Affordable Learning Georgia Affordable Materials Grants  
Transformation Grants Final Report

*(or Textbook Transformation Grants, if R17 or earlier)*

Once you have completed this template, to submit your Final Report, go to the [Final Report submission](https://survey.zohopublic.com/zs/xTCCvG) form.

The final report submission form allows you to submit the following:

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

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

* Qualitative/Quantitative Measures data files (optional, as needed)

*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: 12/19/2024**

**Grant Round: 24**

**Grant Number: 696**

**Institution Name(s): Middle Georgia State University**

**Project Lead: Myungjae Kwak**

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

* **Myungjae Kwak, Professor, Computer Science,** [**myungjae.kwak@mga.edu**](mailto:myungjae.kwak@mga.edu)
* **Jonathan Jenkins, Associate Professor, Computer Science,** [**jonathan.jenkins2@mga.edu**](mailto:jonathan.jenkins2@mga.edu)
* **Joobum Kim, Assistant Professor, Computer Science,** [**joobum.kim@mga.edu**](mailto:joobum.kim@mga.edu)
* **Kevin Floyd, Associate Dean, School of Computing,** [**kevin.floyd@mga.edu**](mailto:kevin.floyd@mga.edu)

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

* **Computer Science I - CSCI 1301 I**
* **Computer Science II – CSCI 1302**
* **Intro to Programming – ITEC 2260**
* **Application Development – ITEC 2270**

**Semester Project Began: Spring 2024**

**Final Semester of Implementation: Fall 2024**

**Total Number of Students Affected During Project: 195**

# Narrative

* 1. *Describe the key outcomes, whether positive, negative, or interesting, of your project. Include:*
* *Summary of your transformation experience, including challenges and accomplishments*
* *Transformative impacts on your instruction*
* *Transformative impacts on your students and their performance*

The project successfully achieved its goals of developing affordable and interactive course materials for four introductory programming courses at Middle Georgia State University. One of the primary accomplishments was the creation of 24 Python learning modules that integrate text content, quizzes, and programming exercises. These modules were complemented by the development of an interactive web application, allowing students to practice coding and complete tasks directly within the platform. The project's transformative impact on instruction was significant, as it provided an engaging alternative to expensive commercial textbooks, drastically reducing costs for students while enhancing their understanding of foundational programming concepts. The new materials and platform not only improved student learning outcomes, as evidenced by pre- and post-test assessments, but also offered a scalable, sustainable resource that can be shared with other institutions. Overall, the project’s combination of cost savings, educational innovation, and long-term accessibility has had a positive and far-reaching effect on both faculty instruction and student performance.

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

The project was a challenging but rewarding experience that required significant time and resources to complete. While the development of the learning modules and platform was successful, I learned that more advanced technologies, such as AI, could have been used to enhance the platform's design and functionality. In hindsight, investing additional time in exploring AI-driven tools could have improved the platform’s interactivity and personalized learning features. Additionally, streamlining the development process with more efficient project management techniques could have helped reduce the overall time commitment. Moving forward, I would incorporate these insights to create even more innovative and effective educational resources.

* 1. *Describe any materials you created or revised/remixed that will be shared with the public. Include the* [*open license your materials will be shared under*](https://creativecommons.org/share-your-work/)*—for most materials, this will be an Attribution 4.0 License (CC BY) as required in the Grants Request for Proposals.*

As part of this project, I created 24 learning modules that cover key concepts in introductory programming. Each module includes detailed text content, PowerPoint slides, and quiz questions designed to help students grasp fundamental programming concepts. These materials have been designed to be interactive and engaging, offering a comprehensive learning experience. The complete set of learning modules, along with the accompanying slides and quiz questions, is accessible through the following URL: <https://comp.mga.edu/learning/python/list>.

The learning platform itself was developed using Docker technology, ensuring easy deployment and scalability. This allows users to run the platform on their own systems without complicated setups. The platform and all associated learning materials, including the Python modules, are available for free download from the project's GitHub repository: <https://github.com/mkwak718/learning_python>. This open-source approach enables other educators and institutions to adopt and adapt these materials for their own use, fostering wider access to quality programming education.

# Quotes

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

"The no-cost learning materials were a game changer for me. Not only did I save money on textbooks, but the interactive quizzes and coding exercises helped reinforce what I learned in class. It made learning Python feel more hands-on and practical."

"I appreciated how the modules were structured, with clear explanations and exercises to test my understanding. Having everything in one place, including the quizzes, slides, and coding tasks, made studying more efficient and enjoyable."

"At first, I was skeptical about using online materials instead of a traditional textbook, but I found the no-cost resources to be more engaging and effective. The ability to access everything on the platform made it easier to stay on track with the course."

# 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: \_\_\_\_195\_\_\_\_\_\_

* Positive: \_\_\_85.1\_\_\_\_ % of \_\_\_\_86\_\_\_\_ number of respondents
* Neutral: \_\_\_11.3\_\_\_\_ % of \_\_\_86\_\_\_\_\_ number of respondents
* Negative: \_\_\_3.6\_\_\_\_ % of \_\_\_86\_\_\_\_\_ 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?**

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

\_\_\_8\_\_\_\_% of students, out of a total \_\_\_195\_\_\_\_ students affected, dropped/failed/withdrew from the course in the final semester of implementation.

Choose One:

* \_\_\_ Positive: This is a lower percentage of students with D/F/W than previous semester(s)
* \_\_x\_ 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.*

The collected data indicate a strong overall positive impact on student engagement and performance. Of the 195 students involved, 86 provided feedback on their experience with the newly developed learning materials. Among these respondents, approximately 85.1% reported a positive opinion of the materials, while only 3.6% expressed a negative perspective. Neutral responses constituted 11.3%. This suggests that the majority of students favored the materials and found them beneficial for their learning experience.

In addition to qualitative feedback, quantitative measures point to improved student outcomes compared to previous semesters. Performance metrics demonstrate higher overall achievement following the implementation of these materials. The semester in question recorded a noticeable increase in student performance in learning outcomes and grades when contrasted with earlier terms. Two samples t-test results from a controlled study in CSCI 1302 during Fall 2024 confirmed this improvement. In this study, students using the newly developed module performed significantly better than those relying on the original textbook chapter, indicating that the revised resources enhanced comprehension and retention.

Student completion rates remained stable, as the Drop/Fail/Withdraw (DFW) percentage was unchanged from previous semesters at around 8%. This neutral effect on DFW rates, when combined with the clear upward shift in performance metrics, underscores that improvements in learning did not come at the expense of student attrition. Ultimately, these findings, supported by data from both controlled experimental conditions and broad student feedback, confirm that the developed materials positively influenced student success and overall educational experience.

*[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.*

# Sustainability Plan

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

The learning materials developed through this project will be continuously used in all four introductory programming courses with the School of Computing at Middle Georgia State University: CSCI 1301, CSCI 1302, ITEC 2260, and ITEC 2270. These materials will remain an integral part of the curriculum, providing students with a cost-effective and interactive learning experience. Faculty will regularly update the content to ensure that it stays current with the latest advancements in programming concepts and industry trends. Additionally, the learning platform will be upgraded using more advanced technologies, such as AI, to enhance its interactivity and personalized learning features. This continuous maintenance and improvement process will ensure that the materials remain relevant and effective in helping students succeed in their programming education.

# 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.*

This project has significantly influenced our thinking about the development and selection of learning materials for future courses. The success of creating interactive, no-cost materials for introductory programming has shown us the value of such resources in enhancing student engagement and learning. We now recognize that similar learning platforms and materials can be developed for other computer science and information technology courses, such as Database Principles, Data Structures and Algorithms, Machine Learning, and more. The flexibility and scalability of the platform make it possible to adapt these resources for a wide range of subjects, providing students with a consistent and accessible learning experience across various topics.

Moving forward, we will prioritize the development of similar no-cost, interactive learning resources for other courses in the curriculum. This experience has demonstrated the effectiveness of integrating quizzes, coding exercises, and slides into a cohesive platform that enhances students' understanding. We now view learning materials not just as textbooks, but as dynamic, evolving resources that can be continuously updated and improved with new technologies, like AI, to better meet the needs of students. This approach will be a key consideration when selecting and creating future course materials, ensuring they are both cost-effective and highly interactive.

# 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.*

The project team is planning to present the results of the evaluation of the learning platform at an upcoming educational conference. This presentation will showcase the effectiveness of the new no-cost learning materials and the interactive platform, highlighting student feedback, performance outcomes, and the overall impact on the learning experience. By sharing these results, we aim to provide valuable insights into the benefits of developing cost-effective, technology-enhanced learning resources for introductory programming courses.

Additionally, the team intends to publish a journal article that details the design and development process of the learning platform, as well as the outcomes of the project. The article will cover the technical aspects of the platform's creation, including the use of Docker for deployment, the development of the Python learning modules, and the ongoing maintenance and updates planned for the future. This publication will contribute to the growing body of knowledge on open educational resources and offer practical guidance for other educators looking to implement similar solutions in their own institutions. Through these professional activities, we hope to share our experiences and insights with a wider academic audience and inspire further innovation in the field of educational technology.

# 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.*