

## Level 4 Individual Project: Project Summary Report

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*Exerciser - a tool allowing students to practice examples and acquire the necessary way of thinking for their area of interest*

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Learning and most importantly teaching somebody how to “think” like a computer scientist, mathematician or any other kind of specialist cannot be achieved easily. Currently in schools and universities, this is done by delivering raw theory, handing books to read and going over several independent examples. What follows is examining how successfully students can solve difficult problems related to what they have seen and read. However, students are rarely given the opportunity to exercise, to follow the process of thinking a specialist undertakes while solving the presented problem, or to be told why they should approach it in a particular way. The option for students to be able to go back and forward between the steps that are required to solve a problem and review parts they don’t find straightforward are both crucial for the learning process. Last but not least, the steepness of the learning curve often needs to be reduced as students’ brains get overloaded. Instead of acquiring the key techniques for solving a problem, students instead are left feeling frustrated and lost in the struggle of finding a solution that works.

A potential solution to the issues described above would be a computer application that allows students to go over a series of examples of gradually increasing difficulty, complete with a step-by-step explanation about the thinking process. Such a tool has recently been developed as a University of Glasgow PhD project. Its aim was to attempt to minimise the steep learning curve students have to overcome when they are taught a particular way of thinking. The idea and the current implementation are good with the only exception that it is a Java application and must therefore be installed on all computers it has to be used on.

The goal of this fourth year project is to therefore implement and deploy a web-based application with similar functionality, and use this application in schools. This ensures portability, as users of the application will only require a computer with an Internet connection and Web browser to use it.

Currently, the following major components of the project have been implemented:

- the implementation of a database to store the provided examples;
- a user-friendly interface for students that allows them to select an example to work on and go through it step by step, together with explanations and practice questions; and
- logging of data to analyse how students approach each example.

A feature still to be implemented is a teacher’s interface to generate a unique 7-digit random number for identification of their school, and the ability to see how their students perform. An extensive evaluation of whether the new application is more accessible and easy to use will be conducted in schools with the assistance of teachers. Depending on the time left after analysing the results of the evaluation and finishing most of the dissertation, an extension to the project may be

added. A further feature could be an interface for the creation of examples. At the moment, they can only be created via an interface provided by the previous project described above.

One of the major issues that needs to be dealt with is to give as much control to users as possible. This includes the ability to resize different components of the interface to suit users' needs. Furthermore, the design is intended to support responsiveness to changes in window size as well as cross-browser compatibility. These require more time than expected. However, this wouldn't affect the future progress of the project as they are addressed at an early stage and enough time will be dedicated to resolving them.

In summary, the project is developing according to the schedule. Apart from the UI issues, most major components are present and the evaluation stage of the project will be started as soon as Semester 2 begins.