NEA

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# Analysis

## Introducing the problem

### Background

Exeter College is a general further education college that offers a wide range of courses, there most popular of which is A levels for post 16 students. They are an award-winning college with many on site facilities located in the city centre of Exeter. Students from all across Devon enrol at Exeter College, subsequently Exeter College educates 10000+ students for any academic year.

The physics department at Exeter College is comprised of three teaches and has roughly 200 As level physics students and 150 A level physics students at any given time. Typically, a topic that has been notoriously difficult for students has been electricity.

Pino is one of the A level physics teachers at Exeter College and wants a visually interactive tool to help make teaching the electricity topic more intuitive for her students.

### Problem

There are two main problems that the new system will attempt to solve. One, making the electricity topic for AS level physics more intuitive to understand. Two, improve the limited functionality that the current system provides.

### Research

## Users and their needs

### End users

The new system will be a website accessible by anyone and can be used without making an account. However certain features will only be accessible by those who have an account. When making an account you will need to select if you want to make a teacher or a student account. The teacher and student accounts will have the same functionality when it comes to the circuit simulator. However, the teacher account will be able to create a classroom to which they can invite students to. They will then be able to send circuits to the students for them to view and play around with.

### Interview

Q: Would you use the current system to assist in teaching the electricity topic?

A:

Q: What features do you like about the current system or what does the current system do well?

A:

Q: What features do you not like or problems with the current system?

A:

Q: What are the most important features that you would like to see in the new system?

A:

Q: Are there any processes or calculations you would like done by the new system?

(for example, showing the iv characteristic of a filament lamp or calculating the voltage at different parts of the circuit)

A:

Q: What is the most difficult part of the electricity topic for students usually?

A:

Q: Do you have any ideas on how the new system could help the students understand these parts of the topic?

(for example, some visual way of showing current flowing or resistance increasing as current increases)

A:

Q: Are there any other comments or ideas about the new system?

A:

### User requirements

The new system should be able to provide a grid based circuit simulator.

## SMART Objectives

1. Project should be a website which does not require an account to use.
2. Website should have a sign in and sign-up page.
   1. Requires a unique username.
   2. Requires a strong password.
      1. At least 8 characters.
      2. At least one special character.
      3. At least one number.
   3. Requires an email.
      1. That email should be verified.
   4. Select whether the user a teacher or a student.
3. The circuit simulator should be grid based.
   1. The components of the circuit should be able to snap onto the lines of the grid.
4. There should be minimum components for the simulator.
   1. There should be a component wire.
   2. There should be a component filament lightbulb.
   3. There should be a component cell.
   4. There should be a component battery.
   5. There should be a component voltmeter.
   6. There should be a component ammeter.
   7. There should be a component switch.

The website should have a sign in page.

The sign up for the website should have a unique username, an email, and a password.

The password should have a capital letter, numbers and a special character with a length of at least 8

The user should be able to drag and drop different components onto a circuit grid.

Basic components that should be added are: a variable resistor, a filament lightbulb, a cell, a battery, a wire, a voltmeter, and ammeter, a switch

Advanced components to be added if there is time: thermistor, capacitor, diode, LED, fuse, LDR, inductor

The user once signed in should be able to save their favourite circuits to their account to be pulled up later.

The users email should be verified upon sign in.

The user should not be required to sign in in order to use the website.

## Modelling the problem

# Design

# Solution

# Testing

# Evaluation