**Affordable Learning Georgia Textbook Transformation Grants**

**Final Report**

*Instructions:*

*A. Your final report submission must include three separate component files:*

1. *Completed report form. Please complete per inline instructions. The italicized text is provided for your assistance; please delete the italicized text before submitting your report.*
2. *Supporting data on the impact of your Textbook Transformation (survey, analyzed data collected, etc.)*
3. *A photograph of your team and/or your students for use in ALG website and materials*

*B. Go to [URL] to submit these three components of your final report. Follow the instructions on the webpage for uploading your documents. You will receive a confirmation email. Based on receipt of this report, ALG will process the final payment for your grant. ALG may follow up with additional questions or to request your participation in a publication, presentation, or other event.*

**Date: June 1, 2015**

**Grant Number: 24**

**Institution Name(s): Armstrong State University**

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

**Dr. Jared Schlieper, Associate Professor, Department of Mathematics,** **jared.schlieper@armstrong.edu**

**Dr. Michael Tiemeyer, Assistant Professor, Department of Mathematics,** **michael.tiemeyer@armstrong.edu**

**Project Lead: Dr. Jared Schlieper/Dr. Michael Tiemeyer**

**Course Name(s) and Course Numbers: Math 1161 – Calculus 1; Math 2072 – Calculus 2; Math 2083 – Calculus 3**

**Semester Project Began: Fall 2014**

**Semester of Implementation: Spring 2015, Fall 2015**

**Average Number of Students Per Course Section: 30 in Calculus 1; 25 in Calculus 2; 30 in Calculus 3**

**Number of Course Sections Affected by Implementation: 10**

**Total Number of Students Affected by Implementation: 300**

**1. List of Resources Used in the Textbook Transformation**

* *Active Calculus,* Dr. Matt Boelkins*,* Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License, <http://aimath.org/textbooks/approved-textbooks/boelkins/>
* *Apex Calculus,* Drs. Gregory Hartman, Brian Heinold, Troy Siemers, Dimplekumar Chalishajar, Crea􀆟ve Commons A􀆩ribu􀆟on-Noncommercial 3.0, <http://aimath.org/textbooks/approved-textbooks/hartman-et-al/>
* *Calculus,* Drs. Jared Schlieper and Michael Tiemeyer, Creative Commons Attribution-Noncommercial-ShareAlike 4.0 International License, <https://github.com/ArmstrongCal>

**2. Narrative**

A. Describe the key outcomes, whether positive, negative, or interesting, of your project. Include:

Our goal was to adopt an open-source textbook and online homework system for calculus 1, 2, & 3 to bring down the cost of higher education while maintaining academic integrity and success in those courses. While we accomplished this goal by using Active Calculus and Apex Calculus as the text and using WebWorK for the homework system, we also decided to adapt the two referenced texts into our own open source textbook in the Calculus sequence. We have finished Calculus 1, and we are in the process of completing the chapters covered in Calculus 2, which will have the remaining chapters completed before fall semester begins in August 2015. The textbook transformation is being implemented on schedule as outlined in our proposal.

We each used the text in our individual calculus sections by posting the text for Calculus 1 in Desire2Learn. Our students appreciated the availability of the text through D2L without having to pay for access to an online book. While several students would print their own copies, many students would like a printed option. We did not have time to explore this option during our implementation, but we will be in contact with the press at UNG. The main outcome from this project was the financial savings that our students received. Between our two sections, we had 60 students who each saved $300 by using our open source textbook, yielding a total savings of $18,000. Once the textbook is adopted throughout the calculus 1 sections this fall, calculus students will save approximately $90,000 per year! Once the textbook is adopted in calculus 2 and 3, the savings could increase by another $40,000. With so many first generation and non-traditional students populating our calculus sequence, the savings will ease the students' financial burdens.

The biggest challenge was completing our adaptation of the textbook in the allotted time. Our proposal was to adopt an open source textbook for our calculus sequence. We ended up creating an open source book from two others and adding more content to meet our department requirements. We knew this was a large task but we still underestimated how much time creating the text would take, but we are on track for. The other challenge was getting other colleagues on board. While our department is very supportive, there are still faculty who do not understand why not just use a book from the big publishers as before. Seeing the savings to the students as well as the ability to implement changes so quickly convinced them to adopt our book.

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

Work on a transformation for a single course instead of a sequence.

**3. Quotes**

“Unfortunately, my answers are based off of only using the text fairly recently. It's my own fault for not using it sooner but when I did it was clear and concise and explained the subjects well.”

 “Many examples in class were the same as in book. Having different problems to have more examples would have been useful. Homework was hell and seemed much more difficult than anything covered in class. Spent many hours teaching myself through internet. For most part, very good class.”

 “If a textbook is required, I am not really given a choice about buying it. If would be great if there were more examples in the book that had answers broken down. Often times I could feel I understand some of the material and if the question was changed a bit, then I would not know how to approach it. It might be an exposure issue but other than wanting more examples with steps, it is a fine book.”

**4. Quantitative and Qualitative Measures**

The textbook was implemented in two sections of calculus 1 taught by the co-PI's. Both classes were given a survey about the textbook as well as their data collected regarding their performance in the course. Dr. Schlieper had a 25% DFW rate, a 93.75% completion rate and a 2.33 GPA. The textbook did not change how the students performed in the course since historically, Dr. Schlieper's class GPA is 2.21. Dr. Tiemeyer had a 61% DFW rate, a 75% completion rate and a 1.19 GPA, with his historical GPA being 2.18. Dr. Tiemeyer implemented a standards-based grading system this spring, and it had a significant effect on his DFW rate and his GPA. The survey results were similar in both classes. On a scale from 1 to 5 with 1 being Strongly Disagree, 2 Disagree, 3 Neutral, 4 Agree and 5 Strongly Agree, the average response for "I would rather buy a textbook instead of this open-source textbook" was 1.92. The results of the survey are attached.

**5. Sustainability Plan**

The transformed textbook will be available to the public at <https://github.com/ArmstrongCal>, and it will be uploaded into Desire2Learn in all calculus courses. Since we possess the source files to the text, we can and will make any edits that need to be made in the future. Every semester, we will call for edits/suggestions to be made to the text from the faculty in the mathematics department.

**6. Future Plans**

We both have decided to use open-source, open-access, or freely available texts whenever possible in our future courses. Mathematics is a discipline such that all content is essentially public knowledge, and there are many high-quality open resources to use as a text.

In addition, we plan to “hypertextualize” the text so that it may be embedded into a website as an html text and compiled as an e-publication to be viewed on mobile devices. During this process, we also wish to incorporate video into the text to generate a multimedia text, which will be more engaging to the reader. We also plan to add WeBWorK problem links to the text where the student can find similar problems to try themselves and be given immediate feedback.

At this time, we have no plans in this area, but that may change!

**7. Description of Photograph**

 On the left is Dr. Jared Schlieper, Co-Project Lead and Associate Professor of Mathematics, and On the right is Dr. Michael Tiemeyer, Co-Project Lead and Assistant Professor of Mathematics.