Affordable Learning Georgia Textbook Transformation Grants

Final Report

To submit your 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 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)
* Invoice for the second half of the grant’s award amount (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: 12/21/2020**

**Grant Round: 15**

**Grant Number: #482/ #50013-034**

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

**Project Lead: Cengiz Gunay**

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

* **Cengiz Gunay, Dr., Assistant Professor of Information Technology, School of Science and Technology, cgunay@ggc.edu**
* **Anca Doloc-Mihu, Dr., Assistant Professor of Information Technology, School of Science and Technology, adolocmihu@ggc.edu**

**Course Name(s) and Course Numbers: Software Development II, ITEC 3870**

**Semester Project Began: Fall 2019**

**Final Semester of Implementation: Fall 2020**

**Total Number of Students Affected During Project: 36 (2 sections in Fall 2020)**

# Narrative

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

Our textbook is available [here](https://soft-eng-practicum.github.io/softdev2-resources/student/).

The instructor materials are available [here](https://soft-eng-practicum.github.io/softdev2-resources/instructor/).

Overall, we observed that the textbook transformation was a success, based on qualitative and quantitative student feedback. Our experience started by collecting materials from multiple textbooks and other relevant resources and building lecture slides, assignments, hands-on tutorials, and assessments within our school’s learning management system. We tested these materials in class and improved them. Then, we researched and established a sustainable hosting solution with an easy-to-maintain update system for hosting these materials online. We selected the free Github Pages service for hosting and the Hugo static website generator system with the Reveal-Hugo online slide system for building the course materials as easy-to-browse and read slide decks. There was a learning curve converting our Powerpoint and PDF slides to this format, but it did provide us with advantages for accessibility, portability, and flexibility as the materials became accessible within browsers and mobile platforms. Overall, we are satisfied with the outcome of our transformed materials and glad to hear positive feedback from our initial set of students.

* *Transformative impacts on your instruction*Having our materials in open access format allowed us to easily modify and update our materials, while also easily sharing them with students and other colleagues. Overall the transformation improved our instruction and allowed more student interaction.
* *Transformative impacts on your students and their performance*  
  Overall, we observed improved grades and outcomes from our initial set of students. Students overwhelmingly approved the materials and their delivery methods, confirming our efforts.
  1. *Describe lessons learned, including any things you would do differently next time.*   
     From this experience, we learned that new technologies make hosting and maintaining course materials much easier than traditional formats. Next time, we would study these technologies for finding more creative methods of delivering instruction and receiving feedback. Furthermore, these technologies can also offer more student interaction and feedback if designed properly. In terms of the feedback we received from the current materials, we heard that the students need more hands-on tutorials, in addition to the lectures that we provide. Therefore, we submitted a continuation grant to supplement the current OER with video tutorials for practicing relevant software development frameworks. Some students suggested that the materials can be better organized so that questions can be answered faster. We will improve the organization of our materials to address this issue in the future.

# Quotes

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

“I had access to more materials than I probably would have. Access to more materials allowed me to learn more and progress more.”

“Additionally, material that has been cut down in quantity (words per page) and tailored to target specific concepts proved more helpful for studying and applying to real-world scenarios.”

“Not having to decide which book/material was absolutely necessary to buy and which I could skip out on to save costs. I was able to just comfortably have access to all materials without having an existential crisis.”

# 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: \_\_\_36\_\_\_\_\_\_\_

* Positive: \_\_89\_\_\_\_\_ % of \_\_18\_\_\_\_\_\_ number of respondents
* Neutral: \_\_5.5\_\_\_\_\_ % of \_\_18\_\_\_\_\_\_ number of respondents
* Negative: \_\_5.5\_\_\_\_\_ % of \_\_18\_\_\_\_\_ number of respondents

**Student Learning Outcomes and Grades**

**Was the overall comparative impact on student performance in terms of learning outcomes and grades in the semester(s) of implementation over previous semesters positive, neutral, or negative?**

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

Choose One:

* \_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.*

\_\_\_2.77\_\_\_\_% of students, out of a total \_\_\_36\_\_\_\_ students affected, dropped/failed/withdrew from the course in the final semester of implementation.

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:*
  + *Drop, fail, withdraw (DFW) delta rates*
  + *Course retention and completion rates*
  + *Average GPA*
  + *Pre-and post-transformation DFW comparison*
  + *Student success in learning objectives*
  + *Surveys, interviews, and other qualitative measures*
* *Indicate any co-factors that might have influenced the outcomes.*

For each of our goals, we collected answers from students in an anonymous survey at the end of the semester. The survey was approved by GGC IRB committee and was administered on the official GGC Qualtrics surveying service. We include students answers in the boxes below each question. We also provide our statistics below. Note that some students did not respond to all questions and were removed . Also, note that Fall 2020 was a particularly difficult semester because of the COVID-19 pandemic when classes were offered online or in hybrid format and not in the usual face-to-face format.

**GOAL A: Improve student success in ITEC 3870 (Software Development II) by creating on-line, customized, and organized course materials focused on software development industry practices.**

**Qualitative Measure, Methods, and Tools**

Open-ended questions asked:

- How can we improve the new course material?

|  |
| --- |
| I believe this class does a good job of introducing areas in software development that are relevant to real world use. Adding new course material that is being used in industry will be helpful for future students. |
| I think having walkthroughs for certain tools in class would be helpful, as there were situations where we had to learn some tools basically just based off of written instructions and would get stuck sometimes. |
| The new course materials need to be related to the project more. |
| I am in agreement with your current offerings. |
| Maybe have long in depth slides as well as short summarized to the point slides that would be easier to reference. |
| Include videos/demos along with readings. |
| I'm unsure of what can improve the course materials. The topics covered in the No-Cost learning materials are understandable and straight forward. |
| I think it's fine the way it is |
| Have the presentations be more interactive, maybe have in class assignments |
| Focus to some degree on covering the functional side of various software frameworks, instead of purely teaching Agile theory. |
| Maybe give soft dev #1 students time to practice git and react/angular before taking the class |
| Expose them to the material earlier, instead of one semester to learn and do |

**At least two students suggested videos/demos, i.e. more hands-on type of learning than just slides.**

- What would be one thing that can be added to the course material?

|  |
| --- |
| Maybe a single lecture on what to look for in finding our first development jobs? Reading descriptions tend to be intimidating but what the company actually wants usually isn't everything they write on the descriptions. |
| More documentation tips/advice |
| That one thing that would be great to be added is the amount of time that will be put into the project. |
| Possibly add concrete examples of tech/concepts in action. For example, descriptions of common frameworks, languages, etc are already in the material, so maybe add videos/demos of those things and how/why they are used? |
| Maybe a free online course for a new technology. |
| Include reading materials on all current projects. |
| Having exercises for implementing Angular or Bootstrap can be helpful for both students' projects and their career in the ITEC industry. |
| Workshops |
| Intro a Web or Mobile Framework |
| Some examples of code architecture, frameworks, etc. |

**Again, students suggested videos/demos/workshops, i.e. more hands-on type of learning than just slides. Also, more materials relevant to skills required to get a job in the field.**

- Other comments or suggestions about this course?

|  |
| --- |
| Very heavy workload, especially so for me this semester because I did all the troubleshooting and coding. Missed so many other classes I have to do what I can for assignments to pass. Probably more of a teammate issue. |
| Probably reminding teams once in a while to meet with clients and show them progress. |
| The overall class was great. Majority of the students participate and the professor was great at asking questions |

- How did the availability of no-cost online textbook and materials help improve your learning?

|  |
| --- |
| It relieved some stress from an already stressful class as that was one less thing to worry about. |
| Less things I have to think about and less I have to pay for |
| not having to decide which book/material was absolutely necessary to buy and which I could skip out on to save costs. I was able to just comfortably have access to all materials without having an existential crisis. |
| The no cost was great because the powerpoint provide all the information that was needed for the class |
| Additionally, material that has been cut down in quantity (words per page) and tailored to target specific concepts proved more helpful for studying and applying to real-world scenarios |
| n/a |
| Yes |
| Not having to worry about the cost of expensive textbooks. Also the online, electronic versions are soo much easier to read and search through. |
| The information comes from different sources with different views and ways of presenting the topic. |
| It gave me a readily available reference for new learning concepts and was straight to the point. |
| It didn't really improve my learning, but it helped me save money on materials. |
| It helped a lot |
| I much prefer not having to purchase texts, this helps my wallet. Thank you for that. |
| I didn't have to worry about paying the cost and still learned the same. |
| It made it less stressful |
| not much |

**Students appreciate the money saving aspect of the textbook.**

**Quantitative Measure, Methods, and Tools**

We administered a student survey that assessed students’ responses (Strongly disagree/Agree) on the following statements.

- The materials clearly explained concepts. The materials are useful to learn the concepts.

- The materials include enough exercises and examples to help me learn the concepts.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Positive** | **Neutral** | **Negative** |
| The course materials clearly explained the concepts. | 89% | 5.5% | 5.5% |
| The materials are useful to learn the concepts. | 83.3% | 0% | 16.7% |
| The materials include enough exercises and examples to help me learn the concepts. | 89% | 5.5% | 5.5% |

**Majority of students found the materials clear and useful.**

We collected data on course success as required by ALG instructions and compared it to previous data from the course to check for improvements in the following:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Post-transformation,  Fall 2020 | Pre-transformation,  Spring 2020 |  |
| Drop Rate | 0 | 0 |  |
| Passing Rate | 97.2% | 90.9% |  |
| Fail Rate | 2.8% | 9.1% |  |
| Withdraw Rate | 0 | 0 |  |
| Percentage of students receiving A | 75% | 77.2% |  |
| Percentage of students receiving B | 13.8% | 13.6% |  |
| Percentage of students receiving C | 8.3% | 0% |  |
| Percentage of students receiving D | 2.8% | 0% |  |
| Percentage of students receiving F | 0% | 9.1% |  |
| Percentage of students achieving student learning outcomes | 78% | 71% |  |

**Clear improvement was observed in passing, failing, dropping and withdrawal rates.**

**GOAL B: Improve student outcomes oriented towards the Software Development job market by designing course materials customized around a real-world client-based project to provide students with practice.**

**Qualitative Measure, Methods, and Tools**

Open-ended questions asked to the students:

- How can we improve our project-based learning approach?

|  |
| --- |
| N/A |
| none come to mind |
| It's been made clear to me this semester that some students just don't know what they are doing and aren't ready to step up. These students might need extra time, like office hours, to fill in any gaps they missed in previous classes. They need to get up to speed with the rest of the group. If they can't teach themselves, they need to know they can reach out to ask for help. |
| (personal opinion from our project being python/django) probably GGC allowing ITEC students take the intro to python class |
| We can improve by starting the project a little bit sooner and don't have some of the assignment due at the same time as other assignment in the class |
| N/A |
| n/a |
| Unknown |
| More time. |
| I think giving students a more structured timeline from the beginning. I think it would have helped me start coding sooner. which is my only regret. |
| Have the class work on one big project but there are team working on different features. |
| Having a more hands-on introduction (Exercises) to the class can be helpful for letting us know what to expect for our projects, which require a lot of research and tinkering with the unfamiliar technologies. |
| It reflects how the real world is, so I think it's fine. |
| more in class interactive assignments |
| Improve communication of class requirements to some degree, as there was substantial confusion amongst our team at the beginning of the project, especially during the mockup phase. |
| better guidance and structure. |
| n/a |
| Teach a little intro |

**Students state again they want more interactive assignments and materials.**

We will follow up with students to learn about their job application experiences and quality of the job they found (if available) in the SD industry.

**This step is in progress as these students are currently jus starting to apply for jobs.**

We asked external clients who were involved with student project the following survey:

- Comments on satisfactory student progress towards the software product

|  |  |
| --- | --- |
| I was a little disheartened to see how little effort the majority of the team seemed to be putting in throughout the semester. But in true soft dev form, I think they put together a decent effort towards the end :D Not complaining haha, that's how it often goes, and I'm glad to see the work they put in. But I was a little disappointed that only 1 of the features we requested was implemented, and much of what was done was neither asked for nor particularly wanted :P They did make me realize they/you are right, and the website needs some reorganization/structural changes... but I hate knowing Ryan and I probably won't use much of their work. I would've preferred they talked to us more about alternatives. And they basically completely ignored all of our feedback regarding how they were handling multiple schools :P But I think the main goal was for them to learn various aspects of dealing with a client and working on a project. Not just to build my website for me :P In that regard, I think they all did pretty well. We talked about what we all learned from the experience, and I'd say it was good for everyone involved And it was cool seeing them get into a project that's a little dear to me. I completely plan on working with them more if they've any interest. |  |
| I loved that they added more pokemon and expanded the world! It looked great! |  |
| The team went beyond my expectations. Not only they implemented tags, commenting, and admin controls, but they did without resorting to incompatible technologies that they were proposing earlier. |  |
| We are very excited about the starting of an app for the Coop. The team did a great job. Look forward to the project being carried over so that we can get to a test phase and be able to use soon. Thank You |  |
| I was very satisfied with the team's work and look forward to continuing to develop and improve the app next semester if a group is available to take on the project. Thank you! |  |

|  |  |  |
| --- | --- | --- |
| I am satisfied with the current team. Everything what they did so far was about expectation. I like a lot what and how they did this so far. |  | |
| I'm happy that they were able to come together and get the app working correctly. With the semester cut short they unfortunately didn't implement any of the new features we discussed. I'm sure a future team will make more progress. Thanks for the opportunity to serve as a client, it was a great experience! |  |  |

**Quantitative Measure, Methods, and Tools**

We administered a student survey that will assess students’ response (Strongly disagree/Agree) on the following statements:

- Project-based course materials are very important to learn and practice SD skills.

- I learned all the knowledge and skills needed to build a software project.

- The team-based project learning experience was useful.

- The team-based project helped me build my communication skills, and my teamwork skills.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Positive** | **Neutral** | **Negative** |
| Project-based course materials are very important to learn and practice Soft Dev skills. | 94.4% | 0% | 5.6% |
| The team-based project learning experience was useful. | 83.3% | 0% | 16.7% |
| The team-based project helped me build my communication skills, and my teamwork skills. | 89% | 0% | 11% |

We collected data on:

- Source code progress metrics on JIRA, Github, etc.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Post-transformation,  Fall 2020 | Pre-transformation,  Spring 2020 |  |
| Jira  A’s  B’s  C’s  D’s  F’s | 92%  8% | 100% |  |
| Github  A’s  B’s  C’s  D’s  F’s | 50%  16.7%  33.3% | 67%  33.3% |  |

**GOAL C: Eliminate student expenses in textbook purchases.**

**Qualitative Measure, Methods, and Tools**

Open-ended questions asked:

- How much did you spend on course materials?

|  |
| --- |
| $0 |
| $0 |
| 0 for this class |
| basically nothing |
| Overall I did spend around $1200 because I needed a laptop that has the capabilities for the class |
| None: $0 |
| n/a |
| 0 |
| 0 |
| 0 |
| 0 |
| I spent no money on the course materials for this class. |
| 0 |
| 0 |
| $0 |
| no money |
| $0.00 |
| 0 |

- Did the availability of No-Cost-to-Students Learning Materials help improve your success in the course?

|  |
| --- |
| Saved money |
| The quality of the material that is online would've been just as good as if this course required a text book. |
| Textbooks are not always used in classes that "require" them. It's a waste of money. We should use materials that we'll be using in industry like simply Googling how tos & error messages. |
| I had access to more materials than i probably would have. Access to more materials allowed me to learn more and progress more. |
| I could use the money for software programs that I can use for the project and the class. |
| Less financial stress that would affect absorption of knowledge. |
| Cheaper |
| I didn't have to worry about spending money that I don't have for this course. |
| More personalized for the specific subjects we were learning. To the point and did not have extra things that we do not need. |
| Smaller articles is more engaging than traditional textbook |
| It was more tailor made for the class, as opposed to textbooks that give lengthy and sometimes unnecessary explanations. |
| Improved by learning about web development and project management tools |
| I didn't have to purchase textbooks |
| I learned what i needed without paying extra cost |

- What were the challenges of using the No-Cost-to-Students Learning Materials?

|  |
| --- |
| There's no challenges for me. For other students who aren't self learners, maybe having a session for self learning would be helpful for them to get out of their comfort zone. They need to not be afraid to look something up. We were always taught it was bad to use the internet to find answers, but as software developers, we NEED to do just that. Many students are afraid to look something up and aren't strong in self-learning. They need to become comfortable with looking things up, reading articles, forums, and watching tutorial videos to learn things. |
| I think the biggest challenge was the psychological challenge of telling myself that even though I wasn't paying for the materials, they were still valuable and important to have. Because usually, we sort of associate free with not valuable. Being able to adjust the importance in my mind took a minute. |
| I think the only challenges was printing the materials. |
| Occasional network issues wouldn't allow me to download slides/files. No fault to GGC |
| n/a |
| None |
| A lot of things get lost through online learning. |
| no challenges |
| none |
| Being able to learn the material requires a lot of practice, but that is something shared between all educational experiences including paid textbooks. |
| N/A |
| none |
| There were no obvious downsides. |
| Finding the right topics in the material presented. Too many long presentations without separation of content |
| nothing. |
| The learning curve |

**Quantitative Measure, Methods, and Tools**

We administered a student survey that assessed students response (Strongly disagree/Agree) on the following statements.

- The materials are well organized so that necessary information can be found easily.

- The availability of No-Cost-to-Students Learning Materials helped improve my success in the course.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Positive** | **Neutral** | **Negative** |
| The materials are well organized so that necessary information can be found easily. | 77.8% | 0% | 22.2% |
| The availability of No-Cost-to-Students Learning Materials helped improve my success in the course. | 89% | 5.5% | 5.5% |

We will collect institutional data to compare with baseline on:

- Course enrollment numbers. Data will be used to determine overall student savings.

**Course enrollment is currently down due to COVID-19.**

**GOAL D: Share the learning materials with other USG universities and colleges to benefit more students.**

We plan to present our newly developed course materials at conferences. We will share our materials with interested faculty and track their usage and success via a short survey at the end of each semester.

**Qualitative Measure, Methods, and Tools**

- Survey conference participants for adoption interest and general feedback of usefulness

- Survey faculty who adopted the materials on general feedback on usefulness of materials

**Quantitative Measure, Methods, and Tools**

- Tracking of number of downloads

- Tracking of locations from where requests originated

- Collaborate with volunteer instructors to track their student numbers

**This goal is still work in progress. We plan to present our work at a conference and share it with other faculty. We started a collaboration with Prof. Rich Halstead-Nussloch from Kennesaw State University on improving OER materials provided on Github.**

# 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.*

**Since Dr. Gunay serves as the SD II course coordinator in the School of Science and Technology and both PIs are in SST’s Software Development Goal Team, they will be able to promote the adoption of these materials for long-term use. In fact, a new professor teaching next semester this course is already planning to use these course materials.**

**There is no paid software required for using and maintaining our materials, Github is an open and free platform. Authors will update periodically these materials to reflect feedback from students and instructors and newly emerging topics in SD in the industry. If there is a need to make significant improvements to the materials or add ancillary materials, authors will apply for another ALG grant in the future. The website will be hosted on a public platform that allows “forking”, which means instructors from our and other institutions can make their own customized versions of the materials. This way, many versions of the materials can exist and could help sustainability of the effort.**

# 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.*

**We already took action and applied (and successfully obtained) a Continuation ALG round 18 to improve the materials of this work by adding a new chapter and 12 workshops that were asked for by our students.**

**We also plan to properly revise the materials for SD I and SDP courses in subsequent Mini Grant applications to ALG by reaching out to the instructors who regularly teach these courses.**

# 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.*

**We plan to present our work at a conference and share it with other faculty. So far we have collected data from only one semester (Fall 2020). We plan to collect data for another semester and then present our findings at a conference.**

**We also started a collaboration with Prof. Rich Halstead-Nussloch from Kennesaw State University on improving OER materials provided on Github. We are discussing strategies to build OER materials and disseminate the instructor materials on Github. We target a conference paper maybe at SIGITE to publish this work.**

# 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.*

Dr. Anca Doloc-Mihu, Co-PI



Dr Cengiz Gunay, PI

