Application Details

Manage Application: Textbook Transformation Grants Round Seven

Award Cycle:	Round 7
Internal Submission Deadline:	Sunday, September 4, 2016

Application Title:	264
Application ID:	#001163
Submitter First Name:	Hashim
Submitter Last Name:	Saber
Submitter Title:	Professor
Submitter Email Address:	Hashim.saber@ung.edu
Submitter Phone Number:	678-717-3588
Submitter Campus Role:	Proposal Investigator (Primary or additional)
Applicant First Name:	Hashim
Applicant Last Name:	Saber
Applicant Email Address:	hashim.saber@ung.edu
Applicant Phone Number:	678-717-3588
Primary Appointment Title:	Professor
Institution Name(s):	University of North Georgia
Proposal Category:	No-or-Low-Cost-to-Students Learning Materials
Submission Date:	Tuesday, September 6, 2016

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

Dr. Hashim Saber, Professor of Mathematics; Hashim.Saber@ung.edu

Dr. Piotr Hebda, Professor of Mathematics; Piotr.Hebda@ung.edu

Dr. Beata Hebda, Professor of Mathematics; Beata.Hebda@ung.edu

Dr. Benkam Bobga, Associate Professor of Mathematics; Benkam.Bobga@ung.edu

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

Dr. John Cruthirds, Department Chair of Mathematics, University of North Georgia;

john.cruthirds@ung.edu

Final Semester of Instruction: Fall 2017

Proposal Title: 264

Course Names, Course Numbers and Semesters Offered:

1.	*Calculus I; Math 1450, offered every Fall, Spring and Summer semesters*
2.	*Calculus III; Math 2470, offered every Fall, Spring, and Summer semesters.*
3.	*Linear Algebra; Math 3650, offered every Fall, Spring and Summer semesters.*
4.	*Differential Equations; Math 3000, Offered every Fall and Spring semesters.*

Average Number of Students per Course Section: 30

Number of Course Sections Affected by Implementation in Academic Year: 20

Total Number of Students Affected by Implementation in Academic Year: 600

List the original course materials for students (including title, whether optional or required, & cost for each item):

Requested Amount of Funding: $21,400

Original per Student Cost: Calculus I($305.00); Clculus III($305.00)Linear Algebra($207.00);Differential Equations($235.00)

Post-Proposal Projected Student Cost: $0. (100% savings)

Projected Per Student Savings:	Calculus I($305.00); Clculus III($305.00)Linear Algebra($207.00);Differential Equations($235.00)
Projected Total Annual Student Savings:	Total $167,880

Creation and Hosting Platforms (Use "n/a" if none):

WeBWork*: Online Homework Management System – Hosted by UNG server,*

Shared Class Files: *local platform made available to our faculty to store class materials,*

Desire to Learn (D2L).

Project Goals:

1.1Project Goals

There are four goals that the project intends to achieve

To Replace high-cost required textbooks by high-quality and affordable instructional materials through Open Education Resources (OER) at zero cost to students for four courses. As a result of using available zero cost resources, students will have access to their textbooks starting the first day of class, regardless of their financial situation. Some students in general 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. By using available textbooks from day one of classes, we eliminate such issues.

To incorporate a free computerized homework delivery, quiz delivery, and grading system (WeBWork) into each course. WeBWorK is a free online homework management system created by the Mathematical Association of America to manage homework assignments, quizzes, and to create problem sheets. Commercial software is usually costly and most students do not take the advantage of using the software because they cannot afford buying it. WeBWork is already hosted on the UNG server. With WeBWork complementing a free textbook, we will be matching the commercial textbook approach by having an online textbook and an online homework delivery system at no cost.

Utilize the freedom to edit, share, and make the necessary changes to open educational resources to construct and tailor class notes. This will be done utilizing an instructional framework that is more classroom-devoted, engaging students in the learning process, and

teaching students how to learn. Two of the proposed textbooks (Calculus I and Calculus III) will be chosen from OpenStax College textbooks and the other two (Differential Equations and Linear Algebra) from other OER.

Build awareness among faculty at UNG about open educational resources (OERs) and the available Open resources. This will include introducing faculty at our four campuses to the opportunities and resources offered at Affordable Learning Georgia (ALG). To achieve this goal we will organize a presentation accessible to all campuses.

This project will make all instructional materials (online textbook and online homework system) available to all students in the four proposed courses from day one of the semester at no cost. The project may serve to increase retention and progression in the course especially for low-income students and students who rely on financial-aid arrangements.

Statement of Transformation:

1.1Statement of Transformation

For the four courses, Calculus I, Calculus III, Linear Algebra, and Differential Equations, free online texts will be adopted and will be linked to D2L and Shared Class Files to make them accessible to students on-campus and out of campus. We will be using OpenStax textbooks for Calculus I and Calculus II. The Linear algebra and Differential equations textbooks will be chosen from other from other OER.

Students will access all open resources on the D2L and Shared Class Files at no cost to them. To improve teaching and learning, WeBWork, which is also free, will be used for homework and quizzes. All materials will be available to students at no cost. Students will be given the option to purchase a hard copy (which is about $35 for OpenStax textbooks). Research results indicated that 82% of students felt they would do SIGNIFICANTLY BETTER in a course if the textbook was available free online and buying a hard copy was optional. (Senack, Ethan 2014)

The primary stakeholders are students. Utilizing the Affordable Learning Georgia Textbook Transformation Grant, students will have opportunities to learn using materials with the same educational recourses and similar instructional methods to commercial resources at no cost.

The faculty members at UNG who teach these courses are also stakeholders, because the materials developed in this project will be available to them. Mathematics faculty will have the opportunity to use innovative open resources with the same quality as commercial texts and materials. In addition, each faculty member will be able to use the same problem sets for their quizzes and homework on WeBWorK because WeBWorK changes the numerical values using

the same question forms. Thus, this project will encourage faculty to align their instruction with sound pedagogical methods and innovative open educational recourses for the four proposed courses. Significant features of this project are: the high quality of teaching materials using OpenStax and other resources, reduction in financial concerns for students, and easy access to our class websites on Shared Class Files. Also, in agreement with the goals of this project, we will organize a presentation to UNG faculty to introduce them to open resources.

This project will have an immediate impact on approximately 600 students, reducing their total cost of learning materials by approximately *$167,880* during the implementation year. The annual savings will be even higher when more faculty join the program in the future.

Transformation Action Plan:

1.1Transformation Action Plan

There are four components of the action plan for this project:

Review and development

Each team member will review all course materials and examine available free educational open resources in order to find the most appropriate open texts. We will modify existing syllabi to incorporate free open resources and computerized homework delivery system using WeBWorK.

Creation of open education rescores

Delivery process of the course material will be based on the selected open textbooks. We will also create homework assignments and quizzes for each section of each course on WeBWorK and make these assignments available to faculty who teach these courses.

Integration

We will search for appropriate videos and interactive multimedia content. We will supply students with the necessary links needed to access these short videos or interactive multimedia contents.

Implementation

The proposed project will be implemented in Calculus I, Calculus III, Linear Algebra, and Differential Equations. The proposed classes and sections covered by this project during the year of implementation is summarized in the table.

	Spring 2017	*Summer 2017*	*Fall 2017*

Dr. P. Hebda	*Calc 1;DE*		*Calc 1;DE*
Dr. H. Saber	*Calc 1; LA*	*Calc I; LA*	*Calc 1; LA;DE*
Dr. B. Bobga	*Calc I; Calc III*	*Calc III*	*Calc I; Calc III*
Dr. B. Hebda	*Calc I; Calc III*		*Calc I; Calc III*

The open texts, online lecture notes with linked video and interactive multimedia, and WeBWorK for each course will be uploaded into the D2L or Shared Class Files.

Quantitative & Qualitative Measures:

1.1QUantitative and Qualitative MeasuresQuantitative MeasureThe data for the quantitative measure will be collected according to the following table:Data for the table above will be collected from Spring 2017 and Fall 2017 for all the above mentioned courses which will be analytically compared with a similar set of data from control courses (collected from old records and Banner Web) previously taught in a traditional fashion using commercial textbooks and/or an online publishers' website. The linear correlation will be examined to study the interplay between "no cost" courses and "students' success/retention". We anticipate the adoption of free material will increase retention. Existing research shows an increase in student retention and an improvement in student performance associated with the adoption of free instructional materials (Bryan and Miller, 2013).Qualitative MeasureThe data for qualitative measure will be collected through students' feedback surveys. Students will be asked to participate in anonymous surveys about the overall effectiveness of the "no cost" courses at least twice during the semester. We plan to conduct an initial survey early in the term with a final survey near the end of the semester. The two surveys will be conducted to determine students' progress in the following areas: how often students use online resources; how regularly students are attending classes; to what degree the major assignments are being completed; the degree of efficiency in completing major assignments; and the level of student participation in class work and/or discussions. We also ask students if they encountered any difficulties using the materials accessible through the internet or their mobile devices so that the courses will be easier to access from anywhere using a wide variety of devices such as tablets and smartphones.Moreover, the principal investigators will conduct a self-assessment of the experience of adopting the Affordable Learning Georgia initiatives.At the conclusion of the semester, a general report will be

created to address the effect of applying open resources on the following learning outcomes:Students will be able to identify and relate to the course specific topic mastery requirements.Students will be able to relate each of the course topics with at least one real life application problem and master it.Students will be able to develop skills for reading Mathematics course materials and retain the information with ease.Students will exhibit the characteristic of self-directed learners.

Timeline:

1.1Timeline

10/17/2016	Kick-off meeting to construct learning materials for the four courses (Calculus I, Calculus III, Linear Algebra, and Differential Equations).
10/30/2016	Finalize reviewing and evaluating no-cost e-textbooks. Map the learning objectives (stated in UNG syllabi) of each of the four courses to the sections of the texts selected from the e-textbook. Modify each course syllabus to reflect the changes.
11/30/2016	Complete creation of the necessary class notes and materials needed for each of the four courses based on the selected no-cost e-textbook.
12/15/2016	Complete creation of assignments in WeBWork for each of the four courses. [WeBWork is already installed in UNG-Gainesville server]
12/20/2016	Submit a semester status report to ALG
12/20/2016	Finalize the learning materials and upload all needed electronic materials to Shared Class Files and UNG WeBWork site to make sure that all four courses are ready for delivery in the Spring 2017 semester.

January 09, 2017-May 6, 2017	1/16/2017 Pre-survey completed for the four courses
	Implementation: Piloting of course materials for 8 sections of the four courses during Spring 2017 semester.
	5/6/2017 Complete data collection and complete Post-survey (for the four courses)
May 2017	Review and modify the piloted materials
May 20, 2017	Submit a semester status report to ALG
Summer 2017	Implement possibly 3 sections for three of the four courses
August 12, 2017	Submit a semester status report to ALG
Fall 2017	Implement the process for 9 sections of the four courses;
	Give a presentation to introduce faculty to open resources and conduct discussions to see if implementation on a larger scale is an appropriate departmental endeavor.
December 2017	Work on data analysis and evaluating course effectiveness
	Prepare final project report
December 23, 2017	Submit final project report

Budget:

1.1Budget

Dr. Hashim Saber	Faculty additional time spent for preparing instructional materials	$5,000
Dr. Piotr Hebda		$5,000
Dr. Beata Hebda		$5,000
Dr. Benkam Bobga		$5,000
Travel	Kick-off meeting or Conference	$800
Supplementary material	Paper, ink cartridges, hardcopies of the textbook, and copying cost. etc	$600

Sustainability Plan:

1.1Sustainability Plan

We anticipate good results and a positive impact on student success as a result of piloting the four courses during the first academic year (8 sections in Spring 2017, possibly 3 sections in Summer 2017, and 9 sections in Fall 2017). Materials (OpenStax and No-Cost Resources Textbook, class notes, and WeBWrok assignments) for the four redesigned courses will be available to math instructors who are interested in OER for future terms. The project team members will keep the original copy of the learning materials and will maintain and update materials as needed.

References & attachments

Goodwin Bryan, and Kirsten Miller. “Evidence On Flipped Classrooms Is Still Coming In.” Educational Leadership 70.6 (2013): 78–80. OmniFile Full Text Mega (H.W. Wilson).

Lane Fischer, John Hilton III, T. Jared Robinson, David A. Wiley “*A multi-institutional study of the impact of open textbook adoption on the learning outcomes of post-secondary students”;* Journal of Computing in Higher Education; December 2015, Volume 27, Issue 3, pp 159–172

Ruthven, K., & Hennessy, S. (2002). “*A practitioner model of the use of computer-based tools and resources to support mathematics teaching andLearning”.* Educational studies in mathematics, *49*(1), 47-88.

Senack, Ethan. “*Fixing the Broken Textbook Market: How Students Respond to High Textbook Costs and Demand Alternatives*.” (2014). US Public Interest Research Group. retrieved from http://www.uspirg.org/sites/pirg/files/reports/NATIONAL%20Fixing%20Broken%20Textbooks%20Report1.pdf

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DEPARTMENT OF MATHEMATICS

August 30, 2016

Affordable Learning Textbook Transformation Grant
Review Committee

Dear Committee Members:

I am writing this letter in support of the proposal being submitted to you by Professors Piotr Hebda, Beata Hebda, Benkam Bobga, and Hashim Saber from my department. I am in full support of this proposal because I believe the proposal has strong merit and because these four faculty members are talented faculty members who are well qualified to accomplish the goals of the proposal.

Piotr Hebda, Beata Hebda, Benkam Bobga, and Hashim Saber all have significant experience teaching the courses that are targeted in the proposal. I am excited at the potential financial savings our students could realize, and I intend to lend full departmental support for the work of this proposal. Since we teach multiple sections of these courses every semester, including summer, the potential sustainability of the project will not be a concern. The expansion of the project to other sections of these classes on our other four campuses can be accomplished by working through our existing departmental Curriculum Committee which has representation from faculty on all University of North Georgia campuses.

I am in full support of this proposal, and I hope that you will be able to give the proposal every possible consideration. I would be happy to comment further if you so like.

Sincerely,

John Cruthirds

John Cruthirds, Head
Department of Mathematics
john.cruthirds@ung.edu
706 864-1810

Affordable Learning Georgia Textbook Transformation Grants
Rounds Six, Seven, and Eight
For Implementations beginning Spring Semester 2017
Running Through Fall Semester 2017

Submitter Name	Hashim Saber
Submitter Title	Professor
Submitter Email	Hashim.saber@ung.edu
Submitter Phone Number	678-717-3588
Submitter Campus Role	*Proposal Investigator*
Applicant Name	*Hashim Saber*
Applicant Email	Hashim.saber@ung.edu
Applicant Phone Number	678-717-3588
Primary Appointment Title	Professor
Institution Name(s)	University of North Georgia – Gainesville Campus
Team Members	1. *Dr. Hashim Saber, Professor of Mathematics; Hashim.Saber@ung.edu* 2. *Dr. Piotr Hebda, Professor of Mathematics; Piotr.Hebda@ung.edu* 3. *Dr. Beata Hebda, Professor of Mathematics; Beata.Hebda@ung.edu* 4. *Dr. Benkam Bobga, Associate Professor of Mathematics; Benkam.Bobga@ung.edu*
Sponsor, Title, Department, Institution	*Dr. John Cruthirds, Department Chair of Mathematics, University of North Georgia; john.cruthirds@ung.edu*

<table>
<tr><td>Proposal Title</td><td colspan="5">Zero-cost textbooks and online homework management system for four mathematics courses

(Calculus I, Calculus III, Differential Equations and Linear Algebra)</td></tr>
<tr><td>Course Names, Course Numbers and Semesters Offered</td><td colspan="5"><table>
<tr><td>1.</td><td>Calculus I; Math 1450, offered every Fall, Spring and Summer semesters</td></tr>
<tr><td>2.</td><td>Calculus III; Math 2470, offered every Fall, Spring, and Summer semesters.</td></tr>
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<tr><td>4.</td><td>Differential Equations; Math 3000, Offered every Fall and Spring semesters.</td></tr>
</table></td></tr>
<tr><td>Final Semester of Instruction</td><td colspan="5">Fall 2017</td></tr>
<tr><td>Average Number of Students Per Course Section</td><td>30</td><td>Number of Course Sections Affected by Implementation in Academic Year</td><td>20</td><td>Total Number of Students Affected by Implementation in Academic Year</td><td>600</td></tr>
<tr><td>Award Category (pick one)</td><td colspan="5">☒ No-or-Low-Cost-to-Students Learning Materials (No – Cost for Differential Equations and Linear Algebra)
☒ OpenStax Textbooks (for Calculus I and III)
☐ Interactive Course-Authoring Tools and Software
☐ Specific Top 100 Undergraduate Courses</td></tr>
<tr><td>List the original course materials for students (including title, whether optional or required, & cost for each item)</td><td colspan="5"><table>
<tr><td>Calculus I</td><td>Calculus. Early Transcendental Functions 6th edition by Larson & Edwards (Publisher: Brooks/Cole)</td><td>$305</td></tr>
<tr><td>Calculus III</td><td>Same as Calculus I</td><td>$ 305</td></tr>
<tr><td>Linear Algebra (LA)</td><td>Linear Algebra and its Applications (5th edition)</td><td>$207</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td></td><td>David Lay, Steven Lay, Judi McDonald</td><td></td></tr>
<tr><td>Differential Equations (DE)</td><td>Zill, A First Course in Differential Equations with Modeling Applications, 10th Ed., Brooks/Cole, 2012.</td><td>$235.00</td></tr>
</table>
</td></tr>
<tr><td>Requested Amount of Funding</td><td>$21,400</td></tr>
<tr><td>Original Per Student Cost</td><td>
<table>
<tr><td>1</td><td>Calculus I</td><td>$305.00</td><td>Total 9 sections per year</td></tr>
<tr><td>2</td><td>Calculus III</td><td>$305.00</td><td>Total 5 sections per year</td></tr>
<tr><td>3</td><td>Linear Algebra</td><td>$207.00</td><td>Total 3 section per year</td></tr>
<tr><td>4</td><td>Differential Equations</td><td>$235.00</td><td>Total 3 section per year</td></tr>
</table>
</td></tr>
<tr><td>Post-Proposal Projected Per Student Cost</td><td>$0. (100% savings)</td></tr>
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<tr><td>4</td><td>Differential Equations</td><td>$ 235.00</td></tr>
</table>
</td></tr>
<tr><td>Projected Total Annual Student Savings</td><td>Calculus I: 9*30*$305= $82, 350
Calc III: 5*30*$305=$45,750
Linear Algebra: 3*30*207 = $18,630
Differential Equations: 3*30*$235 =$21,150
Total $167,880</td></tr>
<tr><td>Creation and Hosting Platforms Used</td><td>WeBWork: Online Homework Management System – Hosted by UNG server,

Shared Class Files: local platform made available to our faculty to store class materials,</td></tr>
</table>

	Desire to Learn (D2L).

NARRATIVE

1.1 PROJECT GOALS

There are four goals that the project intends to achieve

1. To Replace high-cost required textbooks by high-quality and affordable instructional materials through Open Education Resources (OER) at zero cost to students for four courses. As a result of using available zero cost resources, students will have access to their textbooks starting the first day of class, regardless of their financial situation. Some students in general 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. By using available textbooks from day one of classes, we eliminate such issues.

2. To incorporate a free computerized homework delivery, quiz delivery, and grading system (WeBWork) into each course. WeBWorK is a free online homework management system created by the Mathematical Association of America to manage homework assignments, quizzes, and to create problem sheets. Commercial software is usually costly and most students do not take the advantage of using the software because they cannot afford buying it. WeBWork is already hosted on the UNG server. With WeBWork complementing a free textbook, we will be matching the commercial textbook approach by having an online textbook and an online homework delivery system at no cost.

3. Utilize the freedom to edit, share, and make the necessary changes to open educational resources to construct and tailor class notes. This will be done utilizing an instructional framework that is more classroom-devoted, engaging students in the learning process, and teaching students how to learn. Two of the proposed textbooks (Calculus I and Calculus III) will be chosen from OpenStax College textbooks and the other two (Differential Equations and Linear Algebra) from other OER.

4. Build awareness among faculty at UNG about open educational resources (OERs) and the available Open resources. This will include introducing faculty at our four campuses to the opportunities and resources offered at Affordable Learning Georgia (ALG). To achieve this goal we will organize a presentation accessible to all campuses.

   This project will make all instructional materials (online textbook and online homework system) available to all students in the four proposed courses from day one of the semester at

no cost. The project may serve to increase retention and progression in the course especially for low-income students and students who rely on financial-aid arrangements.

1.2 STATEMENT OF TRANSFORMATION

For the four courses, Calculus I, Calculus III, Linear Algebra, and Differential Equations, free online texts will be adopted and will be linked to D2L and Shared Class Files to make them accessible to students on-campus and out of campus. We will be using OpenStax textbooks for Calculus I and Calculus II. The Linear algebra and Differential equations textbooks will be chosen from other from other OER.

Students will access all open resources on the D2L and Shared Class Files at no cost to them. To improve teaching and learning, WeBWork, which is also free, will be used for homework and quizzes. All materials will be available to students at no cost. Students will be given the option to purchase a hard copy (which is about $35 for OpenStax textbooks). Research results indicated that 82% of students felt they would do SIGNIFICANTLY BETTER in a course if the textbook was available free online and buying a hard copy was optional. (Senack, Ethan 2014)

The primary stakeholders are students. Utilizing the Affordable Learning Georgia Textbook Transformation Grant, students will have opportunities to learn using materials with the same educational recourses and similar instructional methods to commercial resources at no cost.

The faculty members at UNG who teach these courses are also stakeholders, because the materials developed in this project will be available to them. Mathematics faculty will have the opportunity to use innovative open resources with the same quality as commercial texts and materials. In addition, each faculty member will be able to use the same problem sets for their quizzes and homework on WeBWorK because WeBWorK changes the numerical values using the same question forms. Thus, this project will encourage faculty to align their instruction with sound pedagogical methods and innovative open educational recourses for the four proposed courses. Significant features of this project are: the high quality of teaching materials using OpenStax and other resources, reduction in financial concerns for students, and easy access to our class websites on Shared Class Files. Also, in agreement with the goals of this project, we will organize a presentation to UNG faculty to introduce them to open resources.

This project will have an immediate impact on approximately 600 students, reducing their total cost of learning materials by approximately *$167,880* during the implementation year. The annual savings will be even higher when more faculty join the program in the future.

1.3 TRANSFORMATION ACTION PLAN

There are four components of the action plan for this project:

1. Review and development

Each team member will review all course materials and examine available free educational open resources in order to find the most appropriate open texts. We will modify existing syllabi to incorporate free open resources and computerized homework delivery system using WeBWorK.

2. *Creation of open education rescores*

Delivery process of the course material will be based on the selected open textbooks. We will also create homework assignments and quizzes for each section of each course on WeBWorK and make these assignments available to faculty who teach these courses.

3. Integration

We will search for appropriate videos and interactive multimedia content. We will supply students with the necessary links needed to access these short videos or interactive multimedia contents.

4. Implementation

The proposed project will be implemented in Calculus I, Calculus III, Linear Algebra, and Differential Equations. The proposed classes and sections covered by this project during the year of implementation is summarized in the table.

	Spring 2017	*Summer 2017*	*Fall 2017*
Dr. P. Hebda	*Calc 1;DE*		*Calc 1;DE*
Dr. H. Saber	*Calc 1; LA*	*Calc I; LA*	*Calc 1; LA;DE*
Dr. B. Bobga	*Calc I; Calc III*	*Calc III*	*Calc I; Calc III*
Dr. B. Hebda	*Calc I; Calc III*		*Calc I; Calc III*

The open texts, online lecture notes with linked video and interactive multimedia, and WeBWorK for each course will be uploaded into the D2L or Shared Class Files.

1.4 QUANTITATIVE AND QUALITATIVE MEASURES

Quantitative Measure

The data for the quantitative measure will be collected according to the following table:

Course	Total no. of stud. Registered	Preliminary assessment [First formative assessment] (median)	Withdraw %	Cumulative Final exam [Summative assessment] (median)	Pass %	Fail % Individual Scores are less than 60%
Calculus I (Math 1450)						
Calculus III (Math 2470)						

Linear Algebra (Math 3650)						
Differential Equations (Math 3000)						

Data for the table above will be collected from Spring 2017 and Fall 2017 for all the above mentioned courses which will be analytically compared with a similar set of data from control courses (collected from old records and Banner Web) previously taught in a traditional fashion using commercial textbooks and/or an online publishers' website. The linear correlation will be examined to study the interplay between "no cost" courses and "students' success/retention". We anticipate the adoption of free material will increase retention. Existing research shows an increase in student retention and an improvement in student performance associated with the adoption of free instructional materials (Bryan and Miller, 2013).

Qualitative Measure

The data for qualitative measure will be collected through students' feedback surveys. Students will be asked to participate in anonymous surveys about the overall effectiveness of the "no cost" courses at least twice during the semester. We plan to conduct an initial survey early in the term with a final survey near the end of the semester. The two surveys will be conducted to determine students' progress in the following areas: how often students use online resources; how regularly students are attending classes; to what degree the major assignments are being completed; the degree of efficiency in completing major assignments; and the level of student participation in class work and/or discussions. We also ask students if they encountered any difficulties using the materials accessible through the internet or their mobile devices so that the courses will be easier to access from anywhere using a wide variety of devices such as tablets and smartphones.

Moreover, the principal investigators will conduct a self-assessment of the experience of adopting the **Affordable Learning Georgia** initiatives.

At the conclusion of the semester, a general report will be created to address the effect of applying open resources on the following learning outcomes:

1. Students will be able to identify and relate to the course specific topic mastery requirements.
2. Students will be able to relate each of the course topics with at least one real life application problem and master it.
3. Students will be able to develop skills for reading Mathematics course materials and retain the information with ease.
4. Students will exhibit the characteristic of self-directed learners.

1.5 TIMELINE

10/17/2016	Kick-off meeting to construct learning materials for the four courses (Calculus I, Calculus III, Linear Algebra, and Differential Equations).
10/30/2016	Finalize reviewing and evaluating no-cost e-textbooks. Map the learning objectives (stated in UNG syllabi) of each of the four courses to the sections of the texts selected from the e-textbook. Modify each course syllabus to reflect the changes.
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12/15/2016	Complete creation of assignments in WeBWork for each of the four courses. [WeBWork is already installed in UNG-Gainesville server]
12/20/2016	Submit a semester status report to ALG
12/20/2016	Finalize the learning materials and upload all needed electronic materials to Shared Class Files and UNG WeBWork site to make sure that all four courses are ready for delivery in the Spring 2017 semester.
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December 2017	Work on data analysis and evaluating course effectiveness Prepare final project report
December 23, 2017	Submit final project report

1.6 BUDGET

Dr. Hashim Saber	Faculty additional time spent for preparing instructional materials	$5,000
Dr. Piotr Hebda		$5,000
Dr. Beata Hebda		$5,000
Dr. Benkam Bobga		$5,000
Travel	Kick-off meeting or Conference	$800
Supplementary material	Paper, ink cartridges, hardcopies of the textbook, and copying cost. etc	$600

1.7 SUSTAINABILITY PLAN

We anticipate good results and a positive impact on student success as a result of piloting the four courses during the first academic year (8 sections in Spring 2017, possibly 3 sections in Summer 2017, and 9 sections in Fall 2017). Materials (OpenStax and No-Cost Resources Textbook, class notes, and WeBWrok assignments) for the four redesigned courses will be available to math instructors who are interested in OER for future terms. The project team members will keep the original copy of the learning materials and will maintain and update materials as needed.

References & attachments

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