**Analysis of Problem**

The problem that I am addressing is the lack of online revision resources for AS Physics, especially interactive ones. At GCSE level, there are many revision tools in place, such as GCSE bitesize, but at A Level, I think there is an inadequate provision. Providing a tool will definitely help other taking AS Physics, and provide a more fun way to revise.

At the moment, the majority of physics revision materials consist of past papers. While this is a very effective method of revision, I feel that there is little to learn from this in terms of pointing out which areas need revision. This is why I would like to include in the tool a way of feeding back to the user what they can go over to improve their knowledge. In terms of content, I think that past exam questions are suitable, especially the multiple choice part of the paper. In order to use these questions effectively, I will need to create a database with all past paper questions in it, and have fields related to what topic they are from within the course and what could be revised if the user got that particular question wrong. The problem could be that the database is too large for the program to be distributed appropriately. This is something I would need to investigate.

The users would obviously be those taking AS Physics, however I could extend the program once completed and produce a version for A2 Physics or maybe even other subjects. This small user group means that I can have very specific features to accommodate to their needs. The program would need to be relatively easy for them to access both at home and at school, so I could implement it in a web page – maybe as part of the school website. The user interface would need to be very simple, as I do not know the level of competence with IT of the user. The critical part is the feedback. The user needs to know how they have done, and what they got wrong. This way they can focus their revision once they have used the tool, and possibly it could hold their scores, and show how they have improved.

I did a survey in the AS Physics class, asking questions on what they would want from the revision tool. The most popular features were that there would be a mixture of different types of questions, which means I would need to provide a mark scheme for the user to mark their own work on long answer questions. They also preferred the questions to come from past papers, which means the inclusion of a database with all the questions on. The students also were very keen on having a form of feedback, so as well as showing their scores, I could include a database that updates every time the student uses the software with their scores, so they can access it and track their progress. The favoured distribution of the software was to be given to each student digitally for their home PC, possibly shared using a service such as dropbox or Google drive. The problem here is that the student would need to be competent at using that service and also, since I plan on developing the program in Java, they would need to be able to run a .jar file which requires an installation of the Java runtime environment. In the documentation I will have to include installation instructions for the Java runtime environment as well as instructions on how to run the program. A popular suggestion for additional features was a glossary with key terms and formulae for each topic. The feedback on how effective as a revision aid this would be was very positive, leading me to believe that this is a relevant and useful tool to be developing.

I have decided to create the following specification for the program based on the survey results:

* A quiz type program.
* Mixtures of multiple choice and 1 word answer questions.
* Questions relating to topics chosen by the student.
* Feedback given to the students, in the form of a score and what the student needs to work on.
* Record of previous scores in each topic on a database.
* A formula sheet provided, possibly a pdf file stored in the program directory.
* Easy to use UI that can be displayed smoothly on any system.
* The ability to request and fetch the information from the database promptly.
* Installation instructions for JRE.

The main source of data will be the collection of Edexcel Physics AS Papers available on their website. I will store these in a database, in the form of 2 tables, Question and Answer. Papers that rely on diagrams and images will have to be omitted.

Here is a basic data flow diagram showing the structure the program will take:

Student

Selection of topic to revise

Program reads students selection

Database of questions and answers

Questions & answers

Request for questions and answers in the topic

Program stores questions & answers as variables and checks to see if the student is correct

Student

Questions

Answers

Student’s score, grade and areas to revise

Here is the Entity-Relationship diagram for my database. It is a simple database with 2 tables to avoid any errors and complications with the data.

Answer

Question

In the case of a multiple choice question, I will store all answers in the Answers table, leading to an ER diagram as such:

Question

Answer

I think that overall, this tool will be successful and useful for Physics students, because often an interactive approach to revision is the most useful, especially with a feedback element. This project is definitely feasible, and I can see it being a well-used tool for future AS Students. It also has the potential to be expanded for other subjects, such as A2 Physics and other exam based courses.