced Programming). Typically, we offer between 8 and 10 sections of this course in fall and spring. This is fewer than ITEC 2140 because we also have non-majors taking ITEC 2140: ITEC minor students and REPP (Regents Engineering Pathway Program) both take ITEC 2140, but rarely move on to ITEC 2150 and 3150.

To the ITEC majors who do continue to their majors, providing multiple types of no-cost learning materials on the very first day of class will likely lead to improved student performance or decrease the number receiving Ds and Fs. Moreover, the improved, up-to-date, and industry-relevant materials will greatly improve the programming skills of ITEC students.

B. Student Retention – Decrease the dropout and withdrawal rates of students by providing students with no-cost solution to textbook purchase.

It is well documented that students who are unable to afford course materials do poorly in class [2] [5]. Because of poor academic performance, students may choose to drop out of a class or even withdraw entirely from school. Through this project, the team aspires to keep over 500 students to stay in class by lifting some of the financial burden to help keep them on track with their academic progress.

As noted in goal 1, ITEC 2150 is part of the programming course sequence. It must be noted that the project team has completed the **development of its recently ALG-funded textbook for ITEC 2140 and started its utilization in GGC**. The ITEC 2150 marks an important continuation of free online textbooks in the programming series. Improvements to this course will be reflected in subsequent ITEC courses in that such enhancements will likely lead to a lower number of students switching from an ITEC major to other majors.

C. Student satisfaction – Enhance ITEC 2150 by improving instructional practices and introducing relevant, engaging learning experience.

Understanding student experience and satisfaction are critical to the continued use of the proposed materials and of any OER materials. Through this project, the team plans to create materials that not only provide valid content, but also are engaging, skill-based, and industry-appropriate. The traditional textbook looks at the learner as more of a passive receiver of information. As this project moves away from that, our expectation is that today's technology-driven educational landscape (such as our use of OER) will enable our students to become

active in their learning and even create knowledge, leading to a more enriching academic experience.

2. STATEMENT OF TRANSFORMATION

Overview of the Transformation

The cost of textbooks has steadily increased since the 70s so that today one book alone may cost as much as $400 [9]. The response to the ever-increasing costs of textbooks has resulted in cheaper [5] alternatives such as rental, digital textbooks, and OER [3]. The National Repository of Online Courses (NROC) [11] Project is an initiative whose organizational mission is to develop, distribute, and sustain high-quality OER using its web-based tools Hippo Campus and EdReady. Even traditional booksellers are now innovating because the continued skyrocketing costs of textbooks is just not sustainable as a business model. Barnes & Noble [7] and Amazon, for example, provide physical and digital book rentals, while Yuzu [13] is a digital app that replaces multiple textbooks and course materials in one app. A quick survey of institutions of higher education now feature several OERs often in each discipline/subject, rather just per course [12].

The move to create OER **for a course sequence or even an entire degree program** is an even more welcomed trend. In 2019, California implemented the Zero Textbook Cost (ZTC) Degree Program, an initiative of the Community College Chancellor's office [4]. This program allowed 23 community colleges to implement 34 degrees or certificate pathways that did not carry any textbook costs. With the project team's effort to provide **a similar seamless offering** of no-cost textbooks to IT students taking the programming gateway courses, GGC can expect to have a transformative effect on student savings across the IT major.

The project team's first endeavor to transform ITEC programming gateway courses was when we applied for the ALG Textbook Transformation grant for ITEC 2140 in spring 2019. We have since piloted the textbook and its resources in 24 sections for fall 2019 and spring 2020, affecting 624 students to date. Our preliminary evaluation results show that students are incredibly enthusiastic about open textbooks used in the classroom and that open textbook results in increased access for students. Some of the comments are:

"That it is free and actually useful"

"It was well organized"

"It was easy to access"

"I liked that the book was free and accessible and that it provided practice and resources directly from the source material."

Aside from the student feedback to date, the faculty team members found that the project helped them enhance the content of the course, create innovative/creative and appropriate exercises, and enhance learning because of up-to-date information. We conducted a study on using open textbook of the ALG ITEC 2140 project, presented at the annual ACM Southeast

conference on April 04, 2020 [8], and are planning to do a presentation at the 10th IEEE Integrated STEM Education Conference [6] (both proceedings will be published). This study shows that accessibility to the textbook increases dramatically with a free and open source textbook [7] [12]. **Because of these positive outcomes, it made sense for us to continue our efforts onto the next course in the programming sequence, ITEC 2150.**

About 500 students take ITEC 2150 during the academic year. Like ITEC 2140 which is prerequisite course of ITEC 2150, students struggle to afford the ~$173 textbook. Faculty estimate that about 30% of the students are not purchasing the textbook. Rather than purchase the book, the faculty report that students are likely coping by borrowing textbooks from the library and borrowing their classmate's textbook and taking pictures of the exercise/homework page in order to complete the required work and pass the tests. The results are higher failure rates in the course, less likelihood to proceed to the next programming sequence, or (worst) even dropping out of the program or college. Therefore, a free and open source textbook in ITEC 2150 is also much needed to address the issue of access.

The primary goal of the proposed project is to create an open textbook that student can access online and on the first day of class. We will also create a common course shell that can accompany the textbook, which contains quizzes, assignments, exams, slides and other relevant course materials. The textbook for ITEC 2150 costs more than a hundred dollars. The inclusion of a transformed ITEC 2150 course will continue this tradition of helping lessen the financial burden on students so that they may stay in school and graduate.

Project's transformative impact on course and department

Rising textbook cost has made students reluctant to purchase textbooks. Textbook prices have risen faster than inflation and the rate of its increase has been greater than tuition. Among students who are registered for ITEC 2150 each year, it was estimated that approximately 30% of our students do not buy or delay buying the current textbook due to its cost until they realize that they need the textbook. In GGC, half of our students are from low-income background and 51% of GGC undergraduate students and 52% of IT major students are Federal Pell Grant recipients. The no-cost textbook is necessary for our students at GGC since delaying the purchase of or not purchasing the book at all often lead to class underachievement in in many cases [6] [8].

Since we have started adopting online open text for ITEC 2140 (Programming Fundamentals) as part of ALG round 13 projects, most of students do not buy the textbook for ITEC 2150 anymore because they expect to have an open text. They neglect to purchase the book even after they realize that they needed to buy the textbook for ITEC 2150. Therefore, we still observed a high number of students giving up purchasing the textbook for ITEC 2150.

The lack of textbook has negatively affected student performance and retention in our ITEC 2150 classes. It is our aspiration that having a no-cost alternative will allow students to have access to the textbook on the first day of class. This will hopefully decrease the percentage of IT students failing or withdrawing from the class and spur our student to continue to improve in their academic performance in the course. In addition, many students do not use the current textbook

since it is either heavy to carry around or difficult to use as an e-text format. The current textbook, either online or in hardcopy form, is external to Desire to Learn (D2L), the learning environment that they are in most of the times. Assembling resources in one place and embedding it with interactive components will improve the utilization. The interactive components can also be utilized in the classroom, increasing student engagement with the material. In other words, we would like to make the "textbook" alive and more integrated with student learning in and outside of the classroom.

During the development of the open text, we plan to use our insights about our students from our prior experiences and add the best practices that work for our students into the choosing, adapting, and arrangement of learning materials and resources. These resources will be tailored to our ITEC 2150 Intermediate students and may be very useful for similar courses at other institutions.

These efforts will lead to better student experiences and learning outcomes. They may lead to other positive outcomes. Since we have successfully piloted OER in ITEC 2140, this new ITEC 2150 with Intermediate level of programming enhanced curriculum will positively impact the performance of these students and lead to better performance in subsequent ITEC courses. The result is improved knowledge retention and student success; higher retention among IT students; and better learning outcomes for the entire IT program/discipline/department.

Project's transformative impact on institution

GGC and the USG effort to provide OER resources in place of expensive textbooks is now becoming part a national movement, such as the 2019 ZTC initiative and the 2016 Open Educational Resources (OER) Degree Initiative [10].

The OER Degree Initiative [10] now has 38 U.S. community colleges in 13 states involved in the project, with these institutions developing no-cost OER textbooks for a total of 53 degrees and certificates in mostly General Studies AA/AS or liberal arts degrees. This is exciting news. Georgia Gwinnett College has also been involved in the movement since ALG launched its Textbook Transformation Grant completion in 2015. Since then, GGC has provided over $2M of savings to 18,605 GGC students. Moreover, MyDashboard has shown that GGC's OER are utilized in and impacting other parts of the country and the world. As a colleague in Geography stated, their ALG-funded textbook has had 2,000 downloads and is a required text at a few schools now [1].

Advantages of using OERs include:

- Expanded access to learning
- Lead to better scalability
- Better opportunity of augmentation of class materials.
- Better enhancement of regular course contents
- Quick circulation and adoption
- Showcasing of innovation
- Capability of resource improvement.

As stated earlier, the inclusion of a transformed ITEC 2150 course will continue this tradition of helping lessen the financial burden on students so that they may stay in school and graduate. The College will also be able to add 500 more students who will benefit from the savings. We expect the number of students and cost saving to increase as other ITEC faculty adopt the transformed textbook and as interest grows through Banner registration marking both the ITEC 2140 and ITEC 2150 as requiring our no-cost textbook and materials.

3. TRANSFORMATION ACTION PLAN

The project team will begin work on the project in summer 2020.

The schedule for our project is the following:

Summer 2020

June: Evaluate current instructional material, identify existing material and select appropriate existing material. All team members.

July 2020: Write chapters of the textbook and organize appropriate OER content

- The team will refine and structure the material collection to make it easy to access and use.
- The team will use ASCIIDOC and ASCIIDOCFX book editor to create the open resource materials and other supporting materials such as PowerPoint slides, assignments, pool of exam questions and two projects.

August 2020:

- The team members will create quizzes for the chapters they create.
- The team will create a questionnaire to evaluate the content created and used in classes.

The collection and organization of material is expected to be complete before all 2020.

Fall 2020 (Pilot Test)

- Use all the material in classes in fall 2020.
- Make minor changes to the collection on a regular basis and as needed, although the main content is not expected to change drastically. Quiz and exam questions and projects are expected to change frequently to maintain the integrity of these activities.
- Revise content as new materials are added to the open education resources or as new members are added to the teaching community at GGC.

Spring 2021

- Deploy textbook and organize the materials in the learning management system D2L.
- Analyze fall 2020 and spring 2021 survey data sometime in late spring 2021.

Summer 2021

- Submit final report will be submitted.
- Teach ITEC 2150 courses using the transformed textbook, and analyze the data after conducting the evaluation.
- Prepare for the final report with the result analyzed.
- Update the materials based on evaluation.
- Prepare for another ALG grant for the Advanced Programming Course (ITEC 3150).

Team members' roles

Broadly, there will be three tasks that each team member will be expected to perform:

A. Create online learning materials for ITEC 2150 (Intermediate Programming).
B. Create Quizzes, Assignments and projects to be used with the learning materials.
C. Create Assessment (midterm and final exam) material.

We expect each team member to go through the following phases in gathering materials for the project:

- Evaluate current instructional materials.
- Gather and identify existing online educational resources.
- Select from collected materials.
- Create and/or adapt new course materials.
- Adopt new course materials.

Textbook Transformation

The textbook will consist of the following chapters. Each chapter will contain newly created material, but it will also contain adapted material that are freely available. The author of each chapter is identified, as well as links to examples of resources.

Chapter 1: Memory Model (primitive and objects in memory)

- Faculty Assigned: Sonal Dekhane, author, instructional designer, course instructor
- Examples of online resources:
  - https://books.trinket.io/thinkjava/
  - http://dept.cs.williams.edu/~bailey/JavaStructures/Book_files/JavaStructures.pdf
  - http://people.cs.vt.edu/~shaffer/Book/JAVA3e20130328.pdf

Chapter 2: Inheritance/Composition

- Faculty Assigned: Sonal Dekhane, author, instructional designer, course instructor
- Examples of online resources:
  - https://www.javaworld.com/article/2987426/java-101-inheritance-in-java-part-1.html
  - http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 8)

- http://enos.itcollege.ee/~jpoial/algorithms/GT/Data%20Structures%20and%20Algorithms%20in%20Java%20Fourth%20Edition.pdf

Chapter 3: Polymorphism/Abstract

- Faculty Assigned: Hyesung Park, author, instructional designer, course instructor
- Examples of online resource: http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 8)
- https://www.w3schools.com/java/java_polymorphism.asp

Chapter 4: Exceptions

- Faculty Assigned: Cynthia Johnson, author, instructional designer, course instructor
- Examples of online resources:
  - http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 10)
  - http://enos.itcollege.ee/~jpoial/algorithms/GT/Data%20Structures%20and%20Algorithms%20in%20Java%20Fourth%20Edition.pdf
  - https://www.w3schools.com/java/java_try_catch.asp

Chapter 5: File Input/Output

- Faculty Assigned: Cynthia Johnson, author, instructional designer, course instructor
- Examples of online resources:
  - http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 4)
  - https://www.w3schools.com/java/java_files.asp

Chapter 6: Generic classes / Objective-Oriented Programming (OOP) design

- Faculty Assigned: Wei Jin, author, instructional designer, course instructor
- Examples of online resources:
  - http://dept.cs.williams.edu/~bailey/JavaStructures/Book_files/JavaStructures.pdf (Chapter 4)
  - http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf
  - http://enos.itcollege.ee/~jpoial/algorithms/GT/Data%20Structures%20and%20Algorithms%20in%20Java%20Fourth%20Edition.pdf

Chapter 7: Recursion

- Faculty Assigned: Tacksoo Im, Yan Zong Ding, authors, instructional designer, course instructor
- Examples of online resources:
  - http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 12)
  - https://introcs.cs.princeton.edu/java/23recursion/
  - https://codingbat.com/java/Recursion-1

Chapter 8: Basic Data Structures (stacks, queues, lists)

- Faculty Assigned: Yan Zong Ding, Tacksoo Im, author, instructional designer, course instructor
- Examples of online resources:
    - http://www.cs.trincoll.edu/~ram/jjj/jjj-os-20170625.pdf (Chapter 16)
    - https://algs4.cs.princeton.edu/30searching/
    - http://dept.cs.williams.edu/~bailey/JavaStructures/Book_files/JavaStructures.pdf
    - http://people.cs.vt.edu/~shaffer/Book/JAVA3e20130328.pdf

Ancillary Materials

- Instructor resources including assessment items and PowerPoint slides will be created by the authors of this open textbook.

- Quizzes (Resource examples): The instructors will create their own quizzes. These online quizzes are used only for review purposes.
    - http://www.sarmaroof.com/exercise-intermediate-java-abstract-classes/
    - https://quizlet.com/102961120/intermediate-java-final-flash-cards/
    - https://quizlet.com/78083932/22-intermediate-java-concepts-review-flash-cards/

4. QUANTITATIVE AND QUALITATIVE MEASURES

The team will request for IRB approval prior to starting the grant. Hyesung Park will take the lead in ensuring that the evaluation plan is completed.

Goal A. Student success - Improve students' academic performance through open course materials that are readily accessible and no-cost.

Evaluation:

Impact of the open course materials on students' academic performance will be evaluated by:

- Comparing students' performance on common assessment questions on the final exam in spring 2021 with control sections from fall 2020. This will provide information about course learning outcomes accomplished. The minimum measure of success is that student performance does not degrade. If student performance improves, it is a clear sign of success for the project.

- Comparing the number of A, B, C grades in spring 2021 as compared to prior semesters.
- Historical cost of the textbook will be obtained from the bookstore and compared with the cost of the learning materials created during this project.
- Students will self-report the frequency of usage of learning materials in an end-of-semester survey. Survey results from prior semesters using the high-cost textbook can be compared with survey results from fall 2020 and spring 2021.
- Web analytics tool, such as Google Analytics will be used to track data usage of the open- ended materials to validate self-reported student data regarding frequency of usage.

Goal B. Student Retention – Decrease the dropout and withdrawal rates of students by providing students with no-cost solution to textbook purchase.

Evaluation:

Impact of the open course materials on the dropout and withdrawal rates of students will be evaluated by:

- Comparing DFW rates in fall 2020 and spring 2021 with past semester rates. This data along with the open material usage data can tell us if the open course materials had an impact on the DFW rate.

Goal C. Student satisfaction – Enhance ITEC 2150 by improving instructional practices and introducing relevant, engaging learning experience.

Evaluation:

Quality of the open learning materials and student satisfaction will be evaluated using a survey administered to students at the end of the semester. Survey results from prior semesters using current high-cost textbook will be compared with survey results from semesters in Fall 2020 and spring 2021 using open learning materials. To assess students' satisfaction, a Likert scale will be used. Examples of questions are:

- How easy is it to access the learning materials?
- How often do you use the learning materials?
- How easy is it to understand the learning materials?
- How organized are the learning materials?
- Are the provided materials enough for studying and reviewing?

There are several ways to evaluate instructional practices that go beyond student ratings. For this project, we will be focused on process and summative evaluation as they pertain to pedagogical transformation.

- Questionnaires will be administered to each team member to assess (1) success or challenges that they may have encountered in the process of developing the curriculum;

(2) challenges or successes in teaching the transformed curriculum; and (3) effectiveness of the curriculum in general.

- The team will meet also to discuss the success of the overall project. The Project lead will ask each member to share what worked and what did not work and to suggest plans moving forward to accomplish our sustainability plan.

5. TIMELINE

For the full implementation in the Spring Semester 2021

Summer 2020

June 2020: the team will identify open educational resources for ITEC 2150 and complete the pilot version of the open resource materials

- Evaluate current instructional materials, identify existing materials and select appropriate existing material.

July 2020: Write chapters of the textbook and organize appropriate OER content

- The team will refine and structure the material collection to make it easy to access and use.
- The team will use ASCIIDOC and ASCIIDOCFX book editor to create the open resource materials and other supporting materials such as PowerPoint slides, assignments, pool of exam questions and two projects.

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- Final report will be submitted.
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6. BUDGET

A. Type of Grant: Large Scale Transformation and Scaling UP OER
B. Budget Request: $30,000.00
C. Budget Justification. Funds are requested for the following direct costs:

(a) Personnel: $29,200.00

Project Lead, Hyesung Park. Park will serve as chapter author and instructional designer. She will also be responsible for teaching one section of the transformed ITEC 2150 textbook and course materials. In addition, Park will oversee the project evaluation and analysis of the survey results. She will also take the lead in submitting the semester and annual reports. Total Request for compensation and fringe: $4,870.00.

Project Team Members, Wei Jin, Tacksoo Im, Sonal S. Dekhane, Cynthia Johnson, and Yan Zong Ding request $4,866.00 each to cover their pay and fringe.

Each project team member will be responsible for and assigned to a specific chapter (Chapter 1 and 2: Sonal S. Dekhane, Chapter 3: Hyesung Park, Chapter 4 and 5: Cynthia Johnson, Chapter 6: Wei Jin, Chapter 7 and 8 (Tacksoo Im, and Yan Zong Ding). The team member will serve as that chapter's author and instructional designer. In addition, each will be responsible for teaching one section of the transformed ITEC 2150 learning materials. The member will also be expected to administer and collect course evaluation forms. Finally, the member will assist in compiling the semester and final reports; and participate in the project evaluation design, collection, and, if required, its analysis.

(b) Travel: $800

$800 will be used among the team members to support dissemination of our work. The funds will be used to partially cover the registration fees to disseminate ALG information at the Association for Computing Machinery, Special Interest Group on Computer Science Education conference (April 2021) or the Institute of Electrical and Electronics Engineers, Integrated STEM Education Conference (ISEC) (March 2021)

(c) Total Request: $30,000 ($29,200 + $800)

7. SUSTAINABILITY PLAN

Our sustainability plan falls into three categories:

Plans for maintenance and updating of course materials

After the completion of this project, no additional costs are required for the maintenance and updating of the course materials. However, we will keep maintaining and updating the materials. The learning materials will be updated every semester and periodically (three times per an academic year: January, May, September) by the team members. Any needed updates will be made based on research, publications, and feedback from faculty members and students.

Plans for any possible expansion of the project to more course sections in the future

The learning materials will be available in D2L and will be shared with all ITEC programming course-teaching faculties: We will make an announcement of its availability during the all-ITEC-faculty discipline meetings. We are very encouraged by our experience with *ALG for ITEC 2140*: When the free and open textbook and the companion exercises and PPTs were made available, all the instructors for ITEC 2140 adopted the ALG materials. We expect the same for the materials that we will develop in this ALG project.

In addition, we have strong support from the dean of the School of Science and Technology (SST) to pilot and sustain the project. Moreover, our team members serve in capacities that will help promote the course materials developed in this ALG project. Dr. Sonal Dekhane serves as an IT chair in SST and Dr. Cynthia Johnson serves as the course coordinator for ITEC 2150. Their participation in and commitment to the project ensure the sustainability of our transformation efforts.

After ITEC 2150 project is completed, current instructors of Advanced Programming course (ITEC 3150) are planning to write the open textbook as part of the expansion of the current project.

Future plans for sharing this work with others through presentations, articles, or other scholarly activities

We will share the information with our library so that they can share the information with others and make the materials accessible under the Creative Commons license for public access and usage. The team members will also disseminate information regarding the online learning materials and its impact on student learning at regional and national conferences.

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