Improving Student Resources:
T-Square Mobile App

Caro • Cortes • Lashinsky • Sarkisian • Wallace

IMPROVING STUDENT RESOURCES:

T-SQUARE MOBILE APP

Presented To:

Center for the Enhancement for Teaching and Learning
Georgia Institute of Technology

Prepared By:

Daniel Caro
Alejandro Cortes
Anne Lashinsky
Sela Sarkisian
Matthew Wallace

LMC 3403 - Dr. Kathryn Huie Harrison
Georgia Institute of Technology

December 8, 2015

T-Squared Mobile Team

Caro • Cortes • Lashinsky • Sarkisian • Wallace
Georgia Institute of Technology • Atlanta, GA • tsquare.gatech.edu

December 8, 2015

Dr. Chaohua Ou
Educational Technology Specialist
Center for the Enhancement of Teaching and Learning
266 4th Street NW
Clough Commons, Suite 457
Georgia Institute of Technology
Atlanta, GA 30332

Dear Dr. Chaohua Ou,

We have prepared a report to present the idea of T-Squared: a mobile application as the solution to the growing need for learning management software (LMS) accessibility on smartphones. This report highlights a survey taken of a small sample of the student body, as well as an interview with the application's developer, Cal Stephens.

In this report, you will find an extensive evaluation of the current methods to access T-Square, the learning management platform, on a mobile device, specifically a smartphone. After taking the responses of students currently using these methods, we have concluded that there exists no Georgia Tech-sanctioned mobile application that fulfills the need for portable learning management. Our recommendation is both easy and inexpensive to implement. The application, "T-Squared," is the best option to build upon to properly serve the Georgia Tech community. Already launched, T-Squared provides an easy-to-use interface with even more features than the existing T-Square software. Unfortunately, the application is not currently sponsored by Georgia Tech. We recommend CETL's direct sponsorship of T-Squared as well as a partnership with Cal Stephens and the Office of Information Technology to relaunch and support this application across campus.

We thank Cal Stephens for his time and input to this project. His application was a clear starting point for this initiative. We also thank the 271 students who participated in our survey. This survey gave us clarity on the demand for this initiative. It also gave us some valuable information on what students need. Additionally, the students offered some comments on features they would like to see in the next launch of T-Squared.

Thank you for your time and consideration. We, as students, hope that you will consider this initiative, as it would certainly give us yet another tool for student success. For further questions, please contact Matt Wallace at matthew.wallace@gatech.edu or via phone at (919)971-0452

Sincerely,
Daniel Caro, Alejandro Cortes, Annie Lashinsky, Sela Sarkisian and Matt Wallace
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Executive Summary

Purpose of the Report

The purpose of this report is to gain the sponsorship of the Center for the Enhancement of Teaching and Learning (CETL) for a T-Square mobile application. CETL's support of this application will benefit: 1) the students, by improving accessibility to resources, gradebooks, and other T-Square features, thereby improving grades, and 2) Georgia Tech, by saving training and implementation costs that would be incurred should Georgia Tech switch Learning Management Platforms.

Primary research was conducted to gauge student interest in a Georgia Tech-sponsored mobile T-Square application. A survey was administered to 271 Georgia Tech students. The responses from these surveys informed the recommendations regarding a mobile T-Square application.

The Problem

Georgia Tech does not have an officially sponsored application to go along with its T-Square Course Management Platform.

The Solution

A mobile application called "T-Squared", developed by Georgia Tech freshman computer science major Cal Stephens, will provide students with the mobile access to T-Square that they desire. This app already features "Gradebook", "Resources", "Announcements", and "Assignments": the features that survey respondents said they would find most useful.

Conclusions and Recommendations

After reviewing both our survey of the student body and our own experience, we as students conclude that Georgia Tech is in dire need of a mobile app that is compatible with the learning management platform. We recommend that CETL sponsor Cal Stephen's mobile application, T-Squared. With CETL's sponsorship, the application can have direct access to Georgia Tech servers, allowing the app to run faster than the current mobile website. Additionally, it would be less expensive and easier to update T-Square as opposed to transitioning to a new service, and using an application developed by a Georgia Tech student would reflect Georgia Tech's commitment to homegrown innovation.

Introduction

Purpose

Georgia Tech needs to improve the mobile experience for T-Square, the primary medium that students and professors use to interact online. An improvement to T-Square would correlate to an improved experience and an increase in grades for students.

Scope/Methods

We have found and illustrated in this report that students at Georgia Tech are largely unhappy with the current mobile website of T-Square and would like a mobile application as an alternative way to access the website. These findings came after distributing a survey to 271 current Georgia Tech students in order to gauge their opinions on T-Square. The survey was accessible online via "Google Forms", which is a tool for creating web input forms. Students were able to access it through a link sent via Facebook and email. Respondents were limited to answering thirteen multiple-choice questions and one free response question when taking the survey.

We firmly believe that the best way to offer a mobile application to students would be to utilize an application already available. As outlined in this report, "T-Squared", one of the existing mobile applications that allows access to T-Square, is the best alternative currently available. T-Squared offers the best experience to mobile users and has the most extensive functionality of all of the mobile applications that can be used to access T-Square. Through partnering with CETL, T-Squared will be able to improve the student experience by being the most comprehensive T-Square application available.

Assumptions/Limitations

We assumed that the responses given in the survey were representative of the whole student population because we were unable to survey every student at Georgia Tech due to time constraints. Having respondents answer multiple-choice questions made the survey results easy to compare but limited students answer choices to the ones that we provided. The respondents were also limited to the friends and peers that we were able to contact. This report also presents a simplified view of the costs associated with Blackboard, an alternative learning management software, that is based off of publically available information.

Background

We, the T-Squared Mobile Team, are a group of current Georgia Tech undergraduate students. Formed to better equip students for academic success, we identified new or improved educational resources that truly meet this goal. From personal experiences as students, we recognized a need for enhancing our Georgia Tech learning management platform. Currently, Georgia Tech uses the "T-Square" platform, developed by the Sakai Foundation. We are writing to you, the Center for the Enhancement of Teaching and Learning (CETL), as T-Square is provided to students under your authority. You have also recognized a need to consider upgrading or perhaps replacing T-Square altogether for the benefit of Georgia Tech students and staff. Recently, you have an administered pilot program of additional learning management platforms for students and faculty to explore alternatives to T-Square. Students in the pilot program are experimenting with both Blackboard and Canvas LMS, both of which are competitors to the Sakai Foundation.

Presently, Georgia Tech does not have an officially sponsored mobile app to go along with its T-Square learning management system. Our team sought to investigate whether a sponsored mobile app could be the most viable solution in enhancing T-Square. Students are the primary users of the software system, with over 25,000 students enrolled as of the 2015 Fall semester. Thus, our team decided to conduct a comprehensive survey, sent out exclusively to Georgia Tech students in order to gather important data regarding the prospective implementation of an officially sponsored T-Square mobile app.

Survey Demographics

Our survey was sent out via Facebook and through word of mouth to Tech students, and in total, garnered 271 responses. Along with more topic-oriented questions, our team asked a series of demographic questions in order to better understand the background of the respondents. Over 68% of respondents were females, compared to 30% males (Figure 1). This is certainly a differing distribution than the overall student population, which is approximately 34% females and 66% males. This fact is important to note, yet we believe it poses no significant problem in our research. Of the students surveyed, just over one half were enrolled in the College of Engineering, approximately 21% in the College of Business, 16% in the College of Computing, and about 20% distributed through the remaining three colleges (Table 1). Similarly, approximately a quarter of all students were undergraduate students in their first, second, third, or fourth year, respectively (Figure 2). Three graduate students were also included in the survey respondents. Furthermore, our team asked students what mobile devices they currently owned and used, on the basis of what operating system their device runs (Figure 3). An overwhelming 82% of students used Apple iOS operating systems, 17% used Android OS, while only one respondent used a Windows phone. This information is key in determining for which operating systems a prospective mobile T-Square application would need to be developed. Not surprising, only one respondent did not use a smartphone, indicating that nearly every Georgia Tech student uses a smartphone.

Figure 1: Gender Breakdown

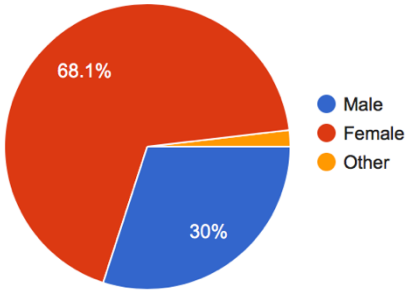


Table 1: Georgia Tech College Breakdown

College of Architecture	8	3%
Scheller College of Business	56	20.7%
College of Computing	42	15.6%
College of Engineering	143	53%
Ivan Allen College of Liberal Arts	18	6.7%
College of Sciences	21	7.8%

Figure 2: Year of Attendance Breakdown

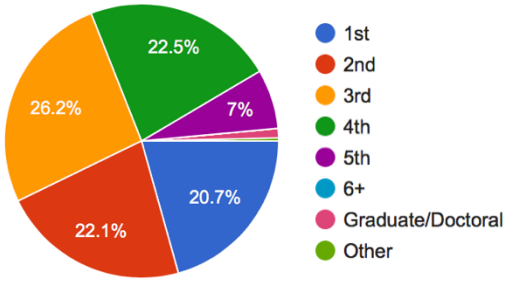


Figure 3: Smartphone Operating System

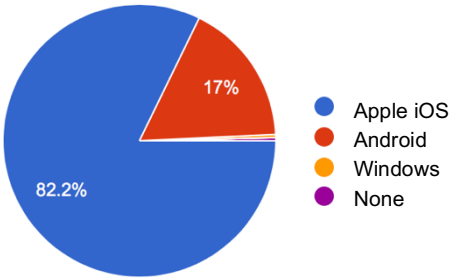


Figure 4: Frequency of T-Square Mobile Access

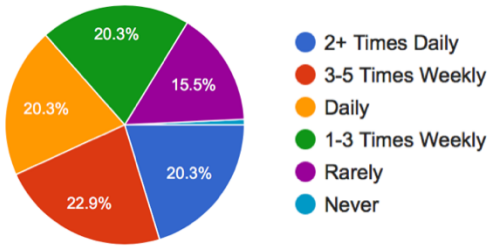


Figure 5: Student Interest in a Mobile App

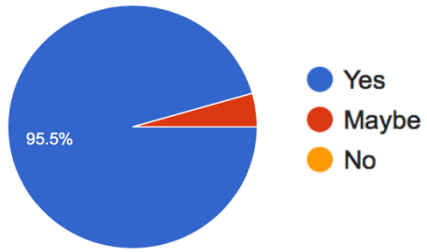
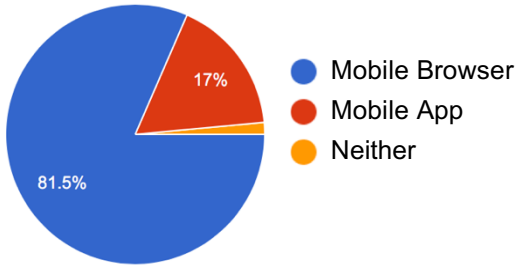


Figure 6: Current T-Square Mobile Access



The Value of an App

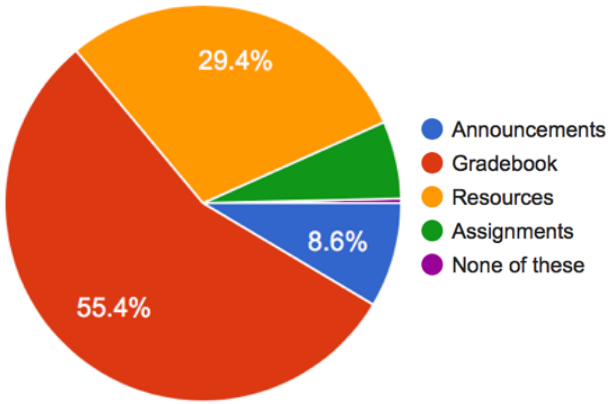
As we are all members of the Georgia Tech community, it is plain to see that smartphones and mobile devices are increasingly more prevalent. A study at Baylor University states that "women college students spend an average of 10 hours a day on their cellphones and men college students spend nearly eight." The survey responses confirmed this as 270 out of 271 Georgia Tech students owned a smartphone. Furthermore, of these students, over 80% of them tried to access T-Square from their mobile device at least once a week (Figure 4). When students were asked if they would be interested in a T-Square mobile application, we found that 95.5% were interested in a mobile app, however the 81.5% still used their mobile browser to access T-Square (Figure 5 & 6). This clearly shows the need for a better method to access T-Square while away from a computer.

An application would provide a seamless way for students to remain organized and informed about all of their classes. It is easily accessible from a smartphone, and students would be more likely to use it if it had a better interface than the current mobile version of T-Square. The application would include all features of T-Square, as well as some added functionality that mobile devices make possible. With the changing pace of technology, an application that provides easy access to learning management will certainly contribute to student success across campus.

Desired Functionality

The section of the survey found in Appendix Figure 8 serves to determine which existing features students prefer to use most on the current website version of T-Square. This data was valuable as it showed us which existing features were most important to students, and thereby which features of the T-Square app should be most developed to meet the student's needs. We found that a majority of students (55.4%) find the "Gradebook" feature of T-Square more useful than any other feature. The three other existing features that students use the most are, in descending order, "Resources" (29.4%), "Announcements" (8.6%), and "Assignments" (6.4%).

Figure 7: Most Desirable T-Square Function



Additional Features Students Would Like to See Not Currently Available through T-Square

82.1%	70.9%	33.2%
"What If" Grade Calculator	Assignment To-Do List Integration	Cloud File Service Integration

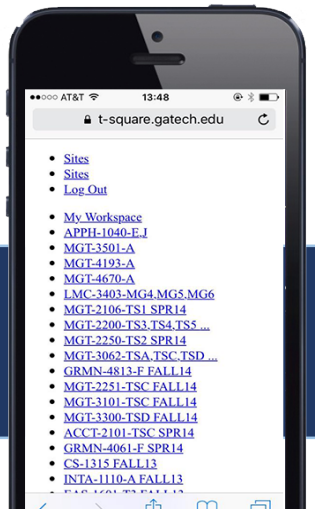
This section of the survey also showed room for growth. In addition to polling usage of existing T-Square features, we gauged student interest in proposed features that do not yet exist in any website or mobile form of T-Square. Our goal was to determine if developing these features in the future would be useful to students. Students positively responded to these suggested functionalities. In particular, a large percentage of students (82.1%) said they would be interested in a "What-If Grade Calculator", while our ideas for "Assignment To-Do List/Reminder Integration" and "DropBox/GoogleDrive/OneDrive Integration" were also well-received.

The final question in this section was a free-response area where students could give us their own ideas for further T-Square functionality. This crowdsourcing method gave us further insight into student's problems, and gave us more creative solutions, such as live chat capabilities, push notifications, and in-app printing capabilities.

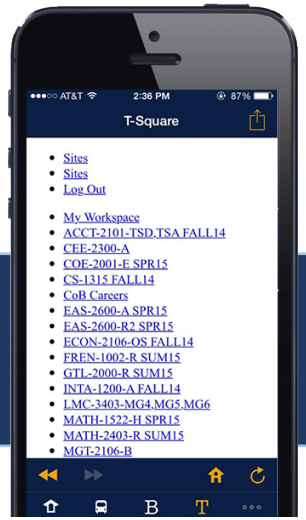
Existing Alternatives

Currently, there are two main ways to access T-Square on a mobile device. The first way is to access the mobile T-Square site via a web browser. The second way is to access T-Square through a mobile application. Phones using iOS software are able to access T-Square through the following applications available on the app store: "GT Portal", "GT Buses", and "Georgia Institute of Technology". Android devices can access T-Square through the following applications: "T-Square Mobile", "Georgia Tech", and "GT Class".

The mobile website for T-Square is available for both iOS and Android users and is the most common way that students accessed T-Square on their mobile devices (see Appendix Figure 5). It utilizes the same login screen as the desktop version and has all of the same functionality as well. This includes items such as "Assignments", "Gradebook", "Resources", and "Calendar". While the mobile website offers all of the functionality as its desktop counterpart, the user interface is much less appealing on the mobile version. The website consists of a bulleted list of blue links and a plain white background. This user interface is not consistent with the design of Georgia Tech's other websites that reflect the school's branding through use of the school's official colors, mascot, and logo among other design facets. Additionally, users often find difficulty in clicking the correct link on their phone screen, as all of the links are clustered close together on each page. The poor design of the mobile website for T-Square was our inspiration to create a better alternative.



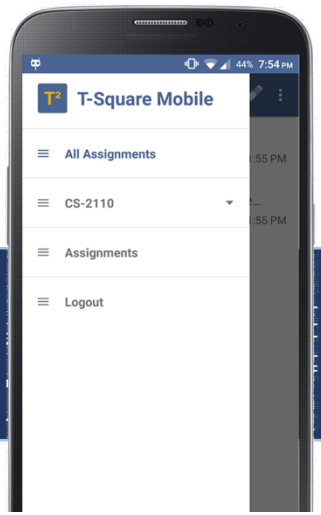
EXISTING MOBILE SITE
Georgia Tech



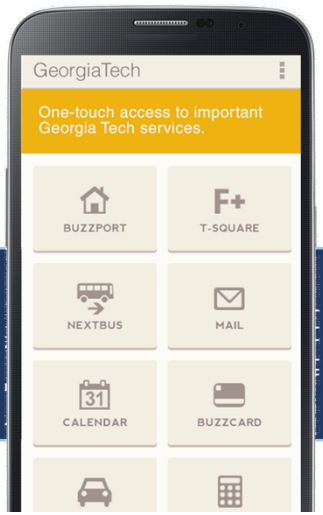
GT Portal
Steady Properties, LLC

iOS users can access T-Square through the mobile website or through one of the previously mentioned applications. “GT Portal” is an application that allows users to access T-Square among other various Georgia Tech websites. Users trying to access T-Square within the “GT Portal” application are redirected to the mobile version of the website because the application does not have a native user interface for T-Square. “GT Buses” and “Georgia Institute of Technology” use the same browser based user interface as the mobile website and “GT Portal”, causing all of the iOS applications to suffer from the same design flaws as the mobile website.

Android users are able to access certain applications that were designed specifically for T-Square. These include “T-Square Mobile” and “Georgia Tech”. “GT Class” is similar to the iOS applications when considering T-Square functionality due to its browser based user interface. Both “T-Square Mobile” and “Georgia Tech” have their own unique user interface that was designed specifically with mobile users in mind. The functionality of these applications are much more limited in scope when compared to the mobile website. Users are only able to access their assignments on “T-Square Mobile” and “Georgia Tech.” None of the other features offered on T-Square such as grade postings and resources are available through these applications. According to our survey, students are most interested in having “Gradebook”, “Resources”, and “Announcements” integrated directly within the application over “Assignments”. However, our survey also showed that 31% of students were interested in having T-Square integrate directly with their native calendar, which is currently a feature that “T-Square Mobile” and “Georgia Tech” both offer.



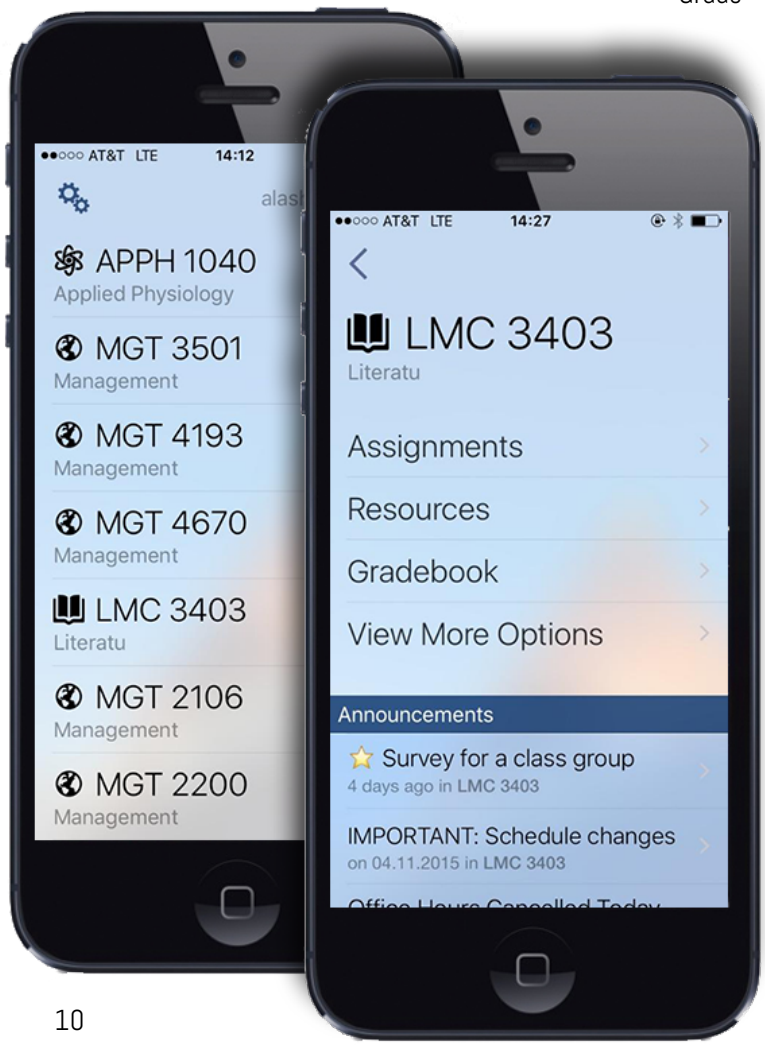
T-SQUARE MOBILE
Shuyang Chen



GEORGIA TECH
Sung Kim

Our Solution

We believe that a mobile application called "T-Squared", developed by Georgia Tech freshman computer science major Cal Stephens, will provide students with the mobile access to T-Square that they desire. This app already features "Gradebook", "Resources", "Announcements", and "Assignments": the features that survey respondents said they would find most useful. In the most recent update, T-Squared also includes the "What-If Grade Calculator" that respondents most wanted to see in a T-Square mobile platform. Furthermore, the T-Squared user interface and experience far exceeds the existing alternatives discussed.



Currently, the app is only available on iOS devices, and has been used by approximately 950 students in the past 30 days (as of December 3, 2015), according to the developer. When survey respondents were asked if they would be interested in using the app, 64.1% of respondents said yes. 27.4% were interested in using the app, but wanted to see additional functionality. An additional 7.8% said they may be interested in using the app, but weren't convinced that it would be useful. That leaves 0.7% of respondents who said they simply wouldn't use the app. In other words, 91.5% of survey respondents

saw the value in this app's being developed further. The day that the survey was distributed, Stephens reported that an additional 78 people downloaded the app as opposed to the daily average of 8-10. This supports our claim that students find value in T-Squared.

In order to implement T-Squared as a comprehensive solution for the entire student body, several steps must be taken. The first step is to allow T-Squared direct access to the current Georgia Tech T-Square server. The app in its current form has to log in to T-Square through the mobile browser and then parse data from the site. In simple terms, the app runs slower than necessary, because it has to wait for a server to deliver data rather than directly accessing the database. By allowing T-Squared access to the T-Square server, the app's performance, reliability, and user experience will be improved significantly.

The next step to T-Squared implementation is to develop other desirable features in the existing T-Squared app for iOS, and to develop an Android version of the application. According to discussions with Stephens, the total time invested in developing the app was approximately 90 hours over a month and a half time frame. He estimates that a similar app could be developed for Android in a similar The final step to T-Squared implementation is marketing the app to students as a sponsored Georgia Tech app. Student awareness of the app will lead to adoption, and will source recommendations for further application improvements. 950 students are currently using the app; just 3.8% of 25,000 undergraduate and graduate students enrolled. Based on survey results, this is likely a function of low student awareness. Just 19.2% of respondents had ever heard of the T-Squared application. Georgia Tech sponsorship and expansive development of app features and user experience as well as marketing flyers, emails, and web ads on T-Square will be the primary driver of awareness and adoption growth.

"If Georgia Tech allowed direct access, [...] integration with Georgia Tech's servers would allow the app to run faster than the current mobile website."

Cal Stephens,
T-Squared App developer

Concerns

There are several concerns that will need to be addressed as T-Squared is implemented. The foremost of these concerns is information security. By providing access to T-Square through a mobile app, new security vulnerabilities will have to be accounted for by the Office of Information Technology (OIT) in the Georgia Tech network. However, these vulnerabilities should be able to be mitigated by regular inspection of the app's source code. Stephens currently evaluates security issues by providing his source code to be evaluated by other developers online via GitHub. A similar approach could be implemented as the app is expanded.

Another concern that needs to be addressed is cost. As with any new product or service that is rolled out, there are development, implementation, and training costs. However, the costs associated with continuing to use the existing T-Square platform and adding a mobile component to the platform will be significantly cheaper than switching to a completely new learning management software. The primary costs associated with the expanded development of T-Square can be found at the bottom of the page.

To provide a comparison, the University of North Carolina at Chapel Hill (a similarly sized university) was using Blackboard, one of the options currently being explored, at a cost of nearly $620,000 per year. When they switched to Sakai, the platform T-Square runs on, their annual cost dropped to $330,000 per year (Yopp). By way of extrapolation, staying on the Sakai platform could result in substantial savings for Georgia Tech.

In order to successfully and securely implement T-Squared, CETL will have to work with OIT to ensure Georgia Tech's security standards are met. CETL will also have to control development costs on an ongoing basis. However, as long as measures are taken to address these concerns, updating the T-Square interface and incorporating the T-Squared mobile app is a viable and cost-effective option for Georgia Tech.

Costs Associated with T-Squared Implementation

Development Costs
Since the app has already been developed further development costs would be low.

Implementation
Promotion would be the primary implementation cost.

Training Costs
Training costs would be much lower than training for a new LMS platform.

Personnel
Dedicated personnel are already in place for whichever LMS is selected.

Conclusions

After reviewing both our survey of the student body and reflecting on our own experience, we as students conclude that Georgia Tech is in dire need of a mobile application that is compatible with the learning management platform. T-Square itself is not the problem: its interface simply needs a facelift. Based on our findings, it would be cheaper and easier to update T-Square as opposed to transitioning to a new service, like Blackboard. In addition to improving the user interface, Georgia Tech needs to create a companion application for students to use on their mobile devices.

Throughout this report, we have outlined the existing options to this problem, as well as our strongest solution. We present the existing application, T-Squared, as the best option to fill the need for a mobile application.

Recommendation

Developed by a Georgia Tech student, T-Squared comes as a homegrown result of student frustration with the lack of availability of learning management platform access on smartphones. We recommend that CETL sponsors T-Squared. T-Squared directly integrates T-Square, keeping an intuitive interface. The app also includes new features like the "What If Grade Calculator", a greatly requested functionality from the student body survey (see Appendix Figure 8). Referenced in the report, a study at Baylor University shows the growing use of smartphones across college campuses. This application is the response to students' relying increasingly on their smartphones on Georgia Tech's campus. With direct sponsorship from Georgia Tech's CETL, T-Squared will be able to provide more functionality and run more efficiently to better serve the Georgia Tech community. If you, CETL, decide to sponsor T-Squared, as we have strongly recommend, we have created a timetable to re-launch the application to the entire student body. First, you would meet with Cal Stephens, the developer of the application, and OIT. After this meeting, this new team would be prepared to develop a second version of the application with new desired features, as well as adhere to Georgia Tech security requirements. Stephens mentioned that the current application did not take extensive time to develop, and therefore we foresee the new application available for beta testing by Spring 2016. While the faculty and students are familiar with T-Square as a learning management platform, this new application will require some minimal training to ensure that all Georgia Tech faculty and students are comfortable with the new technology. Similarly, creating a task force within OIT to consistently monitor and make improvements will keep T-Squared running smoothly. By Fall 2016, the application would be ready to launch, just in time for the incoming freshmen to fully integrate it into their daily lives.

As the timeline shows, T-Squared would be an intrinsic part of the college experience for the Class of 2020. If sponsored, T-Squared would change the way students interact with the learning management platform. An accessible mobile application will improve student organization, and provide an excellent tool for student success.

Our Recommendation for CETL Moving Forward

Appendix

Appendix A: T-Squared Survey

Basic Information (Step 1 of 3)

What gender do you identify with?
a) Male
b) Female
c) Other... (specify)

What college at Georgia Tech are you a member of?
___ College of Architecture
___ Scheller College of Business
___ College of Computing
___ College of Engineering
___ Ivan Allen College of Liberal Arts
___ College of Sciences

Do you own a smartphone? If so, what operating system does it run?
a) Apple iOS
b) Android
c) Windows
d) Other
e) I do not own a Smartphone

What year are you at Georgia Tech?
a) 1st
b) 2nd
c) 3rd
d) 4th
e) 5th
f) 6+
g) Graduate/Doctoral
i) Other (specify)

Current & Past Experience (Step 2 of 3)

How often do you use your mobile phone to access T-Square?
a) 2+ Times Daily
b) 3-5 Times Weekly
c) Daily
d) 1-3 Times Weekly
e) Rarely
f) Never

When using your mobile phone to access T-Square, do you normally use your phone's mobile browser or an application?
a) Mobile Browser (Safari, Chrome, or other native browser)
b) Application
c) I do not use my mobile phone to access T-Square

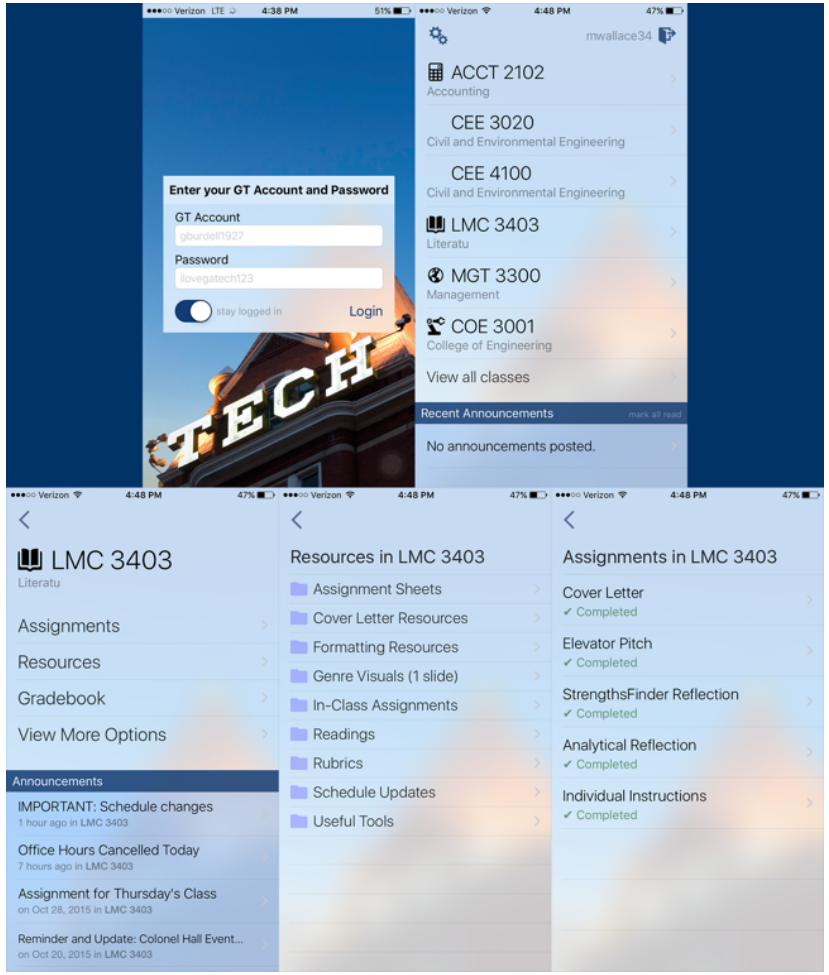
Have you ever used an application to access T-Square? Mark any apps that you have used to access T-Square below. If you have used a different app please include it here:

___ 'Georgia Institute of Technology' by Georgia Tech
___ 'T-Squared for Georgia Tech' by Cal Stephens
___ 'GT Portal' by Steady Properties, LLC
___ 'T-Square Mobile' by Shuyang Chen

___ 'GT Class' by Eric Kidder
___ 'Georgia Tech' by Sung Kim
___ Other (specify)

Gauging Interest (Step 3 of 3)

Assuming reasonable functionality, would you be interested in using a mobile application for T-Square?
a) Yes
b) Maybe
c) No



Have you heard of the 'T-Squared' App (Pictured Above)?
a) Yes
b) No

Would you be interested in using this particular app?
a) Yes
b) Maybe, I'd like to see more functionality
c) Maybe, I'm not sure how useful it would be
d) No

What functions would be most interested in that currently offer direct integration into the app?
a) Announcements
b) Gradebook
c) Resources
d) Assignments
e) None of These

What additional features would you like to see?
___ 'What-If' Grade Calculator
___ Native Calendar Integration
___ Assignment To-Do List/Reminder Integration
___ Dropbox/OneDrive/GoogleDrive Integration for uploading assignments
___ Polls Integration (potential clicker replacement)
___ Forums
___ Groups (for group projects)
___ Tablet Application

Are there any other features you would like to see? Please Specify:

Appendix B: Survey Results

Full Survey Results Spreadsheet:
http://bit.ly/1IywzP1

Full Survey Results Graphically:
http://bit.ly/1NDF0oa

Appendix C: Interview With T-Squared Developer, Cal Stephens

How long did it take you to create T-Squared?
3-4 hours a day for a month and a half

What challenges stood in the way of making an integrated t-square app?
login was the most difficult part, and staying logged in, parsing the website

Do you have any plans to or are you currently working on any improvements to the app?
grade tracker

How many times has the t-squared app been downloaded?
550

Do you have any information on the demographics of the user base?
Not really, unfortunately. Only what Apple provides me with.

Is there analytics available to determine frequency with which the app is used by the established base?
3000, 3-4 times per user

What value do you see the T-Squared app being able to provide?
additional features, UI, ideally ability to add push notifications

Has anyone from Georgia Tech contacted you about the app?
No, but other people have

Do you have any interest in expanding the app to other platforms?
Android would be good, Windows has a low user base.

Is there any physical infrastructure that you had to put in place that was not already in place in the t-square infrastructure?
no

The app runs very quickly. Does it integrate directly with the database associated with t-square or does it somehow parse the website or mobile site to determine content?
Quickly is a relative term, it could definitely be faster. The application parses the T-Square Mobile Website