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Application Summary

Competition Details

Competition Title:	Textbook Transformation Grants, Round Seventeen (Summer 2020 - Summer 2021)
Category:	University System of Georgia
Award Cycle:	Round 17
Submission Deadline:	04/20/2020 at 11:59 PM

Application Information

Submitted By:	Cathy Hakes
Appplication ID:	4605
Application Title:	521
Date Submitted:	04/21/2020 at 8:15 AM

Personal Details

Institution Name(s):	Georgia Gwinnett College
Applicant First Name:	Umar
Applicant Last Name:	Khokhar
Applicant Email Address:	ukhokhar@ggc.edu
Applicant Phone Number:	678-672-7636
Primary Appointment Title:	Assistant Professor of IT
Submitter First Name:	Cathy
Submitter Last Name:	Hakes
Submitter Email Address:	chakes@ggc.edu
Submitter Phone Number:	678-361-0291
Submitter Title:	Executive Director, ORSP and Accreditation

Application Details

Proposal Title
521

Requested Amount of Funding
$10,800

Priority Category (if applicable)
Upper-Level Courses (3000+)

Course Title(s)
Information Security

Course Number(s)
ITEC 3300

Team Member 1 Name
Umar Khokhar

Team Member 1 Email
ukhokhar@ggc.edu

Team Member 2 Name
Binh Tran

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Btran5@ggc.edu

Team Member 3 Name

Team Member 3 Email

Team Member 4 Name

Team Member 4 Email

Additional Team Members (Name and email address for each)

Sponsor Name
Joseph Sloop

Sponsor Title
Interim Dean

Sponsor Department
School of Science and Technology

Total Number of Student Section Enrollments Affected by Project in One Academic Year
205

Average Number of Student Section Enrollments Affected per Summer Semester
25

Average Number of Student Section Enrollments Affected per Fall Semester
100

Average Number of Student Section Enrollments Affected per Spring Semester
80

Original Required Commercial Materials (title, author, price, and bookstore or retailer URL showing price)

Book 1:

Title: Fundamentals of Information System Security 3rd Edition (ISBN-13: 978-1284116458)

Authors: David Kim & Michael G. Solomon

Cost: $99.95

URL: https://www.jblearning.com/catalog/productdetails/9781284116458

Book 2:

Title: CompTIA Security+ Guide to Network Security Fundamentals 6th Edition; ISBN-13: 978-1337288781

Author: Mark Ciampa

Cost: $179.95

URL: https://www.cengage.com/c/comptia-security-guide-to-network-security-fundamentals-6e-ciampa/9781337288781/3

Original Total Cost per Student
$279.90

Post-Project Cost per Student
$0

Post-Project Savings per Student
$279.90

Projected Total Annual Student Savings per Academic Year
$57,379.50

Using OpenStax Textbook?
No

Project Goals

The project goals are described as follows:

A. Student Satisfaction: Create engaging, customized, and focused theoretical contents.

There are six course objectives of ITEC-3300 (information Security), which mainly include the fundamental concepts of information security, cryptography (Symmetric & Asymmetric), Wireless networks, and web application attacks. In order to accomplish all course objectives, we require students to purchase two books. It would be much more convenient and cost-effective for the students if we have one book that is fully customized and covers all the six course objectives at a low or no cost.

B. Student Performance: Improve student success rate through OER hands-on practical labs

Currently, we use cloud-based labs which come with the course package provided by the publisher. These labs contain step-by-step instructions to execute specific tasks over the cloud-based platform. With these cloud-based labs, the students are just following the instructions and getting the lab tasks done; however, they are unable to practice any real-world problem. In our proposed book, the students will have access to the complete version of many ethical hacking software for windows and Linux, which allows them to go beyond the course labs as well. In addition to the hands-on labs, at the end of each chapter, we are also planning to add some scenario-based hands on projects which will help the students to improve their analytical and empirical skills. We hope this pedagogical transformation will fill the gap of textbook knowledge and real-world application and in return improve student success rate. The no cost textbook solution will increase the success rate of those students who could not afford these high cost textbooks.

C. Retention: Reduce student expenses in textbook purchases to $0.

This course is offered three times (Spring, Summer & Fall), and over 200 students take this course every year. The cost of two textbooks is $279.90 and using the no cost learning materials it will lower the cost of college education, a savings of nearly $56,000. Moreover, the availability of textbooks on the first day of class that are completely free besides should help with decreased drop/fail/withdraw rates.

D. Share the learning materials with other USG universities and colleges to benefit more students.

We will make the created learning materials available to USG and other faculty. They can be used as a trial and possible replacement to their current textbooks or supplement teaching materials.

Statement of Transformation

Transformation description:

For the past five years, the U.S has experienced major data breaches that had affected users' personal information and accounts. This list includes Yahoo, which impacted 3 billion user accounts; Equifax's 143 million consumers; Target Stores' 70 million customers; Marriott International's 500 million customers; and Uber's 57 million users and 600,000 drivers, just to name a few. (Armerding, 2018) Trained to serve as the gatekeepers of data, it is no wonder that Information Security analysts are in high demand. The U.S. Department of Labor Statistics published the occupational outlook for some of the top jobs for until 2026. The report stated that "Employment of information security analysts is projected to grow 28 percent from 2016 to 2026, much faster than the average for all occupations. Demand for information security analysts is expected to be very high, as these analysts will be needed to create innovative solutions to prevent hackers from stealing critical information or causing problems for computer networks." In fact, a 2019 article by Paul Rubens stated that there will likely be a global shortage of cybersecurity staff by over 3 million and growing as data breaches escalate and affect government, companies, and individuals. The article went on to showcase the top 10 U.S. cities with the most cybersecurity job postings, and Atlanta, Georgia, was number 6 in this list. With the growing demand for information security both locally and abroad, Georgia Gwinnett College is prepared to do what it needs to do to equip our students with the skills and knowledge they need to succeed in the field. This help extends to reducing the cost of their educational expenses, such as their textbooks.

Systems and Security is one of the most popular concentrations in Information Technology. The current ITEC 3300 course enrolls over 200 students each year. It is a required course in this concentration, and a prerequisite for ITEC 4320 (Internet Security) and ITEC 4810 (capstone project course). The prerequisite courses for ITEC 3300 are ITEC 2120 and ITEC 2140. ALG has already funded the free online textbooks projects for ITEC 2120/BUS 3100 (Yi Ding, PI) and ITEC 2140 (Hyesung Park, PI). Thus, ITEC 3300 would enable students in the Internet Security program to have a seamless progression of free online textbooks as they advance in their academic career. Providing online textbooks across a degree program is a much more practical course of action. As the CEO of Flat World Knowledge, Christopher Eresse, stated, "The ability to measure learning across an entire degree program is really where we're headed in the future rather than just on a course-by-course basis." (Straumsheim, 2015) A case in point is California. In 2016, California piloted the zero-textbook-costs (ZTC) program, which created 37 associate-degree and certificate pathways with no textbooks because legislators saw that textbook prices are a barrier to completion for many students, particularly to those who are homeless or food insecure (Burke, 2019).

Cost is a special consideration for the ITEC 3300 course. This course requires two textbooks, at the total cost of $279.90, and a windows-based laptop or Apple MacBook, which may cost up to $300. The over $500 total expenses of the course is a financial constrain that often forces students to purchase their textbooks much later into the course. In fact, 40% of our students in fall 2018 or spring 2019 purchased their textbooks much later. Purchasing books later in the semester or not all is probably more frequent for upper level courses than for lower level courses simply because upper level books tend to be costlier. Mark Perry (2015) found in his study of textbooks that the most expensive books are for the 3000 and 4000 level classes, oftentimes as high as $400 per book.

Not only are the upper level textbooks costlier, they also are less likely to be in demand for resale because the enrollment in these courses are fewer than the large sections of lower level classes (Perry, 2015). There is even less demand for technology books because of the nature of the field. The fast-evolving nature of the information security field requires textbooks, such as in ITEC 3300, to be updated frequently, which negatively impacts their resale value. In 2017, COMPTIA has made significant changes in Security+ certification. As a result, many of the publishers have updated their books.

Ultimately, the inability to purchase textbooks or to purchase them later have consequences on student success (McKenzie, 2017). When students purchase books later in ITEC 3300, the consequence is the lower grades. In spring 2019, for instance, 30 % of our students enrolled in three sections of ITEC 3300 received DFWs. By digitalizing the textbook and hands-on practical labs available to students at the beginning of class, we expect their grades to improve so there will be fewer students receiving DFWs. Moreover, students would not have to bother with reselling issues.

Learning resources for Information Security are abundant and many of these resources are publicly accessible, free, or with an open license to use. An example is Kali Linux Operating System, which is open source and freeware that comes with many ethical hacking software. The investigators of this proposal will identify, select, and adopt/create no cost online/digital materials to replace the costly textbooks, while still achieving the course's six learning outcomes.

Stakeholders affected by the transformation:

The direct stakeholders affected by the transformation will be approximately 200 traditional and non-

traditional undergraduate students annually who are enrolled in the Information Security at GGC. In addition, faculty in GGC and elsewhere across the country who teach a similar course may have free access to the course materials. As a result, free textbooks will benefit students statewide and nationwide.

The impact of this transformation on stakeholders and course success:

The transformation process will help remove and eliminate the cost of expensive textbooks for students who otherwise cannot afford expensive textbooks. These students can gain access to the textbook and learning materials immediately, which can help them be fully prepared to work on the first day of class. The no cost textbook solution will help increase the success rate of those students who otherwise cannot afford these high cost textbooks.

The hands-on ethical hacking labs will better engage students in classes as whatever they will learn in class can be used to secure themselves and others from being hacked. This will help to improve course's attendance and retention. In addition, the experience of working on a real-world application will benefit their future career success.

The transformation will benefit also faculty teaching similar courses by providing a solution to lower textbook cost, improve student engagement, and increase student success rate.

The transformative impact on the program, department, institutions, access institution, and/or multiple courses:

ITEC 3300 Information Security is a required course for Information Technology major with System and Security concentration and a general education course, which other IT major students can take. Over the years, it has become one of the most popular majors in the college, and the number of majors and graduates has consistently risen. In 2017, Dr. Khokhar had an average of 18-20 students per class. Nowadays, his classes are packed with students. The project team trusts that the successful transformation to a no-cost textbook, improved course engagement and student satisfaction, and up-to-date, industry-related activities will attract even more students to enroll and graduate as IT major.

Aside from increased enrollment in this major, the proposed course with hands-on Practical Labs also strongly support GGC's mission that... "emphasizes the innovative use of technology and active-learning environments to provide students enhanced learning experiences, practical opportunities to apply knowledge..." The team hopes that the project and the idea of no-cost textbook will inspire more successful course transformation in other areas and disciplines at GGC and USG at large.

Transformation Action Plan

ITEC 3300 has six learning outcomes:

1) Define and analyze the key concepts of information security, including confidentiality, integrity, authentication and availability, and identify the salient issues, viewpoints, and trade-offs of information security;

2) Describe and apply the basic concepts and primitives of cryptography, including private-key and public-key encryption, message authentication and digital signature;

3) Describe and apply basic mechanisms of system security, including access control and confinement;

4) Explain attacks against the internet and web applications;

5) Describe protocols that secure the internet and web, including secure email protocols, defense against Structure Query Language (SQL) injection, Secure Socket Layer (SSL), and intrusion detection of malware; and

6) Identify and examine basic human and ethical issues in information security and apply appropriate security controls to systems.

A. Textbook

The current textbook, Fundamentals of Information Systems Security, has 15 chapters, 4 of which are only used by the project team. Meanwhile the CompTIA textbook has also 15 chapters, of which we only use 4 chapters. By transforming the textbook, the students need only use one textbook as resource and have resources that are specific to the course and beneficial to enhancing students' skills.

The new course materials will be identified and gathered/created based on course objectives and student learning outcomes of the ITEC 3300 Information Security course. The course syllabus will be modified for the transformation, such as the course material information, grade distribution, tentative course schedule, etc. The syllabus will be made available in D2L for this course by the PIs. Since the new course materials will be provided on D2L, each topic covered in the course will have a web link in D2L, which contains all the materials relevant to the topic. In addition, each course topic will be designed based on learning-by-doing approach to include many examples, tutorials, and hands-on features that allow students to practice and improve their own analytical skills. Table 1 shows the transformed book and responsible team member.

TABLE 1: Transformed ITEC 3300 Textbook

Part 1: The Need for Information Security

Chapter 1: Information Systems Security

- Sample Link: https://bus206.pressbooks.com/chapter/chapter-6-information-systems-security/
- Person Responsible: Tran

Chapter 2: Fundamentals of Networks

- Sample Link: http://www.tcpipguide.com/free/t_NetworkingFundamentals.htm
- Person Responsible: Tran

Chapter 3: Malicious Attacks, Threats, and Vulnerabilities

- Sample Link: https://www.rapid7.com/fundamentals/types-of-attacks/
- Person Responsible: Khokhar

Part 2: Securing Today's Information Systems

Chapter 4: Access controls

- Sample Link: https://www.citrix.com/glossary/what-is-access-control.html

- Person Responsible: Tran

Chapter 5: Authentication Systems

- Sample Link: https://www.sciencedirect.com/topics/computer-science/authentication-system
- Person Responsible: Khokhar

Chapter 6: Symmetric Cryptography

- Sample Link: https://www.sciencedirect.com/topics/computer-science/symmetric-key-cryptography
- Person Responsible: Khokhar

Chapter 7: Asymmetric Cryptography

- Sample Link:https://cap430.files.wordpress.com/2011/03/ch10_asymmetric-cryptography.pdf
- Person Responsible: Khokhar

Chapter 8: Web and Wireless network attacks

- Sample Link: https://www.pluralsight.com/blog/it-ops/wireless-lan-security-threats
- Person Responsible: Tran

The PIs have already reached out to Ms. Bethany Nash, Systems Librarian, to assist with identifying resources and OERs. They will cull the resources. The team plans to utilize Galileo, OpenStax, and Merlot to create the textbook and the ancillary materials.

B. Hands-On Practical Labs

The PI will lead the development, compilation, and update of the practical labs. The project team has already done preliminary work on researching links that will be incorporated in the ancillary materials. These will include:

- Interactive Game based Learning: Team members have already created many Kahoot Games to involve the students and maximize the learning of the theoretical contents of the course.

Sample links:

1. https://create.kahoot.it/details/itec-3300-ch-3-part-i/9be8dd75-e5cb-408b-9dc9-d55e44c9a51e
2. https://create.kahoot.it/details/ch-6-itec-3300/acd9fbe7-bf2f-49e9-bc12-886321d3ce48
3. https://create.kahoot.it/details/ch-2-itec-3300-part-1/b216d7bc-da46-4b3a-a082-25a4eb122283
4. https://create.kahoot.it/details/ch-6-part-ii-itec-3300/b4fcf71f-d012-4df7-910f-c13e69edb255
5. https://create.kahoot.it/details/ch-8-itec-3300-part-i/962212c6-a06e-4c5e-8ee5-7a070da687d5
6. https://create.kahoot.it/details/ch-7-itec-3300-part-ii/82d42d9c-375a-444f-87f4-0b260e1b8203
7. https://create.kahoot.it/details/ch-8-itec-3300-part-i/962212c6-a06e-4c5e-8ee5-7a070da687d5

- Test bank: Example of link: https://quizlet.com/99706272/information-security-flash-cards/

- Video presentations: Example of links: https://www.youtube.com/playlist?list=PLFX_EwFvKKWOgEO1xR2m-HiiIff-ud5Fu

Team member Roles

Umar Khokhar, Assistant Professor of Information Technology: Dr. Khokhar has been teaching this course for seven (7) years. During that time, he has created customized labs, customized handouts, assignments, and Kahoot Learning games.

The project will allow him the much-needed time to organize his materials, thereby allowing him and future faculty to improve the teaching of the course. As a subject matter expert and instructional designer, he will identify and create new course materials and oversee the entire transformation process. For this project, he will select and determine study material for all quizzes, exams and homework assignments/projects, develop hands-on activities, lab activities, complete and analyze all grade/survey related data for the course. The new course materials will be identified and gathered/created based on course objectives and student learning outcomes of the ITEC 3300 Information Security course.

Binh Tran, Assistant Professor of Information Technology: Dr. Tran has been teaching a networking and cloud security courses for ten years and has created customized materials that would prepare the students especially for the Microsoft Technology Associate (Networks) certificate. In fact, approximately 90% of his students successfully pass the Microsoft Technology Associate (Networks) certification. Dr. Tran focuses on hardware and networking aspects of computing. In 2019, Dr. Tran received the Felton Jenkins Jr. Hall of Fame Faculty Award, the University System of Georgia's highest faculty honor.

Dr. Tran's expertise in cloud computing is of particular benefit to the project since the project team plans to ensure that all materials will be accessible. As the other subject matter expert and instructional designer, he will create new course materials including developing lecture notes/course PPT slides, identifying online free complementary reading materials/tutorials/video clips for each course topic. He will also set up and maintain the D2L course material for this project.

The plan for providing open access to the new materials.

The no-cost textbook and course materials will be hosted in Georgia Gwinnett College Brightspace (D2L) (https://ggc.view.usg.edu/d2l/home) and all students who take this course will have free access to the materials on the first day of class. This website will be used to post all the course materials, announcements, assignments, and for students to submit homework and take tests and quizzes. The "no-cost" textbook will not be "sold" in the GGC bookstore. The textbook will be FULLY accessible through links in D2L.

Quantitative & Qualitative Measures

The team will request for IRB approval prior to starting the grant. Dr. Khokhar will take the lead in ensuring that the evaluation plan is completed. Dr. Tran will assist with the development and refinement of the surveys.

Goal 1: Creating customized and focused theoretical contents

Quantitative Measures, Methods, and Tools:

The PI will assess the impact of the materials contents by ensuring that:

- All of the deliverables are produced in a free digitalized format, including the textbook and ancillary materials.
- All six-course objectives are included in the textbook to ensure that the required learning outcomes that the skills and knowledge that will prepare students for the next level IT course will be achieved.

Qualitative Measures, Methods, and Tools:

- All students will be surveyed on their satisfaction with the course content of the transformed textbook. In addition, students will be surveyed on their assessment on ease of use, accessibility of OER materials, and effectiveness in helping students meet the learning outcomes.
- We will also ask the students:
- What their challenges were with the materials?
- What they liked/did not like?
- What improvements or materials would help them further improve their skill?

Goal 2: Improve student success rate through OER hands-on practical labs

Quantitative Measures, Methods, and Tools:

The PIs will collect data from all students who take this course using the developed no-cost-to-student course materials. These data include but are not limited to:

- Demographic data
- Major area of study
- Retention rate in the course
- Passing and failing rate
- Drop and withdraw rate
- Percentage of students getting A's, B's, C's, D's, F's, W's
- Percentage of students achieving student learning outcomes

The above data will be collected at the end of the semester and compared with the sections of the ITEC 3300 without using the proposed course materials. The comparison result will be used to evaluate the efficacy of the course materials in improving student success.

Qualitative Measures, Methods, and Tools:

The PIs will also survey our students using (Monkey Survey) to understand their experience using the developed no-cost-to-student course material. For example, students will be asked to evaluate the following statement on a 1-5 scale from strongly disagree to strongly agree.

- The project-based course materials are more engaging.
- I like the class activities designed for this course.
- I like the homework designed for this course.
- I learned all the knowledge and skills needed to build my web site project.

- Having a textbook free of charge affected my performance in the class.
- Having a textbook available on the first day of class affected my performance in class.
- Having online resources that are current and industry-focused impact my job/career preparedness.

The students will also be asked the following short answer questions:

- What were the best aspects of using the No-cost-to-Students learning materials?
- What were the challenges of using the No-cost-to-Students learning materials?
- Other comments or suggestions about this course?

The survey will be conducted at the end of the semester and the data collected will help the PIs to modify and improve the learning materials to be used in the following semesters.

Goal 3: Reduce student expenses in textbook purchases to $ 0

Quantitative Measures, Methods, and Tools:

The PIs will:

- Track the amount of savings based on the number of students and current books' prices.

Qualitative Measures, Methods, and Tools:

- Create open-ended questions in the student survey that will assess the impact of no cost versus hardcover textbooks on their finances and ability to keep up with class work. Sample question: How was your experience with e-contents vs traditional book-based contents?

Goal 4: Share the learning materials with other USG universities and colleges to benefit more students.

Quantitative Measures, Methods, and Tools:

The PI will:

- Track the number of presentations made to the academic community through conferences and during GGC TechTalk.
- Track the number of USG and non-USG faculty who have expressed interest on the materials.

Qualitative Measures, Methods, and Tools:

- Track the comments of colleagues who have utilized the materials.

Timeline

Start will be in Summer 2020 and end in Summer 2021 semester.

We anticipate that it will take two semesters to complete the transformed textbook since this is a 3000 level course, which is a core course for majors. We will pilot in the summer and do the full implementation in Summer 2021.

Summer 2020

- May 2020 – July 2020
- Start Literature Review, gathering of materials, start write-up of the textbook (First Four (4) Chapters) and four (4) Labs

Fall 2020

- August 2020 – December 2020
- Continue Write up (Last Four (4) Chapters) and Labs
- Peer Review and ready for pilot the Project for Spring

Spring 2021

- January 2021 – May 2021
- Pilot the project in one section, affecting ~80-90 students. Typically, we only offer three (3) section in the spring.
- Peer review, modifications

Summer 2021

- May 2021– July 2021
- Full implementation of the project in three sections, affecting ~26 students.
- Present the project in national course designing conference.
- Prepare plans to submit an ALG mini-grant.

Budget

A. Type of Grant: Standard-Scale Transformation

B. Budget request: $10,800

C. Budget Justification (Itemized):

(1) Compensation for two faculty: $5,000 *2 = $10,000

Funds are requested to compensate for the investigators' work and activities beyond normal teaching load in order to successfully complete the project. Each team member will receive $5,000 each. The requested amount will cover each team member's pay and fringe benefits (FICA/SS, FICA Med, and Retirement).

$5000 for Dr. Khokhar. Dr. Khokhar will be responsible for chapters 3, 5, 6, and 7 and the practical labs. He will take the lead on implementing the evaluation plan and preparing reports to ALG.

$5,000 for Dr. Tran. Dr. Tran will be responsible for chapters 1, 2, 4, 8 and the practical labs associated with the chapters. He will assist Dr. Khokhar on the evaluation.

(2) Travel expenses: $800

Funds are requested to cover some of the expenses of the two team members' travel to disseminate the project results. The funds will cover per diem, mileage, and hotel. We are planning to present our project findings in ACM SIGITE Conference on Information Technology Education which occurs every year in October within United States. Last year (2019), we successfully conducted a technical workshop titled "Fundamentals of Ethical Hacking and Penetration Testing" in SIGITE'19 (Tacoma WA) and workshop proceeding were published in ACM (https://dl.acm.org/doi/10.1145/3349266.3351391). We are quite confident that we can present and publish this work in the same conference in 2021.

(3) Total: $10,800

Sustainability Plan

In the study entitled "Freeing the Textbook: Educational Resources in U.S. Higher Education, 2018", Seaman and Seaman (2018) stated, "The study results show that there is little question that OER awareness and use will continue to grow." In fact, the study indicated that faculty are preferring OER over print in the classroom for the first time. Yet, we noted that one of the findings is that less than one in five faculty are aware of any institutional or system-wide initiative. The project plans to assist the national and ALG initiative to utilize OER materials in the classroom through our dissemination and sustainability efforts.

The project team understands that this project will greatly reduce students cost, better prepare and engage students, improve academic performance, and in turn improve retention and success rates in this course. As such, the project team will make every effort to disseminate information to other IT faculty through Dr. Khokhar's position as course coordinator for ITEC 3300 and through conference/School-wide presentations.

In Dr. Khokhar's position as course coordinator for ITEC 3300, he is responsible for choosing the course materials. He will share the resources with the other one full-time faculty and two part-time faculty who teach the course so that they may adopt these resources. The adoption will result to an average of seven sections taught by full-time and part-time faculty or the materials being adopted by GGC even after the grant is over.

For GGC faculty, all no-cost materials and resources will be made available in D2L and will be shared among all faculty teaching this course. For non-GGC faculty, the materials will be provided through the ALG textbook transformation repository. After the grant is over, the team plans to submit an ALG minigrant to include other ancillary materials (e.g., Video lectures of the transformed textbook, PowerPoint (D2L), hands on labs, the OER search engines utilized by the project). The Succeeding updates will be based on the feedback received from the students and users, as well as emerging Cybersecurity practices in the industry.

Acknowledgment

Grant Acceptance

[Acknowledged] I understand and acknowledge that acceptance of Affordable Learning Georgia grant funding constitutes a commitment to comply with the required activities listed in the RFP and that my submitted proposal will serve as the statement of work that must be completed by my project team. I further understand and acknowledge that failure to complete the deliverables in the statement of work may result in termination of the agreement and funding.

Georgia Gwinnett COLLEGE

11 March 2020

School of Science & Technology

1000 University Center Lane
Lawrenceville, GA 30043
Phone: 678-407-5602
www.ggc.edu

To: Grant Review Committee
Affordable Learning Georgia, University System of Georgia

Re: Textbook Transformation Grant

Dear Committee,

I am pleased to write this letter to support Dr. Umar Khokhar and Dr. Binh Tran's application for the ALG Textbook Transformation Grant.

The proposal focuses on the creation of low-cost-to-students learning materials to replace current textbook for our IT required course Information Security (ITEC 3300). This will lower costs of students taking this course and will most likely increase our retention and success rates in the course.

Drs. Khokhar and Tran have been teaching ITEC 3300 for a several semesters. They have the knowledge, skills and experiences needed to successfully perform the action plan and meet the obligations of the grant. If awarded the grant, I will work with them to coordinate the distribution of their award and provide necessary resources to facilitate their activities in developing the proposed learning materials.

Please let me know if you have any questions or need additional information .

JOSEPH C. SLOOP
Interim Dean
School of Science and Technology
Georgia Gwinnett College

Textbook Transformation Grants, Round Seventeen
(Summer 2020 – Summer 2021)
Proposal Form and Narrative

Applicant, Team, and Sponsor Information

Institution(s)	Georgia Gwinnett College
Applicant Name	Umar Khokhar
Applicant Email	ukhokhar@ggc.edu
Applicant Phone #	678-672-7636
Applicant Position/Title	Assistant Professor of IT
Submitter Name	Cathy Hakes
Submitter Email	chakes@ggc.edu
Submitter Phone #	678-407-5875
Submitter Position	Executive Director of the Office of Research, Sponsored Programs & Accreditation

Please provide the first/last names and email addresses of all team members within the proposed project. Include the applicant (Project Lead) in this list. Do not include prefixes or suffixes such as Ms., Dr., Ph.D., etc.

	Name	Email Address
Team Member 1	Umar Khokhar (Project Lead)	ukhokhar@ggc.edu
Team Member 2	Binh Tran	Btran5@ggc.edu

Sponsor

Joseph Sloop, Interim Dean of School of Science and Technology, Georgia Gwinnett College

Project Information and Impact Data

Priority Category / Categories	Upper Level Campus Collaborations
Requested Amount of Funding	$10,800
Course Names and Course Numbers	ITEC 3300 – Information Security
Final Semester of Project	Summer 2021
Total Number of Student Section Enrollments Affected by Project in One Academic Year	205

Average Number of Student Section Enrollments Affected per Summer Semester	25
Average Number of Student Section Enrollments Affected per Fall Semester	100
Average Number of Student Section Enrollments Affected per Spring Semester	80
Original Required Commercial Materials	**Book 1:** Title: Fundamentals of Information System Security 3rd Edition (ISBN-13: 978-1284116458) Authors: David Kim & Michael G. Solomon Cost: $99.95 URL: https://www.jblearning.com/catalog/productdetails/9781284116458 **Book 2:** Title: CompTIA Security+ Guide to Network Security Fundamentals 6th Edition; ISBN-13: 978-1337288781 Author: Mark Ciampa Cost: $179.95 URL: https://www.cengage.com/c/comptia-security-guide-to-network-security-fundamentals-6e-ciampa/9781337288781/3
Average Price of Original Required Materials Per Student Section Enrollment	$279.90
Average Post-Project Cost Per Student Section Enrollment	$ 0
Average Post-Project Savings Per Student Section Enrollment	$279.90
Projected Total Annual Student Savings Per Academic Year	$57,379.50
Using OpenStax Textbook?	No

NARRATIVE SECTION

NOTE: We are attaching the narrative in a Word file since the PDF format will not always open the web links, especially the references.

1. PROJECT GOALS

The project goals are described as follows:

A. Student Satisfaction: Create engaging, customized, and focused theoretical contents.

There are six course objectives of ITEC-3300 (information Security), which mainly include the fundamental concepts of information security, cryptography (Symmetric & Asymmetric), Wireless networks, and web application attacks. In order to accomplish all course objectives, we require students to purchase two books. It would be much more convenient and cost-effective for the students if we have one book that is fully customized and covers all the six course objectives at a low or no cost.

B. Student Performance: Improve student success rate through OER hands-on practical labs

Currently, we use cloud-based labs which come with the course package provided by the publisher. These labs contain step-by-step instructions to execute specific tasks over the cloud-based platform. With these cloud-based labs, the students are just following the instructions and getting the lab tasks done; however, they are unable to practice any real-world problem. In our proposed book, the students will have access to the complete version of many ethical hacking software for windows and Linux, which allows them to go beyond the course labs as well. In addition to the hands-on labs, at the end of each chapter, we are also planning to add some scenario-based hands on projects which will help the students to improve their analytical and empirical skills. We hope this pedagogical transformation will fill the gap of textbook knowledge and real-world application and in return improve student success rate. The no cost textbook solution will increase the success rate of those students who could not afford these high cost textbooks.

C. Retention: Reduce student expenses in textbook purchases to $0.

This course is offered three times (Spring, Summer & Fall), and over 200 students take this course every year. The cost of two textbooks is $279.90 and using the no cost learning materials it will lower the cost of college education, a savings of nearly $56,000. Moreover, the availability of textbooks on the first day of class that are completely free besides should help with decreased drop/fail/withdraw rates.

D. Share the learning materials with other USG universities and colleges to benefit more students.

We will make the created learning materials available to USG and other faculty. They can be used as a trial and possible replacement to their current textbooks or supplement teaching materials.

2. STATEMENT OF TRANSFORMATION

Transformation description:

For the past five years, the U.S has experienced major data breaches that had affected users' personal information and accounts. This list includes Yahoo, which impacted 3 billion user accounts; Equifax's 143 million consumers; Target Stores' 70 million customers; Marriott International's 500 million customers; and Uber's 57 million users and 600,000 drivers, just to name a few. (Armerding, 2018) Trained to serve as the gatekeepers of data, it is no wonder that Information Security analysts are in high demand. The U.S. Department of Labor Statistics published the occupational outlook for some of the top jobs for until 2026. The report stated that "Employment of information security analysts is projected to grow 28 percent from 2016 to 2026, much faster than the average for all occupations. Demand for information security analysts is expected to be very high, as these analysts will be needed to create innovative solutions to prevent hackers from stealing critical information or causing problems for computer networks." In fact, a 2019 article by Paul Rubens stated that there will likely be a global shortage of cybersecurity staff by over 3 million and growing as data breaches escalate and affect government, companies, and individuals. The article went on to showcase the top 10 U.S. cities with the most cybersecurity job postings, and Atlanta, Georgia, was number 6 in this list. With the growing demand for information security both locally and abroad, Georgia Gwinnett College is prepared to do what it needs to do to equip our students with the skills and knowledge they need to succeed in the field. This help extends to reducing the cost of their educational expenses, such as their textbooks.

Systems and Security is one of the most popular concentrations in Information Technology. The current ITEC 3300 course enrolls over 200 students each year. It is a required course in this concentration, and a prerequisite for ITEC 4320 (Internet Security) and ITEC 4810 (capstone project course). The prerequisite courses for ITEC 3300 are ITEC 2120 and ITEC 2140. ALG has already funded the free online textbooks projects for ITEC 2120/BUS 3100 (Yi Ding, PI) and ITEC 2140 (Hyesung Park, PI). Thus, ITEC 3300 would enable students in the Internet Security program to have a seamless progression of free online textbooks as they advance in their academic career. Providing online textbooks across a degree program is a much more practical course of action. As the CEO of Flat World Knowledge, Christopher Eresse, stated, "The ability to measure learning across an entire degree program is really where we're headed in the future rather than just on a course-by-course basis." (Straumsheim, 2015) A case in point is California. In 2016, California piloted the zero-textbook-costs (ZTC) program, which created 37 associate-degree and certificate pathways with no textbooks because legislators saw that textbook prices are a barrier to completion for many students, particularly to those who are homeless or food insecure (Burke, 2019).

Cost is a special consideration for the ITEC 3300 course. This course requires two textbooks, at the total cost of $279.90, and a windows-based laptop or Apple MacBook, which may cost up to $300. The over $500 total expenses of the course is a financial constrain that often forces students to purchase their textbooks much later into the course. In fact, 40% of our students in fall 2018 or spring 2019 purchased their textbooks much later. Purchasing books later in the

semester or not all is probably more frequent for upper level courses than for lower level courses simply because upper level books tend to be costlier. Mark Perry (2015) found in his study of textbooks that the most expensive books are for the 3000 and 4000 level classes, oftentimes as high as $400 per book.

Not only are the upper level textbooks costlier, they also are less likely to be in demand for resale because the enrollment in these courses are fewer than the large sections of lower level classes (Perry, 2015). There is even less demand for technology books because of the nature of the field. The fast-evolving nature of the information security field requires textbooks, such as in ITEC 3300, to be updated frequently, which negatively impacts their resale value. In 2017, COMPTIA has made significant changes in Security+ certification. As a result, many of the publishers have updated their books.

Ultimately, the inability to purchase textbooks or to purchase them later have consequences on student success (McKenzie, 2017). When students purchase books later in ITEC 3300, the consequence is the lower grades. In spring 2019, for instance, 30 % of our students enrolled in three sections of ITEC 3300 received DFWs. By digitalizing the textbook and hands-on practical labs available to students at the beginning of class, we expect their grades to improve so there will be fewer students receiving DFWs. Moreover, students would not have to bother with reselling issues.

Learning resources for Information Security are abundant and many of these resources are publicly accessible, free, or with an open license to use. An example is Kali Linux Operating System, which is open source and freeware that comes with many ethical hacking software. The investigators of this proposal will identify, select, and adopt/create no cost online/digital materials to replace the costly textbooks, while still achieving the course's six learning outcomes.

Stakeholders affected by the transformation:

The direct stakeholders affected by the transformation will be approximately 200 traditional and non-traditional undergraduate students annually who are enrolled in the Information Security at GGC. In addition, faculty in GGC and elsewhere across the country who teach a similar course may have free access to the course materials. As a result, free textbooks will benefit students statewide and nationwide.

The impact of this transformation on stakeholders and course success:

The transformation process will help remove and eliminate the cost of expensive textbooks for students who otherwise cannot afford expensive textbooks. These students can gain access to the textbook and learning materials immediately, which can help them be fully prepared to work on the first day of class. The no cost textbook solution will help increase the success rate of those students who otherwise cannot afford these high cost textbooks.

The hands-on ethical hacking labs will better engage students in classes as whatever they will learn in class can be used to secure themselves and others from being hacked. This will help to

improve course's attendance and retention. In addition, the experience of working on a real-world application will benefit their future career success.

The transformation will benefit also faculty teaching similar courses by providing a solution to lower textbook cost, improve student engagement, and increase student success rate.

The transformative impact on the program, department, institutions, access institution, and/or multiple courses:

ITEC 3300 Information Security is a required course for Information Technology major with System and Security concentration and a general education course, which other IT major students can take. Over the years, it has become one of the most popular majors in the college, and the number of majors and graduates has consistently risen. In 2017, Dr. Khokhar had an average of 18-20 students per class. Nowadays, his classes are packed with students. The project team trusts that the successful transformation to a no-cost textbook, improved course engagement and student satisfaction, and up-to-date, industry-related activities will attract even more students to enroll and graduate as IT major.

Aside from increased enrollment in this major, the proposed course with hands-on Practical Labs also strongly support GGC's mission that… "emphasizes the innovative use of technology and active-learning environments to provide students enhanced learning experiences, practical opportunities to apply knowledge…" The team hopes that the project and the idea of no-cost textbook will inspire more successful course transformation in other areas and disciplines at GGC and USG at large.

3. TRANSFORMATION ACTION PLAN

ITEC 3300 has six learning outcomes:

1) Define and analyze the key concepts of information security, including confidentiality, integrity, authentication and availability, and identify the salient issues, viewpoints, and trade-offs of information security;

2) Describe and apply the basic concepts and primitives of cryptography, including private-key and public-key encryption, message authentication and digital signature;

3) Describe and apply basic mechanisms of system security, including access control and confinement;

4) Explain attacks against the internet and web applications;

5) Describe protocols that secure the internet and web, including secure email protocols, defense against Structure Query Language (SQL) injection, Secure Socket Layer (SSL), and intrusion detection of malware; and

6) Identify and examine basic human and ethical issues in information security and apply appropriate security controls to systems.

A. Textbook

The current textbook, Fundamentals of Information Systems Security, has 15 chapters, 4 of which are only used by the project team. Meanwhile the CompTIA textbook has also 15 chapters, of which we only use 4 chapters. By transforming the textbook, the students need only use one textbook as resource and have resources that are specific to the course and beneficial to enhancing students' skills.

The new course materials will be identified and gathered/created based on course objectives and student learning outcomes of the ITEC 3300 Information Security course. The course syllabus will be modified for the transformation, such as the course material information, grade distribution, tentative course schedule, etc. The syllabus will be made available in D2L for this course by the PIs. Since the new course materials will be provided on D2L, each topic covered in the course will have a web link in D2L, which contains all the materials relevant to the topic. In addition, each course topic will be designed based on learning-by-doing approach to include many examples, tutorials, and hands-on features that allow students to practice and improve their own analytical skills. Table 1 shows the transformed book and responsible team member.

TABLE 1: Transformed ITEC 3300 Textbook

CHAPTER	CHAPTER/SECTION TITLES AND SAMPLE LINKS	RESPONSIBLE
Part 1: The Need for Information Security		
Chapter 1	Information Systems Security Sample Link: https://bus206.pressbooks.com/chapter/chapter-6-information-systems-security/	Tran
Chapter 2:	Fundamentals of Networks Sample Link: http://www.tcpipguide.com/free/t_NetworkingFundamentals.htm	Tran
Chapter 3:	Malicious Attacks, Threats, and Vulnerabilities Sample Link: https://www.rapid7.com/fundamentals/types-of-attacks/	Khokhar
Part 2: Securing Today's Information Systems		
Chapter 4:	Access controls Sample Link: https://www.citrix.com/glossary/what-is-access-control.html	Tran
Chapter 5:	Authentication Systems Sample Link: https://www.sciencedirect.com/topics/computer-science/authentication-system	Khokhar
Chapter 6:	Symmetric Cryptography Sample Link: https://www.sciencedirect.com/topics/computer-science/symmetric-key-cryptography	Khokhar

Chapter 7:	Asymmetric Cryptography Sample Link:https://cap430.files.wordpress.com/2011/03/ch10_asymmetric-cryptography.pdf	Khokhar
Chapter 8:	Web and Wireless network attacks Sample Link: https://www.pluralsight.com/blog/it-ops/wireless-lan-security-threats	Tran

The PIs have already reached out to Ms. Bethany Nash, Systems Librarian, to assist with identifying resources and OERs. They will cull the resources. The team plans to utilize Galileo, OpenStax, and Merlot to create the textbook and the ancillary materials.

B. Hands-On Practical Labs

The PI will lead the development, compilation, and update of the practical labs. The project team has already done preliminary work on researching links that will be incorporated in the ancillary materials. These will include:

- Interactive Game based Learning: Team members have already created many Kahoot Games to involve the students and maximize the learning of the theoretical contents of the course.

Sample links:

1. https://create.kahoot.it/details/itec-3300-ch-3-part-i/9be8dd75-e5cb-408b-9dc9-d55e44c9a51e
2. https://create.kahoot.it/details/ch-6-itec-3300/acd9fbe7-bf2f-49e9-bc12-886321d3ce48
3. https://create.kahoot.it/details/ch-2-itec-3300-part-1/b216d7bc-da46-4b3a-a082-25a4eb122283
4. https://create.kahoot.it/details/ch-6-part-ii-itec-3300/b4fcf71f-d012-4df7-910f-c13e69edb255
5. https://create.kahoot.it/details/ch-8-itec-3300-part-i/962212c6-a06e-4c5e-8ee5-7a070da687d5
6. https://create.kahoot.it/details/ch-7-itec-3300-part-ii/82d42d9c-375a-444f-87f4-0b260e1b8203
7. https://create.kahoot.it/details/ch-8-itec-3300-part-i/962212c6-a06e-4c5e-8ee5-7a070da687d5

- Test bank: Example of link: https://quizlet.com/99706272/information-security-flash-cards/

- Video presentations: Example of links: https://www.youtube.com/playlist?list=PLFX_EwFvKKWOgEO1xR2m-HiiIff-ud5Fu

Team member Roles

Umar Khokhar, Assistant Professor of Information Technology: Dr. Khokhar has been teaching this course for seven (7) years. During that time, he has created customized labs, customized handouts, assignments, and Kahoot Learning games.

The project will allow him the much-needed time to organize his materials, thereby allowing him and future faculty to improve the teaching of the course. As a subject matter expert and instructional designer, he will identify and create new course materials and oversee the entire transformation process. For this project, he will select and determine study material for all quizzes, exams and homework assignments/projects, develop hands-on activities, lab activities, complete and analyze all grade/survey related data for the course. The new course materials will be identified and gathered/created based on course objectives and student learning outcomes of the ITEC 3300 Information Security course.

Binh Tran, Assistant Professor of Information Technology: Dr. Tran has been teaching a networking and cloud security courses for ten years and has created customized materials that would prepare the students especially for the Microsoft Technology Associate (Networks) certificate. In fact, approximately 90% of his students successfully pass the Microsoft Technology Associate (Networks) certification. Dr. Tran focuses on hardware and networking aspects of computing. In 2019, Dr. Tran received the Felton Jenkins Jr. Hall of Fame Faculty Award, the University System of Georgia's highest faculty honor.

Dr. Tran's expertise in cloud computing is of particular benefit to the project since the project team plans to ensure that all materials will be accessible. As the other subject matter expert and instructional designer, he will create new course materials including developing lecture notes/course PPT slides, identifying online free complementary reading materials/tutorials/video clips for each course topic. He will also set up and maintain the D2L course material for this project.

The plan for providing open access to the new materials.

The no-cost textbook and course materials will be hosted in Georgia Gwinnett College Brightspace (D2L) (https://ggc.view.usg.edu/d2l/home) and all students who take this course will have free access to the materials on the first day of class. This website will be used to post all the course materials, announcements, assignments, and for students to submit homework and take tests and quizzes. The "no-cost" textbook will not be "sold" in the GGC bookstore. The textbook will be FULLY accessible through links in D2L.

4. QUANTITATIVE AND QUALITATIVE MEASURES

The team will request for IRB approval prior to starting the grant. Dr. Khokhar will take the lead in ensuring that the evaluation plan is completed. Dr. Tran will assist with the development and refinement of the surveys.

Goal 1: Creating customized and focused theoretical contents

Quantitative Measures, Methods, and Tools:

The PI will assess the impact of the materials contents by ensuring that:

- All of the deliverables are produced in a free digitalized format, including the textbook and ancillary materials.
- All six-course objectives are included in the textbook to ensure that the required learning outcomes that the skills and knowledge that will prepare students for the next level IT course will be achieved.

Qualitative Measures, Methods, and Tools:

- All students will be surveyed on their satisfaction with the course content of the transformed textbook. In addition, students will be surveyed on their assessment on ease of use, accessibility of OER materials, and effectiveness in helping students meet the learning outcomes.
- We will also ask the students:
    - What their challenges were with the materials?
    - What they liked/did not like?
    - What improvements or materials would help them further improve their skill?

Goal 2: Improve student success rate through OER hands-on practical labs

Quantitative Measures, Methods, and Tools:

The PIs will collect data from all students who take this course using the developed no-cost-to-student course materials. These data include but are not limited to:

- Demographic data
- Major area of study
- Retention rate in the course
- Passing and failing rate
- Drop and withdraw rate
- Percentage of students getting A's, B's, C's, D's, F's, W's
- Percentage of students achieving student learning outcomes

The above data will be collected at the end of the semester and compared with the sections of the ITEC 3300 without using the proposed course materials. The comparison result will be used to evaluate the efficacy of the course materials in improving student success.

Qualitative Measures, Methods, and Tools:

The PIs will also survey our students using (Monkey Survey) to understand their experience using the developed no-cost-to-student course material. For example, students will be asked to evaluate the following statement on a 1-5 scale from strongly disagree to strongly agree.

- The project-based course materials are more engaging.
- I like the class activities designed for this course.
- I like the homework designed for this course.
- I learned all the knowledge and skills needed to build my web site project.
- Having a textbook free of charge affected my performance in the class.
- Having a textbook available on the first day of class affected my performance in class.
- Having online resources that are current and industry-focused impact my job/career preparedness.

The students will also be asked the following short answer questions:

- What were the best aspects of using the No-cost-to-Students learning materials?
- What were the challenges of using the No-cost-to-Students learning materials?
- Other comments or suggestions about this course?

The survey will be conducted at the end of the semester and the data collected will help the PIs to modify and improve the learning materials to be used in the following semesters.

Goal 3: Reduce student expenses in textbook purchases to $ 0

Quantitative Measures, Methods, and Tools:

The PIs will:

- Track the amount of savings based on the number of students and current books' prices.

Qualitative Measures, Methods, and Tools:

- Create open-ended questions in the student survey that will assess the impact of no cost versus hardcover textbooks on their finances and ability to keep up with

class work. Sample question: How was your experience with e-contents vs traditional book-based contents?

Goal 4: Share the learning materials with other USG universities and colleges to benefit more students.

Quantitative Measures, Methods, and Tools:

The PI will:

- Track the number of presentations made to the academic community through conferences and during GGC TechTalk.
- Track the number of USG and non-USG faculty who have expressed interest on the materials.

Qualitative Measures, Methods, and Tools:

- Track the comments of colleagues who have utilized the materials.

5. TIMELINE

Start will be in Summer 2020 and end in Summer 2021 semester.

We anticipate that it will take two semesters to complete the transformed textbook since this is a 3000 level course, which is a core course for majors. We will pilot in the summer and do the full implementation in Summer 2021.

Summer 2020

- May 2020 – July 2020
  - Start Literature Review, gathering of materials, start write-up of the textbook (First Four (4) Chapters) and four (4) Labs

Fall 2020

- August 2020 – December 2020
  - Continue Write up (Last Four (4) Chapters) and Labs
  - Peer Review and ready for pilot the Project for Spring

Spring 2021

- January 2021 – May 2021
  - Pilot the project in one section, affecting ~80-90 students. Typically, we only offer three (3) section in the spring.
  - Peer review, modifications

Summer 2021

- May 2021– July 2021
  - Full implementation of the project in three sections, affecting ~26 students.
  - Present the project in national course designing conference.
  - Prepare plans to submit an ALG mini-grant.

6. BUDGET

A. Type of Grant: Standard-Scale Transformation

B. Budget request: $10,800

C. Budget Justification (Itemized):

(1) Compensation for two faculty: $5,000 *2 = $10,000

Funds are requested to compensate for the investigators' work and activities beyond normal teaching load in order to successfully complete the project. Each team member will receive $5,000 each. The requested amount will cover each team member's pay and fringe benefits (FICA/SS, FICA Med, and Retirement).

$5000 for Dr. Khokhar. Dr. Khokhar will be responsible for chapters 3, 5, 6, and 7 and the practical labs. He will take the lead on implementing the evaluation plan and preparing reports to ALG.

$5,000 for Dr. Tran. Dr. Tran will be responsible for chapters 1, 2, 4, 8 and the practical labs associated with the chapters. He will assist Dr. Khokhar on the evaluation.

(2) Travel expenses: $800

Funds are requested to cover some of the expenses of the two team members' travel to disseminate the project results. The funds will cover per diem, mileage, and hotel. We are planning to present our project findings in ACM SIGITE Conference on Information Technology Education which occurs every year in October within United States. Last year (2019), we successfully conducted a technical workshop titled "Fundamentals of Ethical Hacking and Penetration Testing" in SIGITE'19 (Tacoma WA) and workshop proceeding were published in ACM (https://dl.acm.org/doi/10.1145/3349266.3351391). We are quite confident that we can present and publish this work in the same conference in 2021.

(3) Total: $10,800

7. SUSTAINABILITY PLAN

In the study entitled "Freeing the Textbook: Educational Resources in U.S. Higher Education, 2018", Seaman and Seaman (2018) stated, "The study results show that there is little question that OER awareness and use will continue to grow." In fact, the study indicated that faculty are

preferring OER over print in the classroom for the first time. Yet, we noted that one of the findings is that less than one in five faculty are aware of any institutional or system-wide initiative. The project plans to assist the national and ALG initiative to utilize OER materials in the classroom through our dissemination and sustainability efforts.

The project team understands that this project will greatly reduce students cost, better prepare and engage students, improve academic performance, and in turn improve retention and success rates in this course. As such, the project team will make every effort to disseminate information to other IT faculty through Dr. Khokhar's position as course coordinator for ITEC 3300 and through conference/School-wide presentations.

In Dr. Khokhar's position as course coordinator for ITEC 3300, he is responsible for choosing the course materials. He will share the resources with the other one full-time faculty and two part-time faculty who teach the course so that they may adopt these resources. The adoption will result to an average of seven sections taught by full-time and part-time faculty or the materials being adopted by GGC even after the grant is over.

For GGC faculty, all no-cost materials and resources will be made available in D2L and will be shared among all faculty teaching this course. For non-GGC faculty, the materials will be provided through the ALG textbook transformation repository. After the grant is over, the team plans to submit an ALG minigrant to include other ancillary materials (e.g., Video lectures of the transformed textbook, PowerPoint (D2L), hands on labs, the OER search engines utilized by the project). The Succeeding updates will be based on the feedback received from the students and users, as well as emerging Cybersecurity practices in the industry.

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