COMP (1682) Project Proposal

An Interactive Web Application to motivate learning of programming

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1   Overview

The project will investigate the different ways of learning programming as well as the key motivating factors affecting learning among first year undergraduate CIS students. Nowadays Software Engineering is one of the most sought after professions all over the world, therefore as future IT specialists the students should possess very good applicable practical skills, in addition to the theoretical knowledge. Without an adequate motivation it is typically very difficult for new students to develop good programming skills, which requires a lot of practice.

"The challenge of preparing graduates for a fast-changing work environment calls for the development of an effective learning framework. In this regard, technology is often used to enhance students' engagement in learning and their academic achievement" (Carle et al., 2009, Roth et al., 2008, Tan, 2006 and Yu et al., 2006).

"However, students nowadays will easily lose enthusiasm and interests in learning computer programming, especially when they experience repetitive failure in practising on their own. The need to improve the teaching and learning of computer programming thus calls for special attention to the factors affecting students' learning motivation" (Jenkins, 2001).

The proposed web application will let the students to practice a chosen programming language (Java, C#, SQL or JavaScript) on their own. The exact programming language is not decided yet, but it will be clear after a questionnaire is sent out to the students. The application will involve some quizzes and small games, which will make the time spent more fun and motivating. Also there will be implemented a score and progress functionality. At first everything will be very easy for the beginners, but it will get more difficult as the student progress through the learning environment by collecting points.

Apparently the development of the application or at least a working prototype will not be an easy task. However I believe that I have the necessary technology skills in order to have a successful final product. The courses Web & Application Development, Advanced Programming and Database Applications Technologies from 2nd Year were very pragmatic and useful. The skills required for this project's application are ASP.Net with C#. SQL, OO concepts and little bit of HTML and CSS. First class

grades acquired from the courses above motivate me that this project will be a successful one.

In order to evaluate the effectiveness of this application, it will be tested by students to see if it would have any impact on their learning and if it helps to get them more confident in programming.

Keywords: learning, motivation, e-learning, programming, self-study, education, interactivity

2   Aim

The aim of this project is to develop an innovative learning application/website for Year 1 CIS student to learn programming basics by "doing". The long term goal is to motivate learners.

3   Objectives

3.1 An Investigation Report [16.0]
3.1.1 The investigation report will consist of literature review and review of existing similar products.
3.1.2 Literature Review [11.0]
    3.1.2.1 Search for articles, journals and books [2.0]
    3.1.2.2 Read the related material [7.0]
    3.1.2.3 Write and finish off the Literature review [2.0]
3.1.3 Existing Products Review [5.0]
    3.1.3.1 Search for similar products [1.0]
    3.1.3.2 Test, compare and evaluate the products [2.0]
    3.1.3.3 Write and finish off the Product review [2.0]

3.2 Design documentation [14.0]
3.2.1 Several design documents will be produced as a result. It includes the statement of requirements, series of design diagrams and the user interface design.
3.2.2 Statement of Requirements [4.0]
    3.2.2.1 Create a questionnaire [1.0]
    3.2.2.2 Analyse results from the questionnaire [1.0]
    3.2.2.1 Gather and write the requirements [2.0]
3.2.3 UML Diagrams [3.0]
    3.2.3.1 Design Use-Case diagrams [1.5]
    3.2.3.2 Design Class diagrams [1.5]
3.2.4 Entity Relationship Diagram (ERD) [1.0]
3.2.5 User Interface Design [6.0]

3.3 Product Implementation [17.5]
3.3.1 This objective involves creating and populating the database to be used and development of the product.
3.3.2 Database Implementation [3.5]
    3.3.2.1 Create the tables [2.0]

            3.3.2.2 Apply normalization rules [1.0]
            3.3.2.3 Populate the tables [0.5]
        3.3.3 Web application development [14.0]

3.4 Testing [7.5]

        3.4.1 The testing documentation involves testing the web application as well as the web application
        3.4.2 Database Testing [3.0]
            3.4.2.1 Create test plan [1.0]
            3.4.2.2 Test the database [0.5]
            3.4.2.3 Review the results [0.5]
            3.4.2.4 Fix if necessary [1.0]
        3.4.3 Web application Testing [4.5]
            3.4.3.1 Create test plan [1.0]
            3.4.3.2 Test the web application [1.0]
            3.4.3.3 Review the results [0.5]
            3.4.3.4 Fix if necessary [2.0]

3.5 An Evaluation Report [5.0]
3.6 A Reflection Report [5.0]

Project estimated duration [65.0]

4   Legal, Social, Ethical and Professional

This project's final product will be developed only for the needs of Year 1 undergraduate students, so it will not require any authorization from the university (as long as they are over 18). Therefore there won't be any underage student involved in the process of requirements gathering and testing. But as the requirements gathering involves handing questionnaires to collect relevant information, a permission by the Research Ethics Committee will be required. Also the questionnaire forms must be designed and written in compliance with the Data Protection Act (1998).

The confidentiality of sensitive data must be signed off by the end user. The privacy aspects will be considered and an encryption will be required when retrieving and saving data to the database. To prevent misuse and going against the law, at the end of the development all collected data will be destroyed.

The project will involve comparing similar products available (functionality and design). All the material (images, sounds and content) to be used in the web application must comply with the Copyright, Designs and Patents Act (1988). Also this involves properly citing and referencing all the sources used while writing the Literature Review or simply the whole project.

To prevent any social issues it will not be required from the users to enter their religion, sex, gender and age, when they register.

A professional manner will be followed by taking under consideration BCS and IEEE standards. Properly planning and managing the project will prove this.

5   Planning (see appendix A)

As the life of the current plan is unpredictable and open to changes (probably many times) at some point, this will require the Rapid Application Development (RAD) Prototyping approach using the 'MoSCoW' methodology to control the process in an evolutionary way. Building an initial prototype as early as possible will be a very significant step. Also an iterative concept will be required in order to test and get feedback from the end-user.

In general, RAD approaches to software development put less emphasis on planning tasks and more emphasis on development. In contrast to the waterfall model, which emphasizes rigorous specification and planning, RAD approaches emphasize the necessity of adjusting requirements in reaction to knowledge gained as the project progresses (Wikipedia, The Free Encyclopedia, 2015).

Using UML will be a big part of the design phase. Its role is to show the actions of the users involved in the system and help to create the prototype by simply designing the Use Case and Class diagrams.

The project objectives will be managed by creating a Gantt chart in MS Project. Adjustments would be made if required during the length of the project. Monitoring this plan at all times will reduce the risks of fail and keep up with deadlines.

6   Initial References

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Appendix A – Gantt Chart

	◢ **Investigation Report**	**17 days**	**Mon 02/11/15**	**Mon 23/11/15**
	◢ **Literature Review**	**12 days**	**Mon 02/11/15**	**Mon 16/11/15**
	Search for reading material	2 days	Mon 02/11/15	Tue 03/11/15
	Read the related material	7 days	Wed 04/11/15	Thu 12/11/15
	Write Literature Review	2 days	Fri 13/11/15	Sun 15/11/15
	◢ **Existing Product Review**	**5 days**	**Tue 17/11/15**	**Mon 23/11/15**
	Search for similar products	1 day	Tue 17/11/15	Tue 17/11/15
	Test, compare and evaluate findings	2 days	Wed 18/11/15	Thu 19/11/15
	Write the Existing Products Review	2 days	Fri 20/11/15	Mon 23/11/15

Task Mode	Task Name	Duration	Start	Finish
⮕	⊿ **Design Documentation**	**14 days**	**Tue 24/11/15**	**Fri 11/12/15**
⮕	⊿ **Statement of Requirements**	**4 days**	**Tue 24/11/15**	**Fri 27/11/15**
⮕	Create a questionnair	1 day	Tue 24/11/15	Tue 24/11/15
⮕	Analyse results	1 day	Wed 25/11/15	Wed 25/11/15
⮕	Write requirement	2 days	Thu 26/11/15	Fri 27/11/15
⮕	⊿ **UML Diagrams**	**3 days**	**Mon 30/11/15**	**Wed 02/12/15**
⮕	Design Use Case diagrams	1.5 days	Mon 30/11/15	Tue 01/12/15
⮕	Design Class diagram	1.5 days	Tue 01/12/15	Wed 02/12/15
⮕	ERD	1 day	Thu 03/12/15	Thu 03/12/15
⮕	User Interface Design	6 days	Fri 04/12/15	Fri 11/12/15

Task Mode	Task Name	Duration	Start	Finish
⮕	⊿ **Product Implementation**	**17.5 days**	**Mon 14/12/15**	**Tue 05/01/16**
⮕	⊿ **Database Implementation**	**3.5 days**	**Mon 14/12/15**	**Thu 17/12/15**
⮕	Create the tables	2 days	Mon 14/12/15	Tue 15/12/15
⮕	Apply normalization	1 day	Wed 16/12/15	Wed 16/12/15
⮕	Populate tables	0.5 days	Thu 17/12/15	Thu 17/12/15
⮕	Develop the Web Application	14 days	Thu 17/12/15	Tue 05/01/16
⮕	⊿ **Testing**	**7.5 days**	**Tue 05/01/16**	**Thu 14/01/16**
⮕	⊿ **Database testing**	**3 days**	**Tue 05/01/16**	**Fri 08/01/16**
⮕	Create test plans	1 day	Tue 05/01/16	Wed 06/01/16
⮕	Test the database	0.5 days	Wed 06/01/16	Wed 06/01/16
⮕	Review results	0.5 days	Thu 07/01/16	Thu 07/01/16
⮕	Fix if necessary	1 day	Thu 07/01/16	Fri 08/01/16

Task Mode	Task Name	Duration	Start	Finish
	⊿ **Web Application testing**	**4.5 days**	**Fri 08/01/16**	**Thu 14/01/16**
	Create test plan	1 day	Fri 08/01/16	Mon 11/01/16
	Test the web application	1 day	Mon 11/01/16	Tue 12/01/16
	Review the results	0.5 days	Tue 12/01/16	Tue 12/01/16
	Fix if necessary	2 days	Wed 13/01/16	Thu 14/01/16
	Evaluation Report	5 days	Fri 15/01/16	Thu 21/01/16
	Reflection Report	5 days	Fri 22/01/16	Thu 28/01/16
	⊿ **Project Delivarables**			
	Demonstration of Prototype	1 day?	Mon 07/12/15	Mon 07/12/15
	Initial Contextual Report	1 day?	Fri 18/12/15	Fri 18/12/15
	Interim Report	1 day?	Sat 13/02/16	Sat 13/02/16
	Demonstration and Viva	6 days?	Mon 07/03/16	Mon 14/03/16
	Final Report Upload	1 day?	Mon 18/04/16	Mon 18/04/16
	⊿ **Other Course Deliverables**			
	WAD CW1	20 days	Tue 10/11/15	Sat 05/12/15
	WAD CW2	10 days?	Sun 27/12/15	Thu 07/01/16
	SEM CW	10 days?	Tue 10/11/15	Sat 21/11/15