Department of Computer Science
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Final Year Project
Project Plan

Interactive Web Content for STEM

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Background

STEM is a short term for Science, Technology, Engineering and Mathematic. In the age of information, most fields of study and application such as engineering, accounting, medicine play an important role in modern economies, they are indispensable to technology driven society and they rely on a strong STEM background. However, STEM disciplines are often regarded as difficult and boring, it is common that high school students from Hong Kong prefer commercial electives rather than STEM related electives. As a result, only few high school graduates are proficient in STEM. Besides, STEM related jobs are continuously growing worldwide. According to the report of U.S. Economics and Statistics Administration. STEM related jobs grew 24.4 percent over the last decade, and STEM related jobs are predicted to grow by 8.9 percent from 2014 to 2024 [2]. The current STEM workers are not adequate for the growing demand in the society. It is clear that STEM fields virtually affect every component of our society. Therefore, a solid STEM education is essential to sustainable economic growth and competitive advantages [1].

Apart from our society, being proficient in STEM is beneficial to personal life. As STEM disciplines encourage creativity, critical thinking and problem-solving, it helps teenagers to develop a logical mindset. Students with logical mindset are able to solve complex questions and develop solutions for real world problems in different disciplines. Besides, most of the STEM related jobs are well-paid and secured. According to the report of U.S. Economics and Statistics Administration, the salaries of STEM job is 29% higher than non-STEM job and the unemployment rate is lower than non-STEM job [2]. Therefore, being proficient in STEM increase personal capability and competence in different industries, and it is beneficial for pursuing a better job in the future.

Although there are many STEM resources in the internet, most of them are designed as teaching tools for teacher only. There are few contents for students to learn in the internet. Therefore, we would like to develop a platform with interesting and interactive content related to STEM to assist students in learning STEM. The platform will focus on science and mathematics as we think that engineering and Technology are the extension of science and mathematics. Also, people are familiar with science and mathematics. Therefore, it would be easier for teenagers to study STEM and develop interest in STEM.
**Objective**

There are two objectives in this project. First and foremost, this project aims to enhance teenager’s knowledge and motivation of STEM by providing content related to science and mathematics in a web platform. The content needs to be interactive and interesting to attract teenagers and give a positive image of STEM that learning STEM is funny and beneficial. The platform will consist of different tutorials, quizzes and games, these are the most popular and common web contents in e-learning platform. Also, the platform needs to be user friendly to improve the user experience. With good user experience, users can study STEM topic more efficiently and it can increase the number of teenagers to join the platform. The goal of the project is to raise user’s interest in studying STEM-related topic and assist teachers to help students to develop STEM background.

Besides, the project will also promote the importance of STEM to the society. It is common that students do not know the practical usage when they study STEM topic, the platform will introduce some real-life usages of the STEM topics so that teenagers will have a better understanding on what they can achieve in the future with STEM disciplines.

Second, this project helps to track and analyze the progress of every user. The platform will store the history and performance of user in database. The data are used to analyze the preference of user such as what kind of content and topic are the most popular and the STEM level of teenagers in different age group. With the data of the users, we can design a better STEM education and develop better application for STEM learning in the future which helps sustainable development of STEM Education in Hong Kong.

**Project Scope**

The project will consist of different interactive contents. A web application will include different topics related to science and mathematics. Each topic will consist of different content as a tutorial for user to study STEM. However, most topics included in the website are related to secondary school syllabus due to the time constraint. Also, there will be limited topics as we need time to design interactive content for each topic.
In the web application, the website will also provide features to improve user experience. For instances, users are allowed to search for different topics and attempt a quiz after completing the tutorials. Also, there will be some tooltips for user to study the topic more efficiently. Besides, users are allowed to return feedback to us. By collecting different user experience, we can further improve our interface and user experience.

**Methodology**

To achieve our objective, we would like to build a web application for secondary school students to study STEM. The user interface of the application will be built using Angular 6. There will be interactive contents related to STEM topics in the platform, students can first interact with the application and try to understand the topics and finish some online exercises and quizzes at the end. Most of the interactive contents will be built using JavaScript. Also this application will include features to make the learning platform more user friendly and comfortable for secondary school students.

The features are as follow:

User profile: every user will have their own profile after they registered as a user. User need to provide their nickname, gender, age, education background in registration form. The user profile consists of user information and achievement. User will obtain an achievement when they complete a topic. With the achievements, User will feel more satisfied and be motivated to obtain more achievement which mean study more topics.

Search function: the application will provide a search box for user to search for a particular topic. When user enter a letter in the search box, the system will filter the topics and show the list of filtered topics to the user. User can utilize this function to select a particular topic easily. This can give user a more comfortable experience.

Feedback System: a feedback system is provided in the application, user can submit feedback form using their own account. User can give opinions on the application or the design on STEM contents. The feedback system is used to collect opinions to help us improve the application in the future.
In order to achieve the second objective, we need to design a database to store user data. As we need to collect the input when user interact with the application, an application programming interface will be built for receiving user data by Post method. The API connect to the database and store the data. After collecting enough data, we will apply some basic analysis and summaries the data.

**Schedule**

| September 2018 | Prepare Deliverables of Phase 1  
Select appropriate STEM topic |
|---------------|--------------------------------------------------------------------------------|
| 30 September 2018 | Deliver detailed project plan.  
Deliver project website |
| October 2018 – January 2019 | Design interactive content for each selected topic  
games, quizzes)  
Design and setup Database  
Implement the interface and functions of the platform |
| 7-11 January 2019 | First presentation |
| 20 January 2019 | Deliver preliminary implementation  
Deliver interim report |
| January 2019 – April 2019 | Develop Final Product  
Test and Debug  
Collect feedback from teenagers, then improve the functions  
Add more features |
| 14 April 2019 | Deliver final report  
Deliver finalized implementation |
| 15-19 April 2019 | Final presentation |
| 29 April 2019 | Project exhibition |
| 29 May 2019 | Project competition |
Reference

[Accessed: 2018, Sep 26]

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