

Application Form

Personal

Details

***Submitter First Name:** Chaogui

***Submitter Last Name:** Zhang

***Submitter Title:** Chair and Associate Professor

***Submitter Email Address:** ChaoguiZhang@clayton.edu

***Submitter Phone Number:** (678)466-4435

***Submitter Campus Role:** Proposal Investigator (Primary or additional)

***Applicant First Name:** Chaogui

***Applicant Last Name:** Zhang

***Applicant Email Address:** ChaoguiZhang@clayton.edu

***Applicant Phone Number:** (678)466-4435

***Primary Appointment Title:** Chair and Associate Professor

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

Application Details

***Team Members (Name, Title, Department, Institutions if different, and email address for each. Include the applicant in this list.):**

Project Lead: Chaogui Zhang, Associate Professor and Department Chair, Department of Mathematics, ChaoguiZhang@clayton.edu.

Billie May, Lecturer, Department of Mathematics, BillieMay@clayton.edu.

Jelinda Spotorno, Senior Lecturer, Department of Mathematics, JelindaSpotorno@clayton.edu.

Aaron Rafter, Department of Mathematics, AaronRafter@clayton.edu

Kara Mullen, Head of Electronic Resources and Services, Clayton State University Library, KaraMullen@clayton.edu.

***Sponsor, (Name, Title, Department, Institution):**

Lila Roberts, Dean, College of Information and Mathematical Sciences, Clayton State University

***Proposal Title:** 213

***Course Names, Course Numbers, and Semesters Offered:**

College Algebra, MATH 1111, Trigonometry and Analytic Geometry, MATH 1112, Precalculus, MATH 1113, Spring 2016, Summer 2016, Fall 2016, Spring 2017

***Final Semester of Instruction (This is your final semester of the project):** Spring 2017

***Average Number of Students per Course Section:** 28

***Number of Course Sections Affected by Implementation in Academic Year:** 30

***Total Number of Students Affected by Implementation in Academic Year:** 844

***List the original course materials for students (including title, whether optional or required, & cost for each item):** Algebra and Trigonometry, with MyMathLab and e-book access, 5th edition, by Judith A. Beecher, Judith A. Penna, and Marvin L. Bittinger, \$189.99 at campus bookstore, required.

***Proposal Categories:** OpenStax Textbooks

***Requested Amount of Funding:** \$27,900

***Original per Student Cost:** \$189.99

***Post-Proposal Projected Student Cost:** \$0

***Projected Per Student Savings:** \$189.99

***Plan for Hosting Materials:** D2L

***Project Goals:**

It is our goal to transition to a free, open access mathematics textbook and to design no-cost supplementary materials. We plan to use WeBWorK, a free, online homework management system created by the Mathematical Association of America, and to create supplemental materials such as course PowerPoint presentations for Math 1111, Math 1112, and Math 1113. In doing so, we predict that we will

* save each student enrolled in these courses about \$190,

- * provide high-quality learning materials to these students on day-one, and
- * improve learning outcomes in these courses.

The students at Clayton State University are significantly burdened by the rising costs of textbooks, tuition, and fees. Clayton State University students who applied for financial aid during the 2014-2015 academic year had a median income that is less than \$24,000. For fall 2014, over 90% of our first-year students received federal and/or state financial aid. Many Clayton State University students elect not to purchase required mathematics textbooks even though they know that doing so will likely affect their test scores and ultimately their final course grades. Even when students have sufficient financial aid to purchase all of their required textbooks, they typically are not able to do so at the beginning of the semester because their financial aid awards are not disbursed in a timely manner.

The primary goal of this project is to reduce the cost of course materials for students enrolled in Math 1111 (College Algebra), Math 1112 (Trigonometry and Analytic Geometry), and Math 1113 (Precalculus). The current required textbook for these courses is Algebra and Trigonometry, with MyMathLab, 5th edition, by Judith A. Beecher, Judith A. Penna, and Marvin L. Bittinger, which costs \$189.99 at the campus bookstore. Students typically follow one of two tracks: (1) Math 1111 and Math 1112 or (2) Math 1113. The 30 sections of Math 1111 and Math 1113 served nearly 850 students in the 2015 calendar year (spring, summer, and fall) at Clayton State University. Math 1112 students use the same textbook that is used in Math 1111, so there are typically no additional costs for Math 1112 students who completed Math 1111 at Clayton State. If we were to include Math 1112 students, there would be an additional 14 sections serving about 350 students. The total savings for Clayton State University students taking Math 1111 or Math 1113 is over \$160,000 per year. With increasing enrollments in Math 1111, Math 1112, and Math 1113 each year, the projected savings will continue to increase, as well.

***Statement of Transformation:**

By transitioning to a free, open access textbook and a free, online homework management system, supplemented by high-quality, no-cost course materials, each of the Math 1111, Math 1112, and Math 1113 courses will be transformed from the “way we’ve always done it,” big-publisher driven course model to a more cost-effective and sustainable model appropriate for the students we serve.

The main stakeholders in this transformation are the students themselves. Almost every student in a STEM major is required to take either (1) Math 1111 and Math 1112 or (2) Math 1113 as a prerequisite for Calculus I. Some Non-STEM majors also take Math 1111 to fulfill their degree requirements. Students in these courses will have access to a free, open access textbook supplemented by no-cost learning materials, which we predict will improve learning outcomes since students will not be delaying or foregoing the purchase of a textbook. We will transition to a free homework management system developed by the Mathematical Association of America called WeBWork. We believe that this transformation of Math 1111, Math 1112, and Math 1113 at Clayton State University will have the added benefit of encouraging other mathematics professors in the department to consider implementing a similar model in other mathematics courses.

Starting in fall 2015, Clayton State University (indeed, all universities in the USG) will be required to bear the difference in the cost of a textbook and the allotment provided by the Georgia Student Finance Commission (GSFC) for dual-enrolled (DE) students under the Move on When Ready (MOWR) program. That is, together, Clayton State University and the GSFC are paying for the expensive, big-publisher textbooks currently used in these courses for every student participating in MOWR. In addition, because no funds are provided for access to the MyMathLab online homework management system that we currently use in Math 1111, 1112, and 1113, the DE students must bear the cost of that product, which is currently \$116. That is, even though Clayton State University and the GSFC are providing free textbooks to the students (by absorbing the costs themselves), access to the required MyMathLab homework system remains a burden for the DE student to bear. We anticipate that the number of dual enrollment students will continue to increase at Clayton State University, with continually increasing percentages taking Math 1111, Math 1112, or Math 1113, so these savings would compound over the next few years. Thus, Clayton State University and the State of Georgia are also stakeholders in this transformation.

The project benefits Math 1111, Math 1112, and Math 1113 students primarily, but also benefits the instructors of these courses. Indeed, we will provide

- * a review of three OpenStax mathematics textbooks,
- * homework assignments via WeBWork that contain exercises tailored for each course,
- * high-quality supplementary materials to support each course and the textbook, and
- * an online learning environment via D2L and LibGuides for each course.

***Transformation Action Plan:**

The proposed transformation would affect 25 faculty members (19 full time and 6 adjuncts) in the Department of Mathematics at Clayton State University. These faculty members teach the 44 sections (and increasing) of Math 1111, Math 1112, and Math 1113. There will be four stages of implementation and review.

Stage One: Spring 2016. Chaogui Zhang, Billie May, Jelinda Spotorno, and Aaron Rafter will review three free OpenStax textbooks, College Algebra, Algebra and Trigonometry, and Precalculus, using the criteria developed by Affordable Learning Georgia. The content of these textbooks will be reviewed with respect to the course learning objectives for Math 1111, Math 1112, and Math 1113. Areas where textbook supplementation is required will be identified. Master syllabi for each course will be created. PowerPoint presentations related to the material covered in each course will be developed. WeBWork homework assignments will be created for each course. Kara Mullen will aid in creating online learning environments using D2L and LibGuides. Two team members will attend the kick-off meeting in early February.

Stage Two: Summer 2016. Initial implementation of the transformed Math 1111, Math 1112, and Math 1113 courses will commence. May, Spotorno, Zhang, and/or Rafter will pilot courses to determine the efficacy of the new textbook and supplemental materials. Data will be collected from the students to ascertain whether or not they are, for example, reading the new textbook, reviewing the supplementary materials, and completing the homework assignments in a timely manner. Feedback will be requested to determine if the students have suggestions for improvements to the courses. Best-practices will be discussed and any necessary course redesign will occur.

Stage Three: Fall 2016. Full implementation of the transformed Math 1111, Math 1112, and Math 1113 courses will commence. Using the results of information collected during summer 2016 as well as their personal experiences concerning the initial implementation and pilot courses, May, Spotorno, Zhang, and/or Rafter will provide a half-day training workshop on best-practices for the mathematics faculty members and adjuncts during Faculty Planning Week. For example, the team members will lead discussions on using the new textbook, incorporating supplemental materials, and using WeBWork in the transformed learning environment. Faculty members and/or adjuncts will teach all sections of Math 1111, Math 1112, and Math 1113 using the transformation principles and best-practices that have been developed. Data will be collected from the students to determine whether or not they are, for example, reading the textbook, reviewing the supplementary materials, and completing the homework assignments in a timely manner. Feedback will be requested to determine if the students have suggestions for improvements to the courses. Faculty members teaching these courses will be surveyed to determine how the transformation has impacted their teaching styles and to determine whether there were any positive changes in student-teacher interaction.

Stage Four: Spring 2017. Full implementation of the transformed Math 1111, Math 1112, and Math 1113 courses will continue. Faculty members and/or adjuncts will teach all sections of Math 1111, Math 1112, and Math 1113 using the transformation principles and best-practices that have been developed. Data will be collected from the students to determine whether or not they are, for example, reading the textbook, reviewing the supplementary materials, and completing the homework assignments in a timely manner. Feedback will be requested to determine if the students have suggestions for improvements to the courses. Faculty members teaching these courses will be surveyed to determine how the transformation has impacted their teaching styles and to determine whether there were any positive changes in student-teacher interaction. May, Spotorno, Zhang, and Rafter will review all data collected and prepare a report outlining the transformation of the Math 1111, Math 1112, and Math 1113 courses, with emphasis on the impact to the students in terms of the overall learning environment and increased understanding of mathematics.

Billie May is a Lecturer who has 34 years of teaching experience at the college level. She has taught each of Math 1111, Math 1112, and Math 1113 numerous times. She is currently serving as the Course Coordinator for Math 1111.

Jelinda Spotorno is a Senior Lecturer who has 21 years of experience teaching at the college level, as well as four years teaching K-12. She has taught each of Math 1111, Math 1112, and Math 1113 many times, including sections of Math 1113 at the Peachtree City-Fayette County instructional site, which serves a high number of dual enrollment students.

Chaogui Zhang is an Associate Professor with over 13 years of experience teaching college-level mathematics courses. He is in his first year as Department Chair of the Department of Mathematics at Clayton State University, but comes to Clayton State from Marywood University, where he served as Department Chair for four years. While at Marywood, he received an internal grant that allowed him to introduce WeBWork and maintain the WeBWork server.

Kara Mullen is the Head of Electronic Resources and Services in the Clayton State University library. She has been at Clayton State for five years and specializes in Electronic Resources Management and Electronic Services.

May, Spotorno, Zhang, and Rafter will be assisting each other during the textbook review process and with the creation of supplemental materials and WeBWork homework assignments. May, Spotorno, Zhang, and Rafter will focus on the supplemental materials for Math 1111, Math 1112, and Math 1113, respectively. Zhang will focus on WeBWork implementation and statistical analysis. Mullen will oversee the production of LibGuides and manage the online D2L master courses. All resources will be shared with our colleagues, both at Clayton State University and throughout the USG. Upon request, we will export D2L master courses and WeBWork homework assignments to all faculty members who might be interested in using these resources.

***Quantitative & Qualitative Measures:** Qualtrics surveys will be conducted in spring 2016 (current textbook), in summer and fall 2016, and in spring 2017 (new textbook and supplemental materials) to measure access to, use of, and attitudes toward the learning materials using Likert scale questions. Drop, fail, and withdraw rates and overall course grades will also be compared. A standardized final examination will be given before and during the transformation to determine how the new course materials, implementation of the transformation, and structure of the courses are affecting student learning. In particular, appropriate central tendencies and variabilities will be calculated.

These statistics can then be used to estimate population parameters for the mathematics student population as a whole. In addition, student survey questions will address overall course satisfaction, with attention to determining students' willingness or reluctance to (1) complete homework in a timely manner, (2) read the textbook and supplemental materials, (3) attend class, and (4) participate in classroom discussions. Faculty members and adjuncts will be surveyed after the fall 2016 and spring 2017 terms. Although there are many factors that may be addressed in this survey, two important points are to determine (1) how the transformation has affected their teaching styles and (2) whether or not they have noticed an improvement in student-teacher interaction as a result of the transformation.

***Timeline:**

We provide this timeline as a brief version of the more robust Transformation Action Plan given in Section 1.3, with the intent of providing smaller milestones and deliverables.

Spring 2016: Attend kick-off meeting at beginning of February. Review OpenStax textbooks by end of February. Develop online learning environment in D2L by end of March. Develop supplemental learning materials and LibGuides by end of April. Conduct pre-transformation surveys during first week of May. Create WeBWork homework assignments by end of May.

Summer 2016: Develop and teach pilot courses during June and July. Conduct initial transformation surveys during last week of classes (mid-July).

Early August 2016: Train faculty members and adjuncts concerning transformation principles and best-practices during Faculty Planning Week. Prepare initial progress report.

Fall 2016: Enact full implementation of the transformed Math 1111, Math 1112, and Math 1113 courses August to December. Conduct transformation surveys in first week of December. Prepare intermediate progress report by end of December.

Spring 2017: Continue teaching transformed courses January to May. Prepare final project report by end of May.

***Budget:**

Billie May, contract overload: \$5,000

Aaron Rafter, contract overload: \$5,000

Jelinda Spotorno, contract overload: \$5,000

Chaogui Zhang, contract overload: \$5,000

Kara Mullen, contract overload: \$5,000

Training Workshop (\$100 x 21 faculty/adjuncts): \$2,100

Travel to Kick-off Meeting: \$800

TOTAL \$27,900

***Sustainability Plan:**

We view this transformation as a long-term commitment to student success and we anticipate that the results of the transformation will ultimately have a positive impact on students taking Math 111, Math 1112, or Math 1113. To ensure that the transformation has a lasting effect, the faculty members in the Department of Mathematics will form an assessment committee to determine how well each of these courses is improving student achievement and preparing them for future math courses. Supplemental materials, LibGuides, and the D2L master

courses will be updated as necessary to facilitate student achievement and understanding of learning objectives. We do not anticipate that any updates will require a significant amount of time to complete, so the transformed Math 1111, Math 1112, and Math 1113 course should be relatively easy to sustain once the implementation structure is in place.

Add Other Email Addresses for Notifications

Enter recipient(s) email address(es): BillieMay@clayton.edu,
JelindaSpotorno@clayton.edu,
ChaoguiZhang@clayton.edu,
KaraMullen@clayton.edu



College of Information and Mathematical Sciences

December 1, 2015

Dr. Christopher Raridan
Associate Professor of Mathematics
Department of Mathematics
College of Information and Mathematical Sciences
2000 Clayton State Boulevard
Morrow, Georgia 30260

Reference: Support for the Affordable Learning Georgia Textbook Transformation Grant Proposal

Dear Dr. Raridan:

I am pleased to support you and your team's proposal to transform College Algebra, Trigonometry, and Precalculus at Clayton State University. By offering an open-source textbook option from OpenStax and providing no-cost supplemental materials, including free access to the open source homework management system WeBWork, as part of the Affordable Learning Georgia Textbook Transformation Grant, this proposal, if funded, will provide to the students substantial savings while at the same time offering them high-quality learning materials. The burden of rising tuition costs, along with the ever-increasing costs of textbooks, is seen by reformers of education as a prohibitive expense for many students who would attend college. You and your team's proposal to eliminate the cost of learning materials for College Algebra (Math 1111), Trigonometry and Analytic Geometry (Math 1112), and Precalculus (Math 1113) would save the Clayton State students who take these courses over \$150,000 per year, which is significant by any standards.

The department-wide plan that is outlined in the proposal is both feasible and sustainable. The surveys for students that you intend to use should provide sufficient data to determine what, if any, improvements would be necessary to allow the students to grow intellectually and to achieve their academic goals. Similarly, the faculty surveys will allow your team to understand how the learning materials can be updated as needed to meet our university's strategic plan to "create an outstanding educational experience that stimulates intellectual curiosity, critical thinking, and innovation."

The students and the Department of Mathematics will surely benefit as a result of this proposal being funded. The partnership created by working with both students and faculty to create a robust learning environment represents a vital collaboration that will serve our students in the best way possible. Your development of a modern instructional model, as well as your ability to incorporate proven and innovative teaching and learning strategies, will influence both educators and students and prepare them to meet the challenges of a 21st century, global society. In summation, I am completely confident that you and your team are capable of implementing and effectively managing the transformation of College Algebra, Trigonometry, and Precalculus described in this proposal. I enthusiastically support your efforts and look forward to the great benefit for our students that will be gained through this project.

Sincerely,

A handwritten signature in blue ink that reads "Lila F. Roberts". The signature is written in a cursive style with a long horizontal flourish extending to the right.

Dr. Lila F. Roberts

Dean of the College of Information and Mathematical Sciences