CS310 Specification

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Project Title

Exploring the use of Gamification and Analytics in the Design of Educational Software.

Justification

While the uses of gamification and teaching analytics are often explored at the levels of primary and secondary education, far less has been done to study its effects in the context of undergraduate study. Researching and determining the most effective ways to use gamification in this project will be challenging task, as gamification is still in it's infancy, the concept having only really gained popularity around 2010. In addition to this, the web application that will developed for the project will be complex. It has to manage large amounts of analytics data as well as course content, serving the needs of both students and lecturers.

Objectives

Core App

The core of the application provides services such as database connectivity, objects to encapsulate users and content as well as login and authentication. It must be completed first because every subsequent task builds upon the functionality it provides.

Content Delivery

This part of the software is responsible for reading content from the database and displaying it to the user.

Analytics

A large part of the project revolves around capturing data about users and how they interact with the software. The analytics module is tasked with collecting and storing this data, and making inferences which can be used to offer a more engaging experience to the user (i.e. which gamification elements are used).

Explorer Features

The explorer user type is most engaged by

Socialiser Features

Users who associate more with the socialiser personality type tend to seek out social experiences over anything else. To this end, the features targeted at

socialisers include the ability to interact with other users who are consuming the same content, be it to give or seek help.

Achiever Features

Achievers tend to prioritise completion and progress awards when they interact with systems. The features offered to them will help them track how much of the content they have completed and offer achievements based on challenging goals.

Killer Features

While many of the tendencies displayed by killers is not productive in an educational environment, the competitiveness and desire for control they show can be leveraged to provide an engaging experience. Features like scoreboards appeal to killers, and it may be possible to encourage them to assist other users as it puts them in a position of control.

Broadly, the goal of the project is to explore the use of gamification and advanced analytics in the development of educational software. This will be achieved through the development of an online platform allowing undergraduate students to test and enhance their understanding of course content through hybrid lectures/slides. Questions will be woven in to content delivery to provide students with instant feedback on their understanding of a concept as well as additional material for extra practise. In addition, the software will categorise users into the four Bartle Test personality types (Achiever, Socialiser, Explorer and Killer). Users will be shown features dependent on their identified personality type and the software will use gamification elements appropriate to the users type.

Students excelling in a particular area will be encouraged to help others who are struggling. Likewise, students who are finding a particular piece of content challenging will be prompted to seek help from colleagues who have done well at that task. By designing content assessment to be more specific than the traditional right/wrong it will be possible to give more targeted feedback and suggestions for improvement that traditional tests or assignments allow.

In terms of analytics, lecturers will be presented with a broad overview of their modules, showing how different sections of content are being received by students. Lecturers will also be presented with detailed information on individual students, showing areas they are strong/struggling with as well as suggesting content in that area they have not yet completed to be used as seminar content. Identifying problem areas in this way allows for more effective use of teaching time and a better learning experience for students. For example, students who share a Bartle personality type can be grouped together for seminars so that lecturers can target their teaching style for maximum effectiveness.

Methodology

The software will be web based, written in PHP, HTML, CSS and javascript, using appropriate frameworks and libraries. Github will be used for version control for both software and documents, and the repository will be synchronised with my personal webspace on the computing society's web server to allow for easy testing. User information and module content will be stored in a mySQL database, also hosted on the computing society's server.

The software development methodology used will be an adapted version of the incremental build model. Each section of the software will be developed, tested and integrated in sequence. As the analytics part of the software (tasked with storing and updating user data, as well as making inferences based on this data) is a dependency bottleneck, the agile practise of developing a basic version first before adding features would not work. The lack of external stakeholders removes the need for frequent releases and feedback and makes the proposed methodology effective for the task at hand.

Timeline

Term/Week	Tasks
1/1	Specification
1/2	Specification
1/3	Core App, Environment
1/4	Core App, Content Delivery
1/5	Analytics
1/6	Analytics
1/7	Socialiser features
1/8	Achiever features
1/9	Killer features
1/10	Progress Report
2/1	Explorer Features
2/2	X
2/3	X
2/4	X
2/5	X
2/6	X
2/7	X
2/8	Pesentation
2/9	Presentation
2/10	Presentation

Task	Dependencies
Specification	-
Core App	Specification
Content Delivery	Core App
Analytics	Content Delivery, Core App
Explorer features	Core App, Analytics
Socialiser features	Core App, Analytics
Achiever features	Core App, Analytics
Killer features	Core App, Analytics
Progress Report	-

Resources

As mentioned above, the master copy of project documents and source code will be on Github. In addition, a clone of the repository will be copied after every commit to my Computing Society webspace for testing, and working copies will exist on my desktop and laptop. In terms of reliability, two of the above services could fail with no loss of data for the project. If an alternative web server is required for testing, it is possible to host the project on Joshua in the department if required. The schema and data used to create and populate the database will be added to the repository to aid recovery in the event of the database server failing. This can be uploaded to Joshua in the event of the Computing Society server failing.

When it comes to academic resources, copies of any potential papers or studies will be stored on my personal computer to provide a backup source should access to an online version be lost.

Legal, social, ethical and professional considerations

As student (and potentially staff) feedback will be required, approval will have to be sought from BSREC. As this project fulfils the conditions for delegated approval, any such activities will only have to be signed off by the project supervisor instead of being formally submitted to the committee.