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BOIP: Interactivity Platform

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UNDER MY SUPERVISION BY

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ENTITLED

BOIP: Interactivity Platform

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FOR THE DEGREE OF

BACHELOR OF SCIENCE
IN
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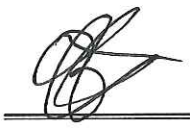

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Abstract

For this project, we have implemented an integrated interactive platform tailored for students and professors. Classes at Santa Clara University come in a variety of sizes and styles, with multiple professors teaching multiple students. These professors have different teaching methods that have to cater to students' different learning styles. One of the main features of our platform is a chat room where professors can collect information from their students. Students are able to ask questions about said topic or answer the professor's posted questions about the topic as well as other students' questions. With our platform, we hope to increase the interactivity between student and professor, making keeping up in class a smoother and more active experience.
The main technologies implemented in this project are basic web languages: HTML, Javascript, and CSS. One of the main goals of the project was to be as simple as possible to minimize distractions, so we used the Bootstrap framework to keep our site organized and consistent. The backbone of our project is an online database driven by Parse that stores all of our chat log data, our user data, and the Power Point slides required to run our project. We tested this project in multiple classrooms with various class demographics. Results are generally positive, with most student users recommending this system to their other professors. The students enjoyed the comfort of being able to ask questions without anxiety or fear of embarrassment due to our anonymity feature we implemented. The professors greatly appreciated the increased amount of participation that Boip provided as well as their ability to answer questions on the fly without having to interrupt the lecture with students raising their hands. Overall, the tempo of the lectures were greatly increased and the general flow was improved.
Some key features that would be helpful if implemented would include a more integrated method to insert Power Point slides and a filtration system for the chatroom. Currently, chatting can get a little out of hand with spam and inappropriate messages. So far we have countered this by having the professor emphasize professionalism before his or her lecture, but a more blunt idea would be to implemented a chat filter that would block inappropriate key words. The second thing that would be helpful is a more integrated method of uploading slides. The method of uploading slides can be tedious as one has to constantly switch tabs to Google Drive to enable permissions and grab the URL of a slideshow, so hopefully in the future adding a friendlier method of adding slides would greatly increase the platform's usability and make it easier on professors.

Acknowledgments

This project is dedicated to our families back home. Thank you for supporting us through all of our good times and bad times. We want to give a big thanks to our advisor, Professor Ben Steichen, who has given us extremely useful information and feedback during the implementation of our project. Professor Steichen kept us on schedule and made sure our end product was extremely professional. Boip would be nothing without his help. Thank you for always supporting us and leading us on the right path. Finally we would like to thank Professor Silvia Figueira and Professor Angela Musurlian for taking the time out of their schedules to help us test our system. The feedback that we received from both you and our students helped us create the final product that we have today.

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1 Introduction

Every day students at Santa Clara attend multiple lectures and classes, which come in a variety of styles and sizes, ranging from just 10 students to up to 50 students. Naturally, the relationship between student and professor can vary depending on the size of the class as well as the length of the class. Professors have to manage hundreds of students per day, and it is rather tough for the professor to cater to every student's learning needs. Students tend to not make a conscious effort to initiate and participate due to various reasons, leading to a lack of interactivity between student and professor.

The obvious solution to improve class interactivity is for students to pose in-class questions about topics they are concerned with. However, not all students are comfortable asking their questions – especially to a class of up to 50 people. Fear of asking a "stupid" question or fear of disrupting the flow of class will often stop students from asking their question. This leads to the student falling behind in the lecture; rather than actually learning the material the student is forced to follow along at a pace he or she is uncomfortable with. The professor, being unaware of how said student learns, makes no adjustments to his or her lecture and just carries on with the topic. Sometimes the opposite happens and several students will have questions they need answered. The professor will not always be able to get to everyone's questions in time, and will only be able to get to a few students before having to continue on with the lecture. This leads to the same problem as before in which students will not have their questions answered and will have to carry on at an uncomfortable pace.

Currently at Santa Clara University some tools to address this are already in place, however they all have their flaws. Camino has a "Discussion" tab in which professors can post a topic that students can collaborate and post in. However, it is not exactly ideal enough for a professor to use during lecture as he or she will have to keep refreshing the page for new replies to pop up. Students may also feel uncomfortable posting questions online since there is no option to post anonymously. Some professors have also tried their best to increase interactivity among students by prompting for questions to be asked or providing worksheets for students to work on during the lecture, but not all professors prefer to teach in this manner. Twitter feeds, while active, lack some of the integrated features that we have implemented into our platform, such as the ability to upload Power Point slides.

Our solution is to design a web application that increases the interactivity between professor and student. We will create an "interactivity platform" that both students and professors can use in order to talk about class material. One way in particular that we plan on doing this is by creating a chat room. The platform is class-based, with each room being assigned to a particular course section. Students are able to ask questions to other students and the professor about any topics they feel uncomfortable about and have the option to do so anonymously if preferred. A professor is able to post Power Point slides that the chat

will center on, making lectures easier to direct. This allows the professor to accurately gauge his or her students' understanding of the course material, making changes to the lecture style if necessary. In order to prevent this from distracting class, the professor has authority over the platform, controlling whether it is active or not.

2 Related Work

While looking for work related to our project, we found some useful info in regards to implementation of our project. A lot of what we discovered had to do with students developing software for mobile applications[1], which we are thinking of eventually implementing for our project in the future. Overall our project seems rather unique in regards to the problem it is solving, but there are many useful sources out there in regards to its implementation.

Again, while creating our project we made sure to analyze solutions that are currently in place. The first one that comes to mind is a Twitter[2] live feed. When looking at the Twitter feed, we found that it possessed the tempo for a lecture environment. In order to differentiate ourselves from a Twitter live feed, we have integrated features that a Twitter feed does not have. For example, our power point slides are a key difference between a Twitter stream and our system. We also made sure to make the anonymity feature a unique feature that Twitter does not have.

In terms of school related platforms that are available, there are the Camino[3] discussion boards. The discussion boards have one key flaw that our system has addressed, and that is the tempo for a lecture environment. When utilizing the Camino discussion boards, one must continually refresh the page in order to see new responses. Although Camino has the strength of having the users automatically signed up for classes in their schedule, continually having to refresh the page to see responses defeats the purpose of making a lecture smoother and more fluid. It was due to this current solution that we opted for a chat room as the main form of communication for both students and professors.

3 Ethical Analysis

Engineers are encouraged to act in accordance with the common good, and as students we feel that helping other students learn material is a great way to aid the common good. It is the job of an engineer to solve and fix current problems, whether they be big or small. Although our engineering project may not address any moral issues, it does address some problems that exist today. Many of the problems we hope to fix with this project come from our experiences as students at Santa Clara, some of which are not exactly well known. An engineer is responsible to perform tasks or create solutions for those who do not have the same luxury or resources to solve them themselves. In this case, it is the students who are too shy to ask questions or do not exactly learn well from a professors teaching style. Aside from solving the problems of fellow students, we believe that this platform can also help professors with their classes and lectures. It is essentially impossible for professors to reach out to every single student they teach, so by introducing this platform it will be much easier for professors to analyze his or her student demographic in classes.

Another problem rises in the form of one of our main features: anonymity. While our intentions for adding an anonymous feature are good, we recognize that anonymity can be a tool that is easily abused. For example, people can freely spam the chat room or post distracting messages while the lecture is going on, which is the opposite of what we are trying to achieve with our project. For now, the main way to combat this is for the professor to stress professionalism and respect while using the platform. Perhaps in the future implementing a sort of toxic user control system that restricts a user from posting too many messages at once can counter this problem. To prevent toxic language, a filter function that does not allow users to post vulgar language in the chat would also be very useful.

Overall although this project does not address many ethical issues, it still addresses many of the normal challenges an engineer faces. An engineer is tasked with working towards the common good as well as for his or her customer(s). With that in mind, although we do not have a direct customer, we still potential users whose problems we would like to solve, namely professors and students. We hope that by introducing this interactivity platform to the curriculum, professors will be able to teach their course material more easily, efficiently, and effectively. We also hope that students will be able to learn a lot more easily, efficiently, and effectively from the professor as a result. This way, students will come out of class learning a lot more than they normally would and become better engineers as a result.

4 Requirements

The following requirements define the goals of the project outlined in the introduction. The functional requirements define features that must or should be done, while the non-functional requirements define how the functional requirements are achieved. Requirements are categorized into critical, recommended, and suggested. Critical requirements are absolutely necessary, recommended are highly desirable, and suggested requirements are not necessary but would be very nice to add.

4.1 Functional Requirements

Critical:

1. Platform will have a basic chat room
2. Power Point slides can be uploaded

Recommended:

1. Student accounts can appear as anonymous
2. Professors can use the chat to post polls

Suggested:

1. Platform is usable via mobile
2. Platform will have a reliable database allowing professors to analyze previous chat rooms and modify lectures

4.2 Non-Functional Requirements

Critical:

1. Platform will be responsive, working quickly and dynamically with optimal user experience.

Recommended:

1. Platform will be usable on multiple browsers

Suggested:

1. Platform will look aesthetically pleasing and clean

5 Use Cases

Below are a few use cases for our platform. Use cases are examples of how our system is to be used. The two main actors of our system are the students and the professors and as such, have included a number of cases involving both.

5.1 Use Case 1:

Name: Student asks question

Goal: User successfully enters chat room and asks a question to the feed

Actors: Student

Pre-conditions:

- User is connected to the website
- User is in the correct chat room/class

Post-conditions:

- Question is added to the stream, viewable by others in the chat room/class

Steps:

1. User enters site
2. User navigates to classroom, current feed is displayed
3. User enters a question, submits
4. Question appears, other users are able to answer/respond

Exceptions: N/A

5.2 Use Case 2:

Name: User views current feed

Goal: User views current feed so that they may project to class

Actors: Student/Professor

Pre-conditions:

- User is connected to the website

- User has Lecturer permissions

Post-conditions:

- Classroom feed is available to user

Steps:

1. User enters site
2. User logs in
3. User navigates to classroom, current feed is displayed with Lecturer permissions

Exceptions: N/A

5.3 Use Case 3:

Name: Lecturer posts slides

Goal: Lecturer successfully posts current lecture slides to feed

Actors: Lecturer

Pre-conditions:

- User is connected to the website
- User is in the correct chat room/class

Post-conditions:

- Slides are added to the stream, viewable by others in the chat room/class

Steps:

1. User enters site
2. User navigates to classroom, current feed is displayed
3. Lecturer clicks "Upload Slides" button on the side
4. User follows tutorial on page to upload the slides
5. Slides appear on the current feed

Exceptions: User must be a Professor for specific course

6 Activity Diagram

The general workflow of Boip can be graphically represented in an activity diagram. Figure 1 shows where the our Boip users begin and end, and their step by step actions. This first activity diagram shows the work flow for all users. Users begin on our site and have the option to log in. If they log-in, they can set their list of preferred courses which allow them to switch between course pages quickly. All users will be able to access all available course pages, from there they can choose between a variety actions. Users can view slides, ask or answer questions in the chat, and contribute to polls.

Figure 2 displays the activity diagram that professors will be represented by. Professors have access to everything that students can do, but they are granted additional tools. Our main focus was to make Boip easy to use, so these additional features can be accessed right in the course page and simply require a professor log-in. Professors have the ability to upload course slides and lead quick polls.

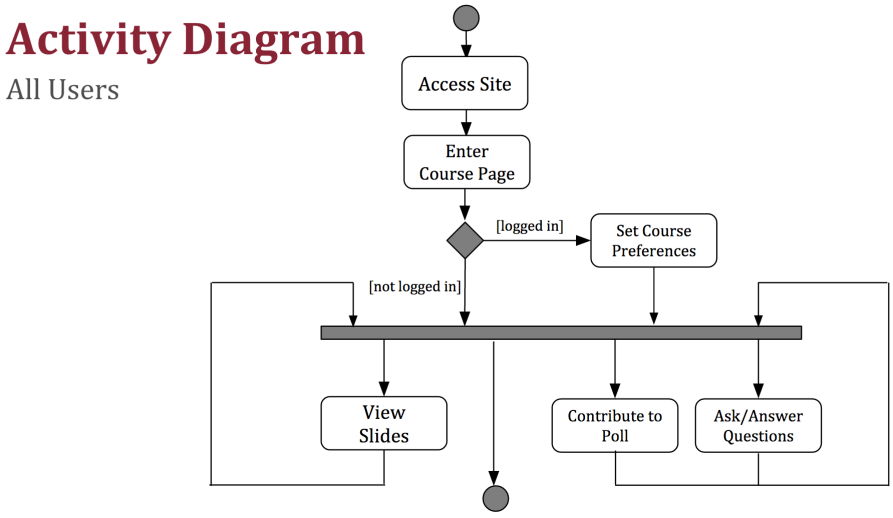


Figure 1: Basic Activity Diagram (Chapter 6)

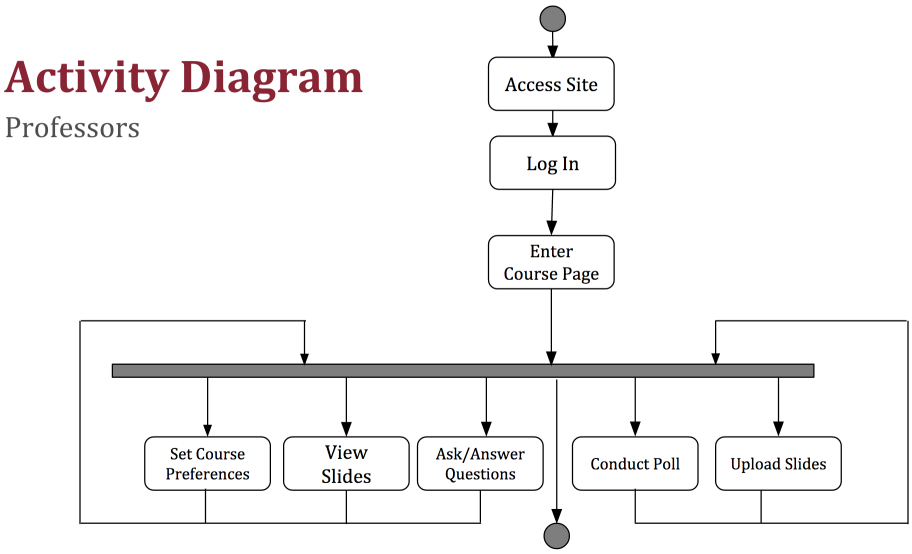


Figure 2: Professor Activity Diagram (Chapter 6)

7 Current Model

Figure 3 consists of a screenshot of a basic chatroom of our system. The main theme behind the system's design is simplicity. In order to achieve ideal usage in a classroom setting, the system must be as little of a distraction as possible while still providing enough utility to increase the interactive learning of the classroom.

The main feature is the chat room, located on the right hand side of a class page. Both students and professors are able to interact and speak with each other by typing in instant messages about the class material. The middle of the screen belongs to the professor's slides for the current lecture. Students are able to freely traverse the slides at their own pace while directing questions about the slides or the lecture in the chat box.

The top right corner of the chat room belongs to a few buttons that house a few key features that we have integrated into the system. The four arrows represent a fullscreen mode that eliminates both the top bar and the side bar, leaving only the chat room and slideshow on the screen. This mode is very useful for the professor during lecture, and we found that professors normally utilized this mode in our testing sessions. The side arrow allows the user to hide the chat bar if he or she wishes to only view the slide show. If you are a professor you get access to an additional button for quick polls that allows chat messages to be collected in a numerical fashion, contributing to the interactive lecture.

To the left of the page is a sidebar with quick links to the user's saved classes. Classes can be added to this list by clicking on the star located next to the class's name on the top of the slides panel. Additionally, professors will be able to access an extra link to upload their slides to the class page.

To upload slides, one must first go to his or her Google Drive and set the sharing permissions to be viewable by all students at Santa Clara University. Once that is done, the user can copy the URL of the Power Point presentation. The user then navigates back to the "Upload Slides" page and pastes the link into the text box we have provided. Finally, the user presses "Upload Slides" and the user will be navigated back to the chat room of the selected class with the slides uploaded.

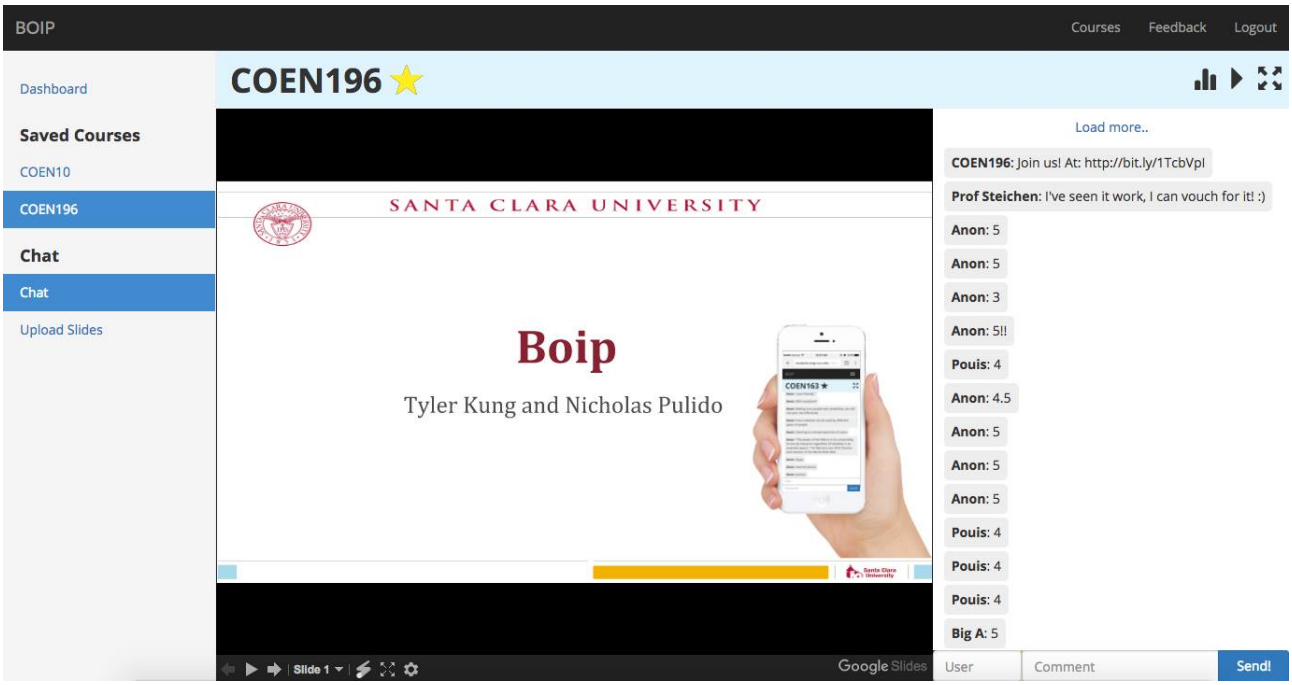


Figure 3: Current Model (Chapter 7)

8 Technologies Used

Below are a list of technologies we opted to use for our project. Being a web-based application, we used a variety of web tools including HTML and JQuery.

- HTML
- CSS
- Javascript
- AJAX
- Parse

We are choosing to use HTML/Javascript because not only are these the most common ways to implement web pages, but also because they are what we are most comfortable with. The goal is to make the page simple and easy to read, which Bootstrap's HTML and CSS framework, and Javascript can do effectively.

The goal of this platform is to be as productive as possible, eliminating most if not all distractions. These technologies make for a simple, yet elegant design that will maximize productivity and interactivity within a lecture whilst cutting down on potential distractions that a web-based client will provide.

Parse is an incredibly useful open source database. It is conveniently hosted on its own website and is the backbone of our system. All of our data from chat logs to user profiles are stored in the Parse database. We will have a database of potential chat logs so that professors can analyze their lectures as well as the students' questions during the lectures.

9 Testing Plan

Since this project is very applicable to Santa Clara University's current regime, we completed the implementation of the project in the middle of winter quarter. Due to the nature of this project, we were able to begin heavy testing in the second half of winter quarter as well as throughout spring quarter.

The main method of testing involved running the system through a normal lecture and recording the different reactions to using the system through observation. We tested the platform in 3 different lectures with varying demographics of students.

COEN 11 is a primarily freshman class, and as such, reflected some of the more negative things that can happen with our system. Initially the chat was spammed with various URLs and inappropriate messages, essentially providing an enormous distraction to the class. After taking this into account, however, we had Professor Figueira emphasize professionalism and conduct before starting her next lecture, and the class ran much more smoothly. Questions were asked in the chat that she was able to get to rather quickly, and overall the experience was much less distracting.

COEN 162 and 163 mainly consisted of upper classmen and reflected a much more mature side of using the system. The students here tested our system and attempted to break it by various means such as HTML injection. However, we planned ahead for that and received no bugs from said methods. The main takeaway from these two classes is that Boip functions at its peak when powered by a proactive professor. We found that the most feedback and chatroom usage came from the professor prompting students to answer questions, as the answers would all instantly pop up on the chat feed. No one had to raise his or her hand to give an answer, and everyone was able to see it. Another big takeaway is that the system may be a little awkward for newer users to use, as Professor Musurlian from COEN 162 took a few minutes to get going when using our system. However, once she did get it working the lecture proceeded very smoothly.

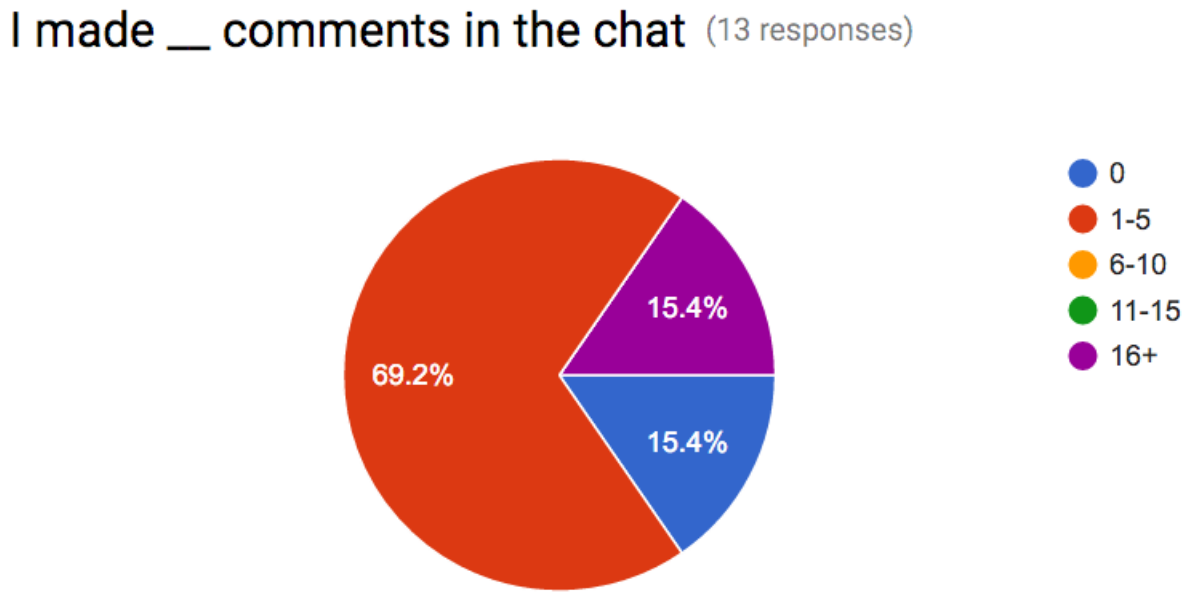
After the lecture, we instructed students to fill out a simple Google spreadsheet with a few questions about their use of the system. Questions included "Would you recommend this to your other professors?" and "What feature did you feel needed improvement?" The data we collected from this helped us analyze the strongest and weakest points of our platform and gave us a nice gauge on features to add in the future.

10 Testing Results

Reactions to using Boip were generally positive. We tested it in 3 total classes: COEN 11, COEN 162, and COEN 163. In all of the lectures we used Boip in, we found that students really enjoyed using the chat room's anonymity feature to ask questions. An overwhelming percentage of every class posted at least one comment in the chat room, as indicated by Figure 4. In addition to the comments made, students also found that they followed the lecture at least as much as a normal lecture.

Students' favorite feature was the chat room, as it was very easy to jump in and contribute to the discussion. Moreover, since the feed was very dynamic and easy to view, multiple answers and questions were able to be posted at once that the professor could respond to. Again, the anonymity feature was a very powerful tool for the students, as it allowed them to answer questions without the stress or anxiety of raising their hands. Of course, this came with a number of downfalls, as the lack of a chat filtration system led to some of the younger COEN 11 students abusing the anonymity feature to spam the chat and break it. The counter to this was the professor putting an emphasis on respect and professionalism at the beginning of the lecture. During the second run of COEN 11, the chat was a lot smoother and more respectful because of this.

The feature that needs a little more work is our slide show presentation. Although the students did not express a particular distaste for the slides themselves, they would prefer if the slides followed the tempo of the professor rather than having to traverse themselves. Our goal behind this was to give students more freedom at learning on their own pace, but this feedback was very useful for future implementation of our system.



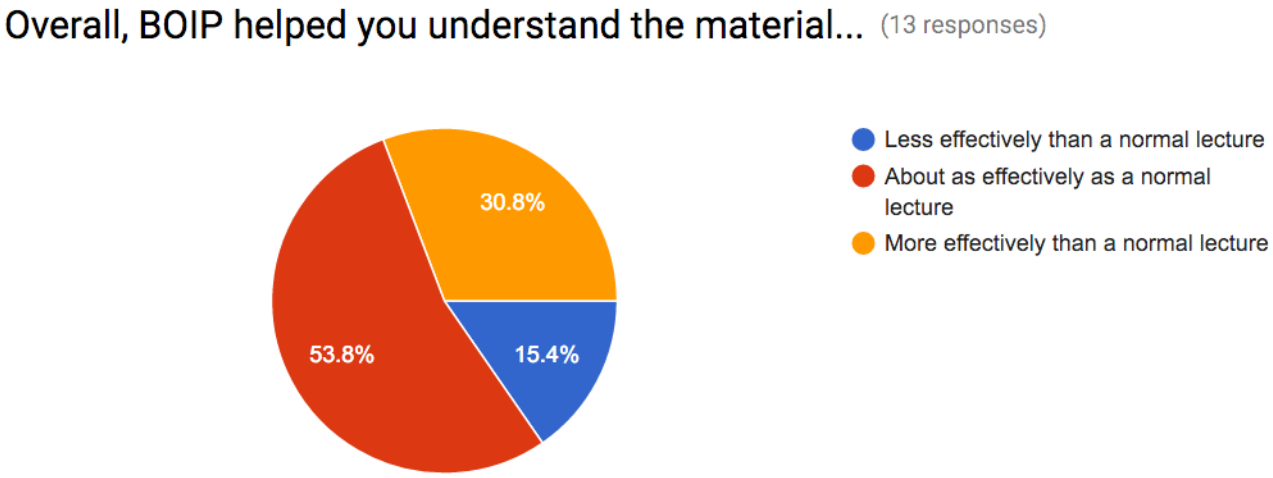


Figure 4: Test Results (Chapter 10)

11 Future Development

Based off of the feedback we collected, we feel that there are 3 main features would be incredibly helpful to our system if implemented. The first feature that would be helpful is a chat filtration system. Like we stressed earlier in the report, the anonymity function is a very powerful feature that can be easily abused. In classes of younger demographics especially, the anonymity function can be used to spam the chat with inappropriate messages, leading to an overall detrimental learning experience that defeats the purpose of our system. Some sort of chat filtration system that can limit the amount of messages sent at a time by a user or a system that can eliminate messages with key words would be incredibly useful to the usability of our system.

The second feature that would be helpful is a more integrated method of uploading power point slides. As it is, uploading slides to our platform can be a little tedious since the user has to switch among multiple tabs. A great way to improve the system would be adding a button to take you to the Google Drive while still being inside the Boip platform. This will reduce the hassle involved when uploading slides.

Finally, a very practical feature to add would be synchronizing user accounts with Santa Clara University's single sign on system. This way users would automatically have all their classes synced up and loaded into their favorites, and they would not have to sign up or favorite each class. On the professor side, the professor's personal preferences for each class can be saved, and they would know each person in their student roster in the chat room as well automatically.

12 Lessons Learned

This project taught us a number of things about developing an ideal product for consumers. Although we do not have any direct consumers, we appealed to two main parties with our project: students and professors. The first lesson we learned is to implement early and test often. We finished the actual implementation of our project during Winter quarter, and as such had plenty of time to test and gather data for our platform. Because of this, we were able to really fine tune our product to suit both parties' needs.

The second lesson we learned is to seek feedback from multiple sources. In the grand scheme of things we want this platform to be usable across not just computer engineering classes, but in all classes. Because of this, it is very important to seek feedback from both technical sources and non-technical sources. If we are able to get people who aren't as technologically comfortable as we are to use our product effectively, then we believe we have created a simple and elegant product.

The third and final lesson we learned is to outline our technologies and design early. Prior to the implementation of Boip we were not familiar with many of the languages and procedures of creating a usable product. However, because both of us sat down with our advisor and discussed exactly which methods would be most effective, we spent more time actually coding the project instead of learning how to code the project.

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