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SCHOOL OF ELECTRONIC ENGINEERING**

Status Report

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Chapter 1 - Introduction

1.1 What is the Problem?

A common issue a lecturer may face, especially in the field of mathematics, is being unable to directly address common errors that students may come across. This problem arose directly from Conor Brennan's experience as a lecturer for Engineering Mathematics. These common errors mean that students will keep making the same errors until they are addressed. This problem remains a constant because while education curriculum in the field of science and history progresses rapidly, the curriculum in the field of mathematics has generally stayed the same [1].

1.2 Why is there a Problem?

Students have been taught primarily based on the concept that they must be able to reach a particular level of fixed intelligence rather than their capacity to learn [1]. This leads to students needing to be taught on an individual level. Teachers are expected to recognise common pupil errors, while understanding how they arise, and how to prevent them [1]. All errors must arise from previous occurrence [2]. Errors can be a powerful tool to diagnose learning difficulties and consequently direct remediation [3].

Several people have attempted to modify teaching methods to include specific types of pupil to pupil discussion into mathematic learning to help avoid these common errors. This draws several principles that suggest how one might design more effective mathematic lessons [2]. This is where the project for web resources of self-diagnostic testing can help.

1.3 How will the problem be addressed?

The idea of web resources for self-diagnostic testing is that outside of regular classes students can test their understanding of course material. These tests are specifically made with common errors in mind, so that when a student takes the test, with every question they get wrong a different common error can be addressed. This allows for the students' issues to be addressed on an individual basis, while not taking time out of a teacher's busy schedule. Rather than similar test that student may take and make mistakes on, but then the errors they made are never addressed. This web application will also have a process where students can upload their work if they come up with a result that is not available to them. In the next

section, it is discussed how this these resources are a good solution for the problem and how the solution will be implemented.

Chapter 2 – Proposed Project and Plans

2.1 Introduce the Project

The scheme of this project is based on web application development and online learning. The core building blocks of web-based systems will be used incrementally to create the web application project [4]. The project is to develop a stand-alone web application that has a set of web resources that will aid students in self-diagnosing of their mathematical ability, as well as identifying and correcting common errors that students may have about basic mathematics. These resources will comprise a set of multiple-choice questions that are arranged by topic, so that the student will be able to focus on specific areas that students may find challenging [5].

Each incorrect multiple-choice answer will correspond to one of several common errors. So, when a student chooses an incorrect answer, the system will trigger a short video to be played outlining the common error and explaining how the student can rectify this error. Interaction with the system will be two way with students being able to take test, but also being able to upload solutions to be shared with the student's teacher. This will allow teachers to identify new common errors and misunderstandings that were not previously included in the system [6].

Also, the results of the student's test will be recorded in a database so that teachers can identify if students are more likely to get the correct answer or if students are more likely to make the common error over the correct result. These larger errors can then be addressed to the whole class.

2.2 Full Project Plan

2.2.1 Completed Work / Semester 1

Work on this project began at the end of Semester 1 Week 3 on October 10th after the first project meeting with Conor Brennan. During this meeting, we discussed the three projects that Conor is supervising this year, along with what work everyone should begin working on the following week. This means that work for this project didn't officially begin till week four of semester one. Semester one was spend working on learning about common errors

and web application development techniques. A web application map shown in Figure 2.1 was constructed and a layout of the web application was created.

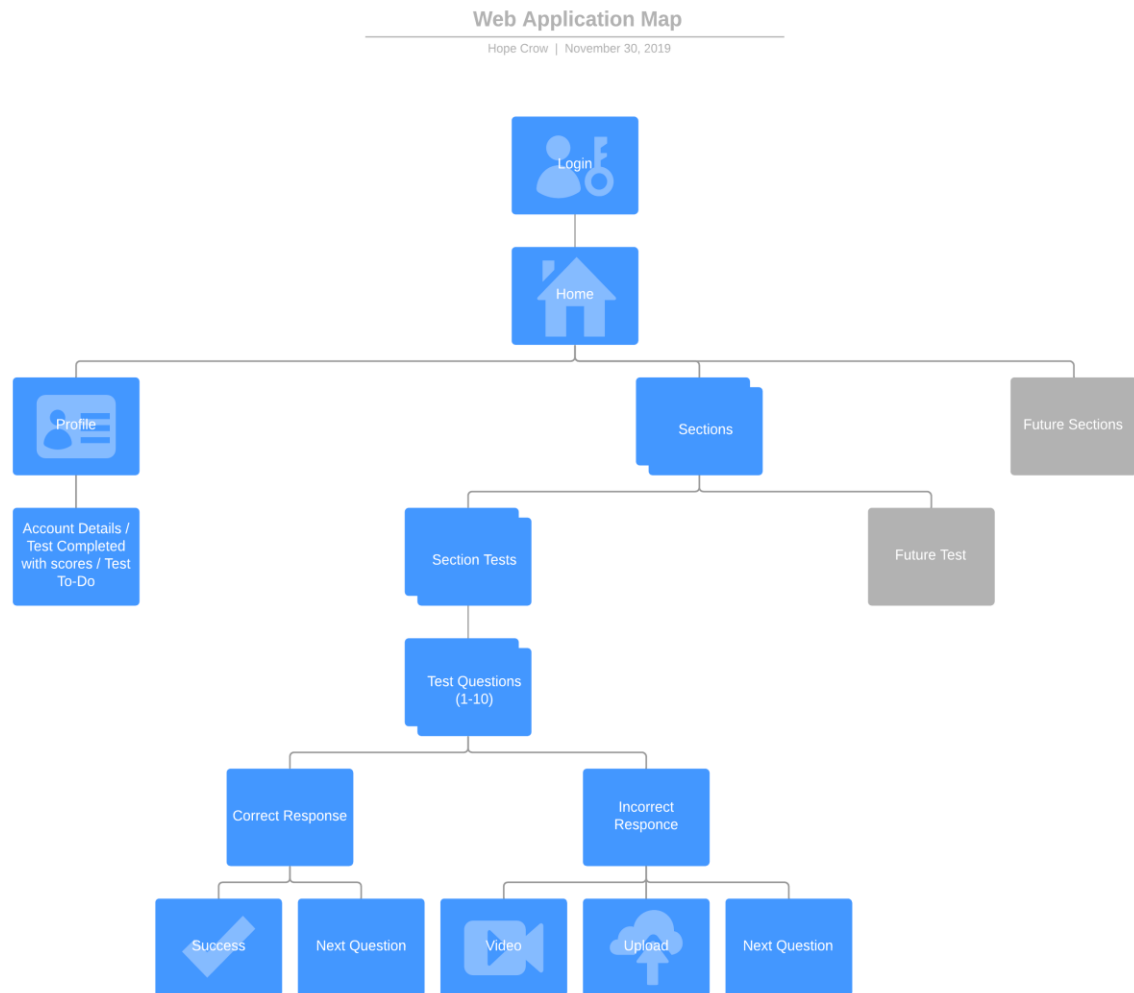


Figure 2.1. Web Application Map

By the end of the Semester, a basic dynamic web application page had been created using a Tomcat Server on Eclipse [7,8]. This Application was made in two forms using Java Servlets and JavaServer Pages [9]. Although this seems like a small step, it was progress towards developing the full web application. Overall, semester one was spent developing ideas of what would go into the web application and starting the development of such a web application. Whereas, more of the application development will done in Semester two while taking part in a Web Application module [4]. To get a better look at what went on during semester one, Figure 2.2 shows a Gantt chart of the all work completed in semester one.

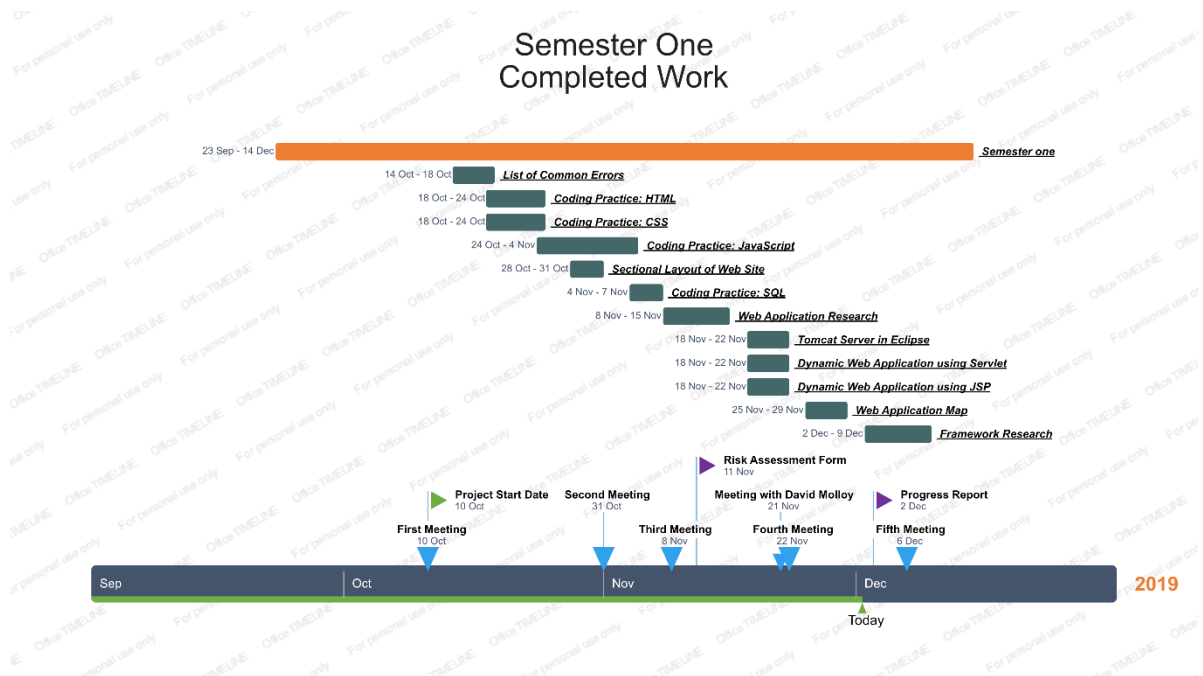


Figure 2.2. Semester One Gantt Chart of Completed Work

2.2.2 Upcoming Plans / Semester 2

Figure 2.3 shows a Gantt chart of the future plans for this project starting back in Semester two after the Christmas holiday. This is obviously a rough outline of semester two, as work during the semester could progress at a different speed.

Next semester's work will consist of creating a few math tests that will be available on the website for users to take, before diving into developing the front-end, back-end, and database of the website [4]. Finally, the error videos must be created and embedded into the application, before testing the system begins before the final report is due.

After the report is due, any final tweaks that need to be made before the Project expo can be made and tested, so that the final version of the project can be presented at the Expo.

Semester Two Future Plans

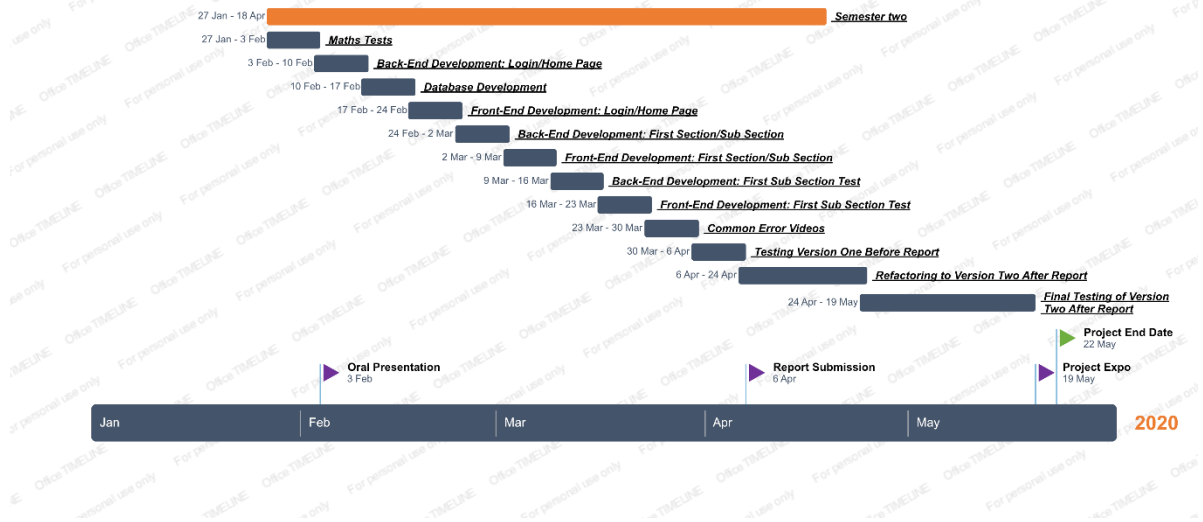


Figure 2.3. Semester Two Gantt Chart of Upcoming Plans

Chapter 3 - Conclusions and Further Research

This web application is made to help solve common errors within the field of mathematics. Even though this application was made for maths, that does not mean that it could easily be modified to help in other subjects such as writing. This application could also evolve into its own online learning platform, which some scholars debate could take over classrooms learning in the future [10]. For now, we could imagine this technology being used by teachers who would like to assign test to students or help them prevail in problem areas.

While there is plenty of evidence around to say that error correction can help students. Once this project is completed, it can be tested by students to divulge into more of the research of error correction. Which could easily be made possible because of the database integrated into the project. From this, we can retrieve data about students that have taken test and see how common errors are within students and how the student improves on these test over time as they continue to take them and train their knowledge of common errors.

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