

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: August 21, 2020

Grant Round: Round 14

Grant Number: 445

Institution Name(s): Clayton State University

Project Lead: Aubrey L. Dyer

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

- Augustine Agyemen, Professor, Chemistry and Physics
- John Meyers, Associate Professor, Chemistry and Physics
- Cass Parker, Professor and Chair, Chemistry and Physics
- Courtney Dubois, Instructional Designer, Center for Excellence and Learning and Teaching

Course Name(s) and Course Numbers:

- Principles of Chemistry I (CHEM 1211)
- Principles of Chemistry II (CHEM 1212)

Semester Project Began:

Summer 2019

Final Semester of Implementation:

Summer 2020

Total Number of Students Affected During Project:

322

1. Narrative

A. *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*

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

During the summer of 2019, the team evaluated available low-cost homework platforms that are compatible with the OpenStax General Chemistry textbook we selected. We ultimately selected Knewton Alta (now a part of Wiley) as the cost of the system met the \$40 threshold and we appreciated the adaptive nature of the homework system. The Fall of 2019 was the first semester we introduced the low-cost materials. We began with the 1st semester course (CHEM 1211) of the sequence and adopted the materials beginning in the Spring of 2020 for the 2nd semester course (CHEM 1212). For the Summer of 2020, both courses continued to use Knewton Alta for the homework system and OpenStax General Chemistry for the textbook. In all, five different faculty were involved in utilization of the course materials (including an additional faculty member who was not on the grant).

Positive comments from the faculty regarding the impact on the students ranged from the students being relieved at the substantially lower cost from other courses/semesters, higher student engagement, and students tended to understand the material better than previous semesters. Challenges faculty faced in adopted the materials ranged from the added effort in incorporating OER materials such as images in powerpoints and in-class problems, the time it takes to become accustomed to a new learning tool, aligning instructional aides to a new textbook, and adapting to the different order of topic introduction compared to previous textbooks. In addition, it

was noted that there were some units in the textbook that were considered weak and faculty had to find additional materials to compensate for this weakness. This weakness of the textbook, along with the challenge of transitioning online during the second half of the Spring 2020 semester, allowed for a positive transformation. As the course materials are open source, it allowed for one of the faculty members to embed the textbook, section-by-section, into the learning management system (Brightspace) and provide additional open source content (PhET simulation links, YouTube videos, etc.) along with the reading materials by section. The students overwhelmingly responded in a positive way to this in the Summer of 2020 when the course (CHEM 1211) was delivered entirely online. This advantage will allow the faculty to work together to adapt the course materials to better suit the content we would like delivered. This is a feature not possible with publisher-generated materials as the textbooks are static and not able to be adapted or altered.

The faculty also noted transformations on their instruction with both Knewton and the book allowing it to be easy to convert to online learning during the Spring of 2020 when the pandemic closed the campus. Faculty were also able to deliver quizzes and exams in Knewton, much more closely aligning the summative assessments with the formative homework assessments. Additionally, faculty noted that they were able to rethink the ways they have been teaching the topics and make improvements in what they have done in the past.

One of the major advantages of the homework system, Knewton Alta, is the daily reports student to the faculty member on what concepts were the students struggling during the previous day. This allowed the faculty members to reach out to the students in real time (not after a quiz or exam) and offer help. Knewton also broke down questions and content based on learning objective, which allowed us to assess student understanding at the learning objective level, rather than focusing solely on final exam grades. We were able to view which concepts the students struggled with the most during the semester and tailor our content delivery the following semester to help target those needs.

As can be seen in the quantitative data supplied, the improvements were not just anecdotal, but also concrete in improvements in student success over the three semesters we utilized the OER materials. In previous semesters (focusing only Fall 2018 through summer 2019), our DFW rate (defined as "D", "F" and "W/WF") was 38% in CHEM 1212 averaged across all sections. In CHEM 1211, averaged across all sections in the Fall of 2018 through Summer 2019, the DFW rate was 29%. In those semesters, we utilized a relatively high-cost publisher textbook and homework system. Upon switching to the low-cost Knewton Alta and free OpenStax textbook, the DFW rate in CHEM 1211 (Fall 2019 through Summer 2020) dropped to 19% and to 30% in CHEM 1212. This is a substantial decrease in DFW rate, especially considering the transition to fully online instruction halfway through the Spring of 2020 and the entire semester of Summer 2020.

We feel that the move to low-cost and OER materials has been a positive one for both our students and faculty. With the ability to adapt the materials to our needs, to allow for the students to have access on the 1st day of class (even earlier if needed), to gauge student understanding of concepts throughout the semesters, and to assess our instruction more quantitatively, these materials are ones that we intent to keep using in future semesters.

2. Quotes

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

OpenStax Textbook:

- “The textbook was useful because it went more in depth on definitions and background information on some topics.”
- “I didn’t like the book. I like the price but the old book was better as far as reading the material to learn it on my own.”
- “I’m grateful that it was free, however you get what you pay for.”

Knewton low-cost homework:

- “I really enjoyed Knewton. Knewton helped me address any misunderstandings I had in regards to the material taught especially very helpful with the the math portions in Chemistry “
- “Though sometimes frustrating when you get stuck on a topic, the adaptive nature of the modules is a fantastic feature “
- “It's really giving the students a chance to rework over the concepts they aren't doing to well in until they understand it “
- “On the section assignments, when you get a question wrong, it gives you too many more questions to answer “

3. Quantitative and Qualitative Measures

A. 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? Data taken from responses to a end-of-term survey given in the Fall of 2020 to two sections of CHEM 1211.

Total number of students affected in this project: 322

- Positive: 78 % of 120 number of respondents

- Neutral: 8 % of 120 number of respondents
- Negative: 14 % of 120 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.

 22 % of students, out of a total 322 students affected, dropped/failed/withdrew from the course in the final semester of implementation. **(across all semesters of implementation)**

Choose One:

- x Positive: This is a lower percentage of students with D/F/W than previous semester(s) **22% vs. 31% in previous semesters**
- 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)

B. 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.*

Supporting impact data included with this final report include student “D”, “F”, and withdraw rate analysis for semesters before OER and after OER adoption. Analysis includes breakdown of metrics per year, per semester, and per course (all sections combined). Student DFW and ABC rates are also calculated and provided. A percent increase of ABC rates of 13% for CHEM 1212 (comparing pre-OER and post-OER adoption) is realized along with a 17% increase in ABC rates for CHEM 1212.

In addition, an analysis of student success per learning objective on the final exam for CHEM 1212 is included. We only obtained this for the Spring 2020 semester as this was the first semester we utilized Knewton to deliver the final exam online. Previous semesters have not been compared as the learning objectives were not identical, but future analysis will be performed in subsequent semesters to target instruction towards learning objectives that students perform poorly on.

In the Fall of 2019, at the end of the semester, a survey was administered to the students to gauge their attitudes towards the adoption of the OpenStax textbook and Knewton Alta. The results of that survey are included with the supporting impact data. A similar survey was not administered in following semesters due to the disruption from the COVID shutdown. However, one of the faculty members did administer a end-of-semester course evaluation survey for both Spring 2020 and Summer 2020. The results of the survey that pertain to the course materials is included. As can be seen, a large majority of students felt that the course materials helped in their understanding of the concepts.

4. 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.

As noted, the department will continue to offer the OpenStax textbook in future semesters. There may be a need to supplement some of the units with more substantive content and/or examples, but that is something that we will be working on in future semesters as a

team. In addition, we fully intend to continue utilizing Knewton Alta due to the overwhelmingly positive impact it has had on student grades, understanding of material, and their perception that it improves their understanding.

5. 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 experience has had a positive impact on the team such that we have applied for (and were awarded) a grant to transform our non-majors first semester general chemistry (CHEM 1151) course beginning in the Fall of 2020. We appreciate the adaptability it affords and the low cost that lowers the barriers to student access to content on the first day of class.

6. 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 team intend to present their experience with adopting OER in chemistry at the USG Teaching and Learning conference in the spring of 2021. We also plan to continue analyzing student gains and present the findings at a regional conference.

7. 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.