

Spring 2018

Principles of Chemistry I & II (CCGA)

Colleen Knight

College of Coastal Georgia, cknight@ccga.edu

Leon Gardner

College of Coastal Georgia, lgardner@ccga.edu

Joseph Lodmell

College of Coastal Georgia, jlodmell@ccga.edu

Ernest Pascoe

College of Coastal Georgia, espascoe@ccga.edu

Andrea Wallace

College of Coastal Georgia, awallace@ccga.edu

See next page for additional authors

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Authors

Colleen Knight, Leon Gardner, Joseph Lodmell, Ernest Pascoe, Andrea Wallace, and Lisa McNeal

Grants Collection

College of Coastal Georgia



UNIVERSITY SYSTEM
OF GEORGIA

Colleen Knight, Leon Gardner, Joseph Lodmell, Ernest Pascoe,
Andrea Wallace, and Lisa McNeal

Principles of Chemistry I & II





Grants Collection

Affordable Learning Georgia Grants Collections are intended to provide faculty with the frameworks to quickly implement or revise the same materials as a Textbook Transformation Grants team, along with the aims and lessons learned from project teams during the implementation process.

Each collection contains the following materials:

- **Linked Syllabus**
 - The syllabus should provide the framework for both direct implementation of the grant team's selected and created materials and the adaptation/transformation of these materials.
- **Initial Proposal**
 - The initial proposal describes the grant project's aims in detail.
- **Final Report**
 - The final report describes the outcomes of the project and any lessons learned.



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Initial Proposal

Application Details

Manage Application: Textbook Transformation Grants Round Seven

Award Cycle: Round 7

Internal Submission Deadline: Sunday, September 4, 2016

Application Title: 259

Application ID: #001169

Submitter First Name: Andrea

Submitter Last Name: Wallace

Submitter Title: Assistant Vice President for Academic Affairs
/ Professor of Chemistry

Submitter Email Address: awallace@ccga.edu

Submitter Phone Number: 912-279-5931

Submitter Campus Role: Provost / Academic Affairs Office

Applicant First Name: Colleen

Applicant Last Name: Knight

Applicant Email Address: cknight@ccga.edu

Applicant Phone Number: 912-279-5937

Primary Appointment Title: Assistant Professor of Chemistry / Chair,
Department of Natural Sciences

Institution Name(s): College of Coastal 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):

Colleen Knight, Assistant Professor of Chemistry, cknight@ccga.edu

Leon Gardner, Associate Professor of Chemistry, lgardner@ccga.edu

Joseph Lodmell, Lecturer of Chemistry, jlodmell@ccga.edu

Ernest Pascoe, Part-time Instructor of Chemistry, espascoe@ccga.edu

Andrea Wallace, Professor of Chemistry, awallace@ccga.edu

Lisa McNeal, Director of e-Learning, lmcneal@ccga.edu

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

Dr. Tracy Pellett, Vice President for Academic Affairs, College of Coastal Georgia

Final Semester of Instruction: Fall 2017

Proposal Title: 259

Course Names, Course Numbers and Semesters Offered:

CHEM 1211, Principles of Chemistry I, Fall/Spring/Summer

CHEM 1212, Principles of Chemistry II, Fall/Spring/Summer

CHEM 2211, Organic Chemistry I, Fall/Spring

CHEM 2212, Organic Chemistry II, Fall/Spring

Average Number of Students per Course Section: 24

Number of Course Sections Affected by Implementation in Academic Year: 24

Total Number of Students Affected by Implementation in Academic Year: 576

List the original course materials for students (including title, whether optional or required, & cost for each item): CHEM 1211/1212 Principles of Chemistry I and II – Chemistry: An Atoms-Focused Approach by Natalie Foster, Thomas Gilbert, and Rein Kirss with Ebook and SmartWork Registration card - \$156.25 – Required
CHEM 2211/2212 Organic Chemistry I and II – Organic Chemistry, 9th ed. by John McMurry with OWL v2 24 month printed access card - \$386.95 - Required

Requested Amount of Funding: \$29,900

Original per Student Cost: CHEM 1211/1212 - \$156.25, CHEM 2211/2212 - \$386.95

Post-Proposal Projected Student Cost: CHEM 1211/1212 - \$60 (includes online homework access) per student over a two semester period, CHEM 2211/2212 - \$65 (includes online homework access) per student over a two semester period

Projected Per Student Savings: CHEM 1211/1212 - \$96.25 per student, CHEM 2211/2212 - \$321.95 per students

Projected Total Annual Student Savings: CHEM 1211/1212 - $\$96.25 \times 432 = \$41,580$, CHEM 2211/2212 - $\$321.95 \times 144 = \$46,360.80$, Total = $\$87,940.80$ per academic year

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

Top Hat software and ebook, and D2L

Project Goals:

The main goals of this project are to provide an accessible, low-cost option for our students while providing a quality product that will enhance student success in the Principles of Chemistry and Organic Chemistry sequences for our Science majors. Please note that the use of Top Hat is a low-cost option as opposed to a no-cost option. However, Top Hat provides a number of advantages. 1) Top Hat provides an e-text that is available through a variety of platforms including an app on an ipad/iphone/Android. Instructors have complete freedom to add or remove text. The changes become available to the students immediately through the app. 2) Questions are embedded in the reading. Instructors may add additional questions as desired. To encourage preparation for class, students may be assigned these questions within the text and may be graded based on participation and/or correctness at the instructor's discretion. 3) PowerPoints in which questions can be embedded and answered by students in real time with analysis collected by the instructor are incorporated into the presentation software. 4) Instructors may annotate the PowerPoint presentation during class using an ipad/Android device. These are preserved for later student review. Students' annotations of the presentation on their device are also preserved for later review. 5) Online homework is included in the cost (\$60 for CHEM 1211/1212, used for two semesters, and available for life / \$65 for CHEM 2211/2212, used for two semesters, and available for life). If the OpenStax text were utilized for the Principles of Chemistry courses, WebAssign online homework would still need to be purchased by the students at a cost of \$33.95 per semester or \$51.90 for a multi-term subscription per textbook. 6) There is no OpenStax option for Organic Chemistry. Utilizing Top Hat throughout the four semester progression of chemistry classes will provide continuity and enhance learning since students will not have to learn a new system each time they begin a new chemistry course. 7) Top Hat texts remain available to the students for life and they may access the version of the textbook they used or the most current textbook. The text can be printed if the students prefer this option.

In conclusion, students will be provided not only a low-cost option for CHEM

1211/1212/2211/2212, but they will also have a much improved, customized product that can be easily accessed through any mobile device.

Statement of Transformation:

At the College of Coastal Georgia, the Bachelors of Science in Biology is one of the most popular programs experiencing much growth over the years and currently having well over 300 majors enrolled in classes. All Biology majors are required to take the four semester sequence of Chemistry courses including CHEM 1211, 1212, 2211, and 2212. In addition, many of our Associate of Science majors, Bachelors of Science in Mathematics majors, etc. will take two or more of these chemistry courses. The texts that are currently in use for these courses are quite costly and what is found is that many of our students attempt to take the course without purchasing a textbook. Approximately 82% of CCGA students receive financial aid and simply cannot afford the high expense of Science textbooks thus limiting accessibility and lowering completion rates due to a lack of resources.

By the end of Spring 2018, Top Hat will be fully incorporated into the four semester sequence set of courses and have students experiencing a seamless transition from one course to the next since they will learn the system in CHEM 1211 and carry this knowledge through all four classes. They will be able to complete the sequence spending only \$125 for materials which previously would have cost approximately \$543 saving them over \$400 per student and allowing them to have experienced superior resources than those previously available. The transition to Top Hat will begin as a pilot project in each course beginning with CHEM 1211 in Fall 2016 and then complete implementation in all sections during the second semester the course is taught. During the second term teaching with Top Hat with a course, a full array of enhanced lecture/PowerPoint notes, a fully customized text, online exercises within the text, online homework, study guides, etc. as well as full integration of the grading system and other material into D2L will be accomplished.

Our ultimate goal is to provide students with excellent resources at low cost and promote student success. All team members which include a variety of professors/lecturer/part-time instructor/instructional design specialist are all at different stages in their careers and all provide a unique perspective to this project. All team members are fully engaged in this project and will work to provide a quality product that will lead to higher student success in Chemistry classes that are known for having high DFW rates.

Transformation Action Plan:

The entire team was involved in the identification, review, selection, and adoption of Top Hat. A representative from the company made a presentation to our group and we were all given access to materials to review on our own after the presentation. All members of the team fully support the concept of a low-cost text which provides more options from a teaching and learning standpoint.

Course syllabi for CHEM 1211, 1212, 2211, and 2212 will be aligned with the Top Hat customized texts that will be created by the team. A common set of learning objectives will be developed and utilized for each course. Course materials – lecture notes, customized texts, online exercises and homework, study guides, etc. will be placed on D2L and made available to all instructors. Our instructional designer will help us with connecting Top Hat to D2L.

Role of each team member:

Dr. Colleen Knight will serve as the coordinator for the entire project. Her responsibilities will include: 1) overseeing the entire project, 2) collecting and collating assessment data, 3) organizing regular meetings with the team to gather information, share materials, and analyze assessment results, and 4) submitting status and final reports.

Dr. Lisa McNeal will provide assistance with instructional design for the entire project. She will assist with online materials and seamless transition of information between the Top Hat app and D2L.

Each of the remaining Chemistry faculty will be assigned as a coordinator for a particular course. The coordinator will be responsible for formulating learning objectives for their assigned course based on input from all instructors, assembling all of the course materials and making them available to other full-time and part-time faculty that teach that particular course, and gathering assessment data for their assigned course and providing it to the primary principal investigator.

Dr. Leon Gardner will serve as the CHEM 1211 coordinator.

Capt. Joseph Lodmell will serve as the CHEM 1212 coordinator.

Dr. Ernest Pascoe will serve as the CHEM 2211 coordinator.

Dr. Andrea Wallace will serve as the CHEM 2212 coordinator.

All Chemistry faculty members who teach these courses will be expected to provide input including assessment data to the coordinators.

Top Hat access codes may be purchased through the CCGA bookstore or online. D2L access is available for all students registered in these courses.

Quantitative & Qualitative Measures: Both qualitative and quantitative measures will be employed to evaluate the effectiveness of Top Hat in CHEM 1211, 1212, 2211, and 2212. Surveys will include questions on student satisfaction with the quality, accessibility, and cost of materials. Students will also be asked to provide open-ended comments on their experience using Top Hat as their textbook, on-line homework, and presentation system in class. In addition, standard student evaluations of the course which are collected every semester will be reviewed and analyzed. The Chemistry unit currently utilizes American Chemical Society Standardized Exams in all of these courses. We will continue to give these exams and compare our scores before and after the introduction of Top Hat. In addition, we will assess DFW rates before and after the introduction of Top Hat. This set of data should provide an excellent quantitative analysis of the success of this project.

Timeline:

Fall 2016

Pilot Top Hat in four sections of CHEM 1211. Prepare class materials (syllabus, customized text, PowerPoint presentations / lecture notes, online exercises and homework, study guides, and exams).

Spring 2017

Fully implement Top Hat into all sections of CHEM 1211. Continually evaluate and improve all class materials.

Pilot Top Hat in at least two sections of CHEM 1212 and one section of 2211. Prepare class materials (syllabus, customized text, PowerPoint presentations / lecture notes, online exercises and homework, study guides, and exams).

Summer 2017

Fully implement Top Hat into all sections of CHEM 1211 and 1212. Continually evaluate and improve all class materials.

Fall 2017

Pilot Top Hat in one section of CHEM 2212. Prepare class materials (syllabus, customized

text, PowerPoint presentations / lecture notes, online exercises and homework, study guides, and exams)

Fully implement Top Hat into all sections of CHEM 1211, 1212, and 2211. Continually evaluate and improve all class materials.

Spring 2018

Full implementation of Top Hat into all sections of CHEM 1211, 1212, 2211, and 2212 is complete.

Status reports will be submitted at the end of Spring 2017 and Summer 2017. A final report will be submitted at the end of Fall 2017 after all courses have been taught using Top Hat at least once.

Budget:

Team members will receive salary supplements of \$4850 each for their contributions to this project. Dr. Knight and Dr. Wallace will receive an additional \$400 each to cover travel expenses to attend the mandatory kick-off meeting on October 17, 2016.

Team Member Salary Supplements

Dr. Colleen Knight - \$4850 (salary supplement) + \$400 (travel)

Dr. Andrea Wallace - \$4850 (salary supplement) + \$400 (travel)

Dr. Leon Gardner - \$4850 (salary supplement)

Capt. Joseph Lodmell – \$4850 (salary supplement)

Dr. Ernest Pascoe – \$4850 (salary supplement)

Dr. Lisa McNeal - \$4850 (salary supplement)

Total Request - \$29,900

This budget falls within the guidelines of the Large-Scale Transformation for multiple courses and department-wide adoptions with 500 or more students enrolled per academic year.

Sustainability Plan:

The plan is to develop and implement course materials associated with the Top Hat texts and platform for CHEM 1211, 1212, 2211, and 2212 within the time frame of Fall 2016 through Fall 2017. Full implementation with tested and refined course materials will be fully operational in

Spring 2018 for all four courses. Based on qualitative and quantitative evaluations that will be done each semester, improvements in course materials will be made as needed. The team will plan to meet at least once each semester to analyze, develop, and implement any new materials that are needed based on assessment data. The plan is to use Top Hat and associated materials indefinitely. After implementation is complete, there should be no additional costs only immense savings for students.

Future plans include utilizing Top Hat in our CHEM 1151/1152 Survey of Chemistry I and II sequence. The Top Hat ebook is in development and expected to be released soon. No cost / low-cost options are being reviewed for CHEM 1100 Introductory Chemistry. Three of our lab classes (CHEM 1100L Introductory Chemistry Lab, CHEM 1211L and CHEM 1212L Principles of Chemistry Lab I and II) already use no cost, department prepared lab handouts. We eventually hope to dispense with all purchased lab manuals for all lab classes and replace them with instructor prepared resources.

September 1, 2016

Mr. Jeff Gallant
ALG Program Officer for Open Educational Resources
Affordable Learning Georgia

Dear Mr. Gallant,

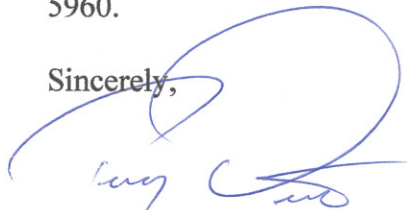
The College of Coastal Georgia (CCGA) fully supports the application for a Round Seven Textbook Transformation Grant for a Large-Scale Transformation from Affordable Learning Georgia that is being submitted by Dr. Colleen Knight, Chair of the Department of Natural Sciences, her Chemistry colleagues, and our Director of e-Learning.

The College of Coastal Georgia is firmly entrenched in the concept of providing accessible, low-cost, high quality course materials to its students as evidenced by a successful Round Two Textbook Transformation Grant for a Large-Scale Transformation from the Department of Mathematics and Round Six Textbook Transformation Grant for a Standard-Scale Transformation from the Department Social Sciences in the area of Psychology. Dr. Knight and her colleagues will continue to expand this project to provide low cost textbooks to students in the area of Chemistry. The redesign of four chemistry courses that are required courses in our BS in Biology major will provide each student over \$400 in savings. The potential annual savings for our students will be in excess of \$87,000. All Chemistry faculty are fully engaged and supportive of this project. The expertise and passion for helping students will be the model for others at CCGA and across Georgia to follow when the project is implemented.

Many students who attend CCGA have a difficult time obtaining all of the needed materials for their classes. This will certainly be another step in the right direction to make college affordable and accessible to all Georgians.

The Office of Academic Affairs is in complete support of Dr. Knight and her colleagues in their application and implementation of their Textbook Transformation Grant Proposal. If you have any questions regarding this support letter, please do not hesitate to contact me at (912) 279-5960.

Sincerely,



Dr. Tracy Pellett,
Vice President for Academic Affairs
Interim Vice President for Advancement
College of Coastal Georgia
tpellett@ccga.edu

September 1, 2016

Mr. Jeff Gallant

ALG Program Officer for Open Educational Resources
Affordable Learning Georgia

Dear Mr. Gallant,

This letter is to extend my full support to the large-scale textbook transformation grant proposal submitted by the Chemistry faculty at the College of Coastal Georgia. I am extremely excited about this project as I have been involved from the beginning with affordable learning Georgia and I have seen the difference this makes in our students and our faculty.

This grant application represents a giant leap into the total transformation that is occurring at the College of Coastal Georgia, the State of Georgia and the United States. Starting with the Department of Mathematics with the large-scale textbook transformation that has been fully and successfully implemented, continuing with the Psychology grant awarded and now, this is another large-scale textbook transformation taking place in the Chemistry Department.

This is without a doubt the result of the commitment and vision of the faculty in the Chemistry Department to PROVIDE affordable, high quality education to the students of Georgia, to PROMOTE the use of high quality, yet affordable educational resources, and to PROPEL our School, College and student to a brighter future in which affordability and quality go hand in hand.

Thank you for supporting our Chemistry Department by offering the opportunity to participate in this project. If you have any questions regarding this support letter, please do not hesitate to contact me at (912) 279-5946.

Sincerely,



Dr. Victor Vega
Interim Dean, School of Arts and Sciences
College of Coastal Georgia
vvega@ccga.edu

**Affordable Learning Georgia Textbook Transformation Grants
Rounds Six, Seven, and Eight
For Implementations beginning Fall Semester 2016
Running Through Fall Semester 2017**

Proposal Form and Narrative

Submitter Name	Andrea Wallace
Submitter Title	Assistant Vice President for Academic Affairs / Professor of Chemistry
Submitter Email	awallace@ccga.edu
Submitter Phone Number	912-279-5931
Submitter Campus Role	Academic Affairs
Applicant Name	Colleen Knight (Primary Principal Investigator)
Applicant Email	cknight@ccga.edu
Applicant Phone Number	912-279-5937
Primary Appointment Title	Assistant Professor of Chemistry and Chair, Department of Natural Sciences
Institution Name(s)	College of Coastal Georgia
Team Members	Colleen Knight, Assistant Professor of Chemistry, cknight@ccga.edu Leon Gardner, Associate Professor of Chemistry, lgardner@ccga.edu Joseph Lodmell, Lecturer of Chemistry, jlodmell@ccga.edu Ernest Pascoe, Part-time Instructor of Chemistry, espascoe@ccga.edu Andrea Wallace, Professor of Chemistry, awallace@ccga.edu

	Lisa McNeal, Director of e-Learning, lmcneal@ccga.edu				
Sponsor, Title, Department, Institution	Tracy Pellett, Vice President for Academic Affairs, College of Coastal Georgia				
Proposal Title	Top Hat for Principles of Chemistry and Organic Chemistry Sequences – An Accessible, Quality, Low-Cost Resource				
Course Names, Course Numbers and Semesters Offered	CHEM 1211, Principles of Chemistry I, Fall/Spring/Summer CHEM 1212, Principles of Chemistry II, Fall/Spring/Summer CHEM 2211, Organic Chemistry I, Fall/Spring CHEM 2212, Organic Chemistry II, Fall/Spring				
Final Semester of Instruction	Fall 2017				
Average Number of Students Per Course Section	24	Number of Course Sections Affected by Implementation in Academic Year	24	Total Number of Students Affected by Implementation in Academic Year	576
Award Category (pick one)	<input checked="" type="checkbox"/> No-or-Low-Cost-to-Students Learning Materials <input type="checkbox"/> OpenStax Textbooks <input type="checkbox"/> Interactive Course-Authoring Tools and Software <input type="checkbox"/> Specific Top 100 Undergraduate Courses				
List the original course materials for students (including title, whether optional or required, & cost for each item)	CHEM 1211/1212 Principles of Chemistry I and II – Chemistry: An Atoms-Focused Approach by Natalie Foster, Thomas Gilbert, and Rein Kirss with Ebook and SmartWork Registration card - \$156.25 – Required CHEM 2211/2212 Organic Chemistry I and II – Organic Chemistry, 9 th ed. by John McMurry with OWL v2 24 month printed access card - \$386.95 - Required				

Requested Amount of Funding	\$29,900
Original Per Student Cost	CHEM 1211/1212 - \$156.25 CHEM 2211/2212 - \$386.95
Post-Proposal Projected Per Student Cost	CHEM 1211/1212 - \$60 (includes online homework access) per student over a two semester period CHEM 2211/2212 - \$65 (includes online homework access) per student over a two semester period
Projected Per Student Savings	CHEM 1211/1212 - \$96.25 per student CHEM 2211/2212 - \$321.95 per students
Projected Total Annual Student Savings	CHEM 1211/1212 - \$96.25 x 432 = \$41,580 CHEM 2211/2212 - \$321.95 x 144 = \$46,360.80 Total = \$87,940.80 per academic year
Creation and Hosting Platforms Used	Top Hat software and ebook, and D2L

NARRATIVE

1.1 PROJECT GOALS

The main goals of this project are to provide an accessible, low-cost option for our students while providing a quality product that will enhance student success in the Principles of Chemistry and Organic Chemistry sequences for our Science majors. Please note that the use of Top Hat is a low-cost option as opposed to a no-cost option. However, Top Hat provides a number of advantages. 1) Top Hat provides an e-text that is available through a variety of platforms including an app on an ipad/iphone/Android. Instructors have complete freedom to add or remove text. The changes become available to the students immediately through the

app. 2) Questions are embedded in the reading. Instructors may add additional questions as desired. To encourage preparation for class, students may be assigned these questions within the text and may be graded based on participation and/or correctness at the instructor's discretion. 3) PowerPoints in which questions can be embedded and answered by students in real time with analysis collected by the instructor are incorporated into the presentation software. 4) Instructors may annotate the PowerPoint presentation during class using an iPad/Android device. These are preserved for later student review. Students' annotations of the presentation on their device are also preserved for later review. 5) Online homework is included in the cost (\$60 for CHEM 1211/1212, used for two semesters, and available for life / \$65 for CHEM 2211/2212, used for two semesters, and available for life). If the OpenStax text were utilized for the Principles of Chemistry courses, WebAssign online homework would still need to be purchased by the students at a cost of \$33.95 per semester or \$51.90 for a multi-term subscription per textbook. 6) There is no OpenStax option for Organic Chemistry. Utilizing Top Hat throughout the four semester progression of chemistry classes will provide continuity and enhance learning since students will not have to learn a new system each time they begin a new chemistry course. 7) Top Hat texts remain available to the students for life and they may access the version of the textbook they used or the most current textbook. The text can be printed if the students prefer this option.

In conclusion, students will be provided not only a low-cost option for CHEM 1211/1212/2211/2212, but they will also have a much improved, customized product that can be easily accessed through any mobile device.

1.2 STATEMENT OF TRANSFORMATION

At the College of Coastal Georgia, the Bachelors of Science in Biology is one of the most popular programs experiencing much growth over the years and currently having well over 300 majors enrolled in classes. All Biology majors are required to take the four semester sequence of Chemistry courses including CHEM 1211, 1212, 2211, and 2212. In addition, many of our Associate of Science majors, Bachelors of Science in Mathematics majors, etc. will take two or more of these chemistry courses. The texts that are currently in use for these courses are quite costly and what is found is that many of our students attempt to take the course without purchasing a textbook. Approximately 82% of CCGA students receive financial aid and simply cannot afford the high expense of Science textbooks thus limiting accessibility and lowering completion rates due to a lack of resources.

By the end of Spring 2018, Top Hat will be fully incorporated into the four semester sequence set of courses and have students experiencing a seamless transition from one course to the next since they will learn the system in CHEM 1211 and carry this knowledge through all four classes. They will be able to complete the sequence spending only \$125 for materials which previously would have cost approximately \$543 saving them over \$400 per student and allowing them to have experienced superior resources than those previously available. The transition to Top Hat will begin as a pilot project in each course beginning with CHEM 1211 in

Fall 2016 and then complete implementation in all sections during the second semester the course is taught. During the second term teaching with Top Hat with a course, a full array of enhanced lecture/PowerPoint notes, a fully customized text, online exercises within the text, online homework, study guides, etc. as well as full integration of the grading system and other material into D2L will be accomplished.

Our ultimate goal is to provide students with excellent resources at low cost and promote student success. All team members which include a variety of professors/lecturer/part-time instructor/instructional design specialist are all at different stages in their careers and all provide a unique perspective to this project. All team members are fully engaged in this project and will work to provide a quality product that will lead to higher student success in Chemistry classes that are known for having high DFW rates.

1.3 TRANSFORMATION ACTION PLAN

The entire team was involved in the identification, review, selection, and adoption of Top Hat. A representative from the company made a presentation to our group and we were all given access to materials to review on our own after the presentation. All members of the team fully support the concept of a low-cost text which provides more options from a teaching and learning standpoint.

Course syllabi for CHEM 1211, 1212, 2211, and 2212 will be aligned with the Top Hat customized texts that will be created by the team. A common set of learning objectives will be developed and utilized for each course. Course materials – lecture notes, customized texts, online exercises and homework, study guides, etc. will be placed on D2L and made available to all instructors. Our instructional designer will help us with connecting Top Hat to D2L.

Role of each team member:

Dr. Colleen Knight will serve as the coordinator for the entire project. Her responsibilities will include: 1) overseeing the entire project, 2) collecting and collating assessment data, 3) organizing regular meetings with the team to gather information, share materials, and analyze assessment results, and 4) submitting status and final reports.

Dr. Lisa McNeal will provide assistance with instructional design for the entire project. She will assist with online materials and seamless transition of information between the Top Hat app and D2L.

Each of the remaining Chemistry faculty will be assigned as a coordinator for a particular course. The coordinator will be responsible for formulating learning objectives for their assigned course based on input from all instructors, assembling all of the course materials and making them available to other full-time and part-time faculty that teach that particular course,

and gathering assessment data for their assigned course and providing it to the primary principal investigator.

Dr. Leon Gardner will serve as the CHEM 1211 coordinator.
Capt. Joseph Lodmell will serve as the CHEM 1212 coordinator.
Dr. Ernest Pascoe will serve as the CHEM 2211 coordinator.
Dr. Andrea Wallace will serve as the CHEM 2212 coordinator.

All Chemistry faculty members who teach these courses will be expected to provide input including assessment data to the coordinators.

Top Hat access codes may be purchased through the CCGA bookstore or online. D2L access is available for all students registered in these courses.

1.4 QUANTITATIVE AND QUALITATIVE MEASURES

Both qualitative and quantitative measures will be employed to evaluate the effectiveness of Top Hat in CHEM 1211, 1212, 2211, and 2212.

Surveys will include questions on student satisfaction with the quality, accessibility, and cost of materials. Students will also be asked to provide open-ended comments on their experience using Top Hat as their textbook, on-line homework, and presentation system in class. In addition, standard student evaluations of the course which are collected every semester will be reviewed and analyzed.

The Chemistry unit currently utilizes American Chemical Society Standardized Exams in all of these courses. We will continue to give these exams and compare our scores before and after the introduction of Top Hat. In addition, we will assess DFW rates before and after the introduction of Top Hat. This set of data should provide an excellent quantitative analysis of the success of this project.

1.5 TIMELINE

Fall 2016

Pilot Top Hat in four sections of CHEM 1211. Prepare class materials (syllabus, customized text, PowerPoint presentations / lecture notes, online exercises and homework, study guides, and exams).

Spring 2017

Fully implement Top Hat into all sections of CHEM 1211. Continually evaluate and improve all class materials.

Pilot Top Hat in at least two sections of CHEM 1212 and one section of 2211. Prepare class materials (syllabus, customized text, PowerPoint presentations / lecture notes, online exercises and homework, study guides, and exams).

Summer 2017

Fully implement Top Hat into all sections of CHEM 1211 and 1212. Continually evaluate and improve all class materials.

Fall 2017

Pilot Top Hat in one section of CHEM 2212. Prepare class materials (syllabus, customized text, PowerPoint presentations / lecture notes, online exercises and homework, study guides, and exams)

Fully implement Top Hat into all sections of CHEM 1211, 1212, and 2211. Continually evaluate and improve all class materials.

Spring 2018

Full implementation of Top Hat into all sections of CHEM 1211, 1212, 2211, and 2212 is complete.

Status reports will be submitted at the end of Spring 2017 and Summer 2017. A final report will be submitted at the end of Fall 2017 after all courses have been taught using Top Hat at least once.

1.6 BUDGET

Team members will receive salary supplements of \$4850 each for their contributions to this project. Dr. Knight and Dr. Wallace will receive an additional \$400 each to cover travel expenses to attend the mandatory kick-off meeting on October 17, 2016.

Team Member Salary Supplements

Dr. Colleen Knight - \$4850 (salary supplement) + \$400 (travel)

Dr. Andrea Wallace - \$4850 (salary supplement) + \$400 (travel)

Dr. Leon Gardner - \$4850 (salary supplement)

Capt. Joseph Lodmell – \$4850 (salary supplement)

Dr. Ernest Pascoe – \$4850 (salary supplement)

Dr. Lisa McNeal - \$4850 (salary supplement)

Total Request - \$29,900

This budget falls within the guidelines of the Large-Scale Transformation for multiple courses and department-wide adoptions with 500 or more students enrolled per academic year.

1.7 SUSTAINABILITY PLAN

The plan is to develop and implement course materials associated with the Top Hat texts and platform for CHEM 1211, 1212, 2211, and 2212 within the time frame of Fall 2016 through Fall 2017. Full implementation with tested and refined course materials will be fully operational in Spring 2018 for all four courses. Based on qualitative and quantitative evaluations that will be done each semester, improvements in course materials will be made as needed. The team will plan to meet at least once each semester to analyze, develop, and implement any new materials that are needed based on assessment data. The plan is to use Top Hat and associated materials indefinitely. After implementation is complete, there should be no additional costs only immense savings for students.

Future plans include utilizing Top Hat in our CHEM 1151/1152 Survey of Chemistry I and II sequence. The Top Hat ebook is in development and expected to be released soon. No cost / low-cost options are being reviewed for CHEM 1100 Introductory Chemistry. Three of our lab classes (CHEM 1100L Introductory Chemistry Lab, CHEM 1211L and CHEM 1212L Principles of Chemistry Lab I and II) already use no cost, department prepared lab handouts. We eventually hope to dispense with all purchased lab manuals for all lab classes and replace them with instructor prepared resources.

1.8 REFERENCES & ATTACHMENTS

Letters of Support

- Dr. Tracy Pellett, Vice President for Academic Affairs
- Dr. Victor Vega, Interim Dean, School of Arts & Sciences

Syllabus

Because our course materials are not OER, we cannot give direct links to lessons. Here is a link to the Top Hat textbook:

<https://tophat.com/marketplace/oer-general-chemistry-franklin-ow/>

Course Schedule

Date		Lab
Wednesday, August 24, 2016	Chapter 1 – Basics	
Monday, August 29, 2016	Chapter 2 – Matter & Light	Safety and Graphing Lab
Wednesday, August 31, 2016	Chapter 2	
Monday, September 5, 2016	Chapter 6 – Early Quantum	no lab
Wednesday, September 7, 2016	Exam 1 (Ch 1-2)	
Monday, September 12, 2016	No Class – Holiday	Basic Laboratory Operations
Wednesday, September 14, 2016	Chapter 7 – Quantum	
Monday, September 19, 2016	Chapter 7	Paper Chromatography and/or Physical and Chemical Changes
Wednesday, September 21, 2016	Chapter 8 – Lewis Struct	
Monday, September 26, 2016	Chapter 8	Gravimetric Analysis-Percent Water
Wednesday, September 28, 2016	Chapter 3 – Molecules	
Monday, October 3, 2016	Exam 2 (Ch 6-8)	Chemical Nomenclature
Wednesday, October 5, 2016	Chapter 3	
Monday, October 10, 2016	Chapter 9 – Chem Struct	Flame Test and VSEPR
Wednesday, October 12, 2016	Chapter 9	
Monday, October 17, 2016	Fall Break - no class	No Lab this Week – Fall Break
Wednesday, October 19, 2016	Chapter 11 – Solids & Liquids	
Monday, October 24, 2016	Chapter 11	Evaporation and Intermolecular Attractions
Wednesday, October 26, 2016	Exam 3 (Ch 3,9)	
Monday, October 31, 2016	Chapter 4 – Reactions	Empirical Formulas and Combustion Analysis
Wednesday, November 2, 2016	Chapter 4	
Monday, November 7, 2016	Chapter 4	Beer's Law - Spectrophotometric Analysis
Wednesday, November 9, 2016	Chapter 5 – Thermodynamics	
Monday, November 14, 2016	Exam 4 (Ch 11,4)	Acid-Base Titration

Wednesday, November 16, 2016	Chapter 5	
Monday, November 21, 2016	Chapter 5	no lab
Wednesday, November 23, 2016	No Class - Holiday	
Monday, November 28, 2016	Chapter 10 – Gas Laws	lab final
Wednesday, November 30, 2016	Chapter 10	
Monday, December 5, 2016	Exam 5 (Ch 5,10)	



CHEMISTRY 1212, PRINCIPLES OF CHEMISTRY II Spring 2016

Because our course materials are not OER, we cannot give direct links to lessons. Here is a link to the Top Hat textbook:

<https://tophat.com/marketplace/oer-general-chemistry-franklin-ow/>

Course Schedule /Calendar:

Date		Lab
Wednesday, January 13, 2016	Chapter 12 - Solutions	Safety/ Check-in
Monday, January 18, 2016	Holiday - no class	
Wednesday, January 20, 2016	Chapter 12	Calorimetry
Monday, January 25, 2016	Chapter 12	
Wednesday, January 27, 2016	Chapter 13 – Kinetics	Temperature and Solubility
Monday, February 01, 2016	Exam 1 (Chapter 12)	
Wednesday, February 03, 2016	Chapter 13	Molar Mass of a Solid
Monday, February 08, 2016	Chapter 13	
Wednesday, February 10, 2016	Chapter 14 - Equilibria	Crystal Violet Kinetics
Monday, February 15, 2016	Chapter 14	
Wednesday, February 17, 2016	Exam 2 (Chapter 12 and 13)	Temperature and Reaction Rate
Monday, February 22, 2016	Chapter 14	
Wednesday, February 24, 2016	Chapter 15 – Acid/base	Household Acids/ Bases
Monday, February 29, 2016	Chapter 15	
Wednesday, March 02, 2016	Chapter 15	Potentiometric Titration
Monday, March 07, 2016	Spring Break	
Wednesday, March 09, 2016	Spring Break	Spring Break
Monday, March 14, 2016	Chapter 16 Aqueous Equil	
Wednesday, March 16, 2016	Chapter 16	Thermodynamics of the Dissolution of Borax
Monday, March 21, 2016	Exam 3 (Chapter 14 and 15)	
Wednesday, March 23, 2016	Chapter 16	Molar Solubility
Monday, March 28, 2016	Chapter 17 – Free Energy	
Wednesday, March 30, 2016	Chapter 17	Galvanic Cells
Monday, April 04, 2016	Chapter 17	
Wednesday, April 06, 2016	Exam 4 (Chapter 16, 17)	Aspirin Synthesis

Monday, April 11, 2016	Chapter 18 – Electrochemistry	
Wednesday, April 13, 2016	Chapter 18	Flex Day
Monday, April 18, 2016	Chapter 19 - Nuclear	
Wednesday, April 20, 2016	Chapter 19	Lab final
Monday, April 25, 2016	Exam 5 (Chapter 18 and 19)	

Final Report

Affordable Learning Georgia Textbook Transformation Grants

Date: 12/22/2017

Grant Number: 259

Institution Name(s): College of Coastal Georgia

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

Colleen Knight, Assistant Professor of Chemistry, Department of Natural Sciences, cknight@ccga.edu
Leon Gardner, Associate Professor of Chemistry, Department of Natural Sciences, lgardner@ccga.edu
Joseph Lodmell, Lecturer of Chemistry, Department of Natural Sciences, jlodmell@ccga.edu
Ernest Pascoe, Part-time Instructor of Chemistry, Department of Natural Sciences, espascoe@ccga.edu
Andrea Wallace, Professor of Chemistry, Department of Natural Sciences, awallace@ccga.edu
Lisa McNeal, Director of e-Learning, Department of eLearning, lmcneal@ccga.edu

Project Lead:

Colleen Knight, Assistant Professor of Chemistry, Department of Natural Sciences, cknight@ccga.edu

Course Name(s) and Course Numbers:

CHEM 1211, Principles of Chemistry I, Fall/Spring/Summer
CHEM 1212, Principles of Chemistry II, Fall/Spring/Summer
CHEM 2211, Organic Chemistry I, Fall/Spring
CHEM 2212, Organic Chemistry II, Fall/Spring

Semester Project Began: Fall 2016

Semester(s) of Implementation: Fall 2016-Fall 2017

Average Number of Students Per Course Section: 24

Number of Course Sections Affected by Implementation: 24

Total Number of Students Affected by Implementation: 576

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

The first semester of implementation using the Top Hat General Chemistry textbook was a fairly smooth transition, with a decent but surmountable learning curve. The instructors initially

enjoyed using the materials and found new ways to engage students in the classroom. Students also seemed to enjoy the savings. However, as the semester (and subsequent semesters) continued, students experienced more problems. This first semester of growing pains seemed to subside with the second semester of use, in the Spring of 2017. Spring 2017 was a semester of smooth sailing for the instructors and smoother sailing for the students. We saw fewer complaints and more enjoyment regarding the interactive nature of the textbook. At this point, the instructors had a good idea on how they wanted to use Top Hat, knew the available settings, and could answer most of the questions raised by students. However, in the final semester of implementation in Fall of 2017, both students and instructors began experiencing a myriad of issues, on the technical side and on the content side. Several errors in the answer key used to automatically grade assignments caused frustration amongst the students and instructors as well. Some features that instructors had become accustomed to were changed or removed, forcing a change in instructional methods. At the completion of the final semester, the majority of the instructors have decided to move away from the Top Hat system. While the savings to students was significant, and there was no statistical decline in student performance from the previous text (as will be demonstrated later), the instructors found that the complications experienced and student frustrations were not worth the economic savings.

Instructors using Top Hat were able to increase engagement in the classroom using Top Hat. A few instructors would post a question at the start of class and use it both as a means to obtain bonus or participation points for the class while reviewing concepts from the last class period, and also a means to obtain attendance. Within the lectures, instructors would imbed multiple choice, click on target, polling, or short answer questions to gauge how well the class was following the lecture. This was an excellent way to keep the instructor's hand on the pulse of the class during each lecture period. The editable, interactive textbook also offered instructors a means to insert personal notes to their students, and make references to events that occurred in class. The imbedded questions allowed the instructor to ensure that students were at least skimming the textbook materials prior to class since points could only be earned if the questions within the textbook were answered.

Overall, the transition to Top Hat has not adversely affected students' performance, but has brought about significant frustration in both students and instructors. Perhaps our student demographic is not yet ready to move to a completely electronic course material system. We are aware that other institutions in the US are effectively using Top Hat, but have decided that it is not appropriate for us at this time.

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

With the experience we had this past year and a half, it is clear that in order to appropriately implement such a system on a large scale, it would be best to have a formal training session with the company itself to ensure that instructors at all levels of technology experience have an opportunity to learn to use the system and troubleshoot common problems. We believe that

part of the frustration experienced by students is that they expect the instructor to be able to help them, and this was often not the case with Top Hat. Because of this, questions would require several days to answer. A system like Top Hat also likely requires an adjustment in pedagogy. Such an innovative system would be best used in flipped classroom type situations and is maybe not best suited for the traditional lecture.

2. Quotes

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

Student reactions were overall negative. If any students actually enjoyed using Top Hat, they were not vocal about it and did not mention any positive comments in course evaluations.

“Top Hat was a poor experience. Completing the reading and homework was more of a hassle than anything else because the website ran INCREDIBLY SLOW.”

“Top Hat needs work, or to be cut. Find something else, or work with them to iron out the bugs.”

“I was constantly calling or emailing the people of TopHat and even Dr. Knight. TopHat should be taken out.”

3. Quantitative and Qualitative Measures

3a. Overall Measurements

Student Opinion of Materials

Was the overall student opinion about the materials used in the course positive, neutral, or negative? Overall Negative

Total number of students affected in this project: 576

- On course evaluations, a majority of students commented on the difficulty of use for Top Hat. We believe that part of this negative experience is a lack of a stable internet infrastructure on campus and at home. Many students had problems saving their work, though Top Hat is supposed to save and sync automatically, even when offline. Other students missed having a physical textbook and found the virtual form to be awkward and unnatural.

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:

- 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? Overall the impact was neutral in the final semester

Drop/Fail/Withdraw Rate:

26.6 % of students, out of a total 576 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)
- 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)

3b. Narrative

In the final semester, the DWF rates from past semesters prior to implementation of Top Hat were similar. The average of the three semesters prior to implementation was 29.8% ± 5.0 and the average of the three semesters during implementation was 31.9% ± 6 . The DWF rates of Fall 2015 and Fall 2017 are nearly identical at 26.3% and 26.6%, respectively. As such, we do not believe there was a significant effect on DWF rates.

As a measure of student performance, we analyzed results from the standardized, cumulative American Chemical Society exam given in each chemistry course, specific to course content. For CHEM 1211, we used the First Term General Chemistry ACS Exam. In CHEM 1212, we administer the Full Year General Chemistry Exam.

For CHEM 1211: This analysis was conducted to compare students results on standardized exams between the ALG supported text (Top Hat) and the two texts previously used in

Chemistry 1211 at the College of Coastal Georgia (Gilbert - used in school years 2014 and 2015 and Tro - used in school years 2013 and earlier). To compare results from the three different exams administered between 2013 and 2017, raw scores were converted to normalized scores using the norm conversions provided by the American Chemical Society for the 2005, 2012 and 2015 editions of the First Term General Chemistry exam. There were 275 data points for the Top Hat text, 188 data points for the Gilbert text and 77 for the Tro text.

The results for Top Hat was a mean score of 15.37 with a standard deviation of 16.10. For Gilbert, the mean was 16.654 with a standard deviation of 17.38. For Tro, the mean was 23.47 with a standard deviation of 20.52.

Analysis was conducted using a Student t-test at a 95% confidence interval for a two-tailed test assuming unequal variance. (Results assuming equal variance were similar.)

In the comparison of Top Hat with Gilbert, t-calculated was 0.804 and t-critical was 1.966. Since t-calculated was less than t-critical there is not a statistical difference between the means of the two data sets.

However, in a comparison of Top Hat with Tro, t-calculated was 3.198 and t-critical was 1.983. This indicates that there is a statistical difference between the mean scores with Top Hat compared to the Tro results.

Gilbert and Tro texts were also compared with t-calculated of 2.745 and t-critical of 1.969 showing a statistically significant difference between those results as well.

In conclusion, the analysis shows that moving from the Gilbert text to the less expensive Top Hat text did not significantly affect the learning and retention of the students based on the standardized exam results. However, the results do support the conclusion of the CCGA chemistry faculty that neither the Gilbert nor Top Hat texts were of the same quality as the Tro text.

For CHEM 1212: The mean for Top Hat was 22.81 with a standard deviation of 20.30. For Gilbert the mean was 20.73 with a standard deviation of 19.54. There were 116 data points for Top Hat and 139 for Gilbert.

The results of a two-tailed Student t-test between Top Hat and Gilbert were t-stat = 0.833 and t-critical = 1.970. Since t-stat is less than t-critical there is no statistically significant difference in the mean of the two samples.

We do not have data for the Tro text for CHEM 1212 standardized exams.

We also do not have full historical data for the Organic Chemistry courses ACS Exam Scores, however, "based on many years of experience teaching organic chemistry both professors

that used Top Hat to teach organic consider it a significantly inferior text to that previously used and will discontinue using Top Hat for Organic Chemistry."

4. Sustainability Plan

Unfortunately, our department has decided to move away from Top Hat. While the economic benefits to the students is commendable, we do not believe the economic benefits outweigh the academic deficits. We will be returning to a standard textbook in the Fall of 2018. For those who have already purchased Top Hat for use in CHEM 1211, they will continue to use the text for CHEM 1212 in the Spring, but the new CHEM 1211 course will be switching to a traditional textbook format.

5. Future Plans

The majority of instructors who have participated in the project have decided to switch back to traditional textbooks. While there was discussion to try Open Educational Resources that are available, the overall consensus was to return to traditional textbooks and rethink textbook transformation in the future. A few faculty members are working on creating open educational course materials, but on a conservative level, and will be introducing smaller elements gradually into the chemistry curriculum over the next few semesters.

It is our belief that, while Open Educational Resources have their place, and low-cost materials are preferable when available, our campus is not yet ready to move to a system like Top Hat and our faculty is not yet ready to embrace OER. However, it is something we will consider in the future as our student demographic shifts.

6. Description of Photograph

Photo and description to follow