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Abstract

We intend to design and develop an educational application aimed at children ages three to seven. This application will follow a level-based format and shall quiz children on a range of subject areas. Mathematics, English, Geometrics and Science will be the main subject focus of our application.

Team Report

Web and Mobile App Development Group Project CSC7054

Project title

Children’s Educational Quiz App

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5. **Project Introduction and Proposal**

We intend to design and develop an educational application aimed at children ages three to seven. This application will follow a level-based format and shall quiz children on a range of subject areas. Mathematics and Numeracy, Geometrics and Science, English and Literacy, will be the main subject focus of our application.

In order to successfully target our defined age groups, we shall closely follow the Northern Ireland Curriculum Framework for Early Years Foundation Stage (EYFS) and Key Stage 1 (KS1). Applying this framework to our quiz questions will ensure our application meets the minimum requirements on education, set by the UK government, following the introduction of the Education Reform Act (1988).

It is our intention to develop a multi-layer scoring system. Unlike many other quiz apps on the market - which only score users based on the number of correct answers - our application will also take into account the length of time spent by the user on each question and award an adjusted score accordingly. Opportunities for bonus points may also be implemented. The app will incorporate different input methods, including, but not limited to; multiple choice, fill-in-the-blanks and text input.

We aim to use a database to store a user’s personal high scores for each level, and separately, the high scores of other users. Furthermore, based on the user’s high scores per level, they may be awarded bronze, silver, or gold medals, as a way of rewarding the users and encouraging them to gain higher scores, which in turn should help educate them.

Targeting a young demographic, we are conscious of the importance of ensuring our application adopts a vibrant and playful experience, whilst maintaining its underlying usefulness as an educational quiz application. Finding the optimal balance between the learning experiences offered and the visual effects on show, will go a long way in determining how well our application is accepted by our primary stakeholders.

In short, the fundamental goal of this application, is to create a quiz that helps children to learn core foundational skills, in key subject areas, based on their age, in an environment that the user will find fun and engaging.

1. **Customer Statement of Requirements (CSR)**
   1. **Problem Statement**

I am a middle-aged woman from Belfast, with two children, aged four and six respectively. They have started primary school recently, and are getting along well. However, at home, they spend a lot of time playing on their tablet and I am worried that this could be distracting them from their homework. I believe that if they were spending time on a fun, but educational app while using their tablet, it would benefit them in school, engage them with their education, whilst making learning a more enjoyable experience for them.

This application should be aimed at children who are old enough to operate a tablet or smartphone, but still learning basic maths and English, among other skills at a primary school level. It should quiz children on subject-specific areas, reflecting what they are be taught in school at their age. Therefore, it would be helpful if the quizzes could be divided into distinguishable difficulty levels, based on the child’s age.

A scoring system that could be understood and interpreted by children would be helpful. For instance, if it could identify which questions they got correct and which they got incorrect – then this should benefit the child’s learning experience. Also, there should be a timer on each question to prevent them from simply going off and looking up the answer. Awarding bonus points for answering questions correctly in less time, may also motivate the children. Based on their high scores per level they may be awarded bronze, silver or gold medals as a way of rewarding them and encouraging them to gain higher scores, which in turn will educate them.

* 1. **Glossary of Terms**

*List important terms and their definitions to ensure consistency and avoid ambiguity in the system specification. Use the language of the application domain and avoid uncommon terms or define these as well.*

*It is helpful to illustrate the complex terms by providing images and graphics to help reader’s understanding.*

*Another option is to provide web links where to find more complete definitions of your terms.*

1. **System Requirements**

**3.1 Functional Requirements**

|  |  |  |
| --- | --- | --- |
| **No.** | **Description** | **Priority Weight** |
| 1 | Upon opening the application, the user shall be directed to the *Home* page. | High |
| 2 | Upon selecting the ‘PLAY’ button on the *Home* page, the user shall be directed to the *Select Age* page. | High |
| 3 | Upon selecting either the ‘3-5YRS’ button or the ‘5-7YRS’ button on the *Select Age* page, the user shall be directed to the *Select Level* page. | High |
| 4 | Upon selecting the ‘LEVEL 1’ button, the ‘LEVEL 2’ button, or the ‘LEVEL 3’ button on the *Select Level* page, the user shall be directed to the *Quiz* page corresponding to the user’s selected age group and level. | High |
| 5 | Upon selecting an answer to a question on the *Quiz* page the selected button shall change colour from yellow to red. Selecting a different answer shall change the colour of that button to red and revert the colour of the previously selected button to yellow. | High |
| 6 | The first time the user selects an answer on the *Quiz* page, a red arrow pointing to the right shall appear in the bottom right corner. Selecting this arrow shall confirm the user’s selection of answer and shall direct the user to the next question. | High |
| 7 | Upon selecting the red arrow on the *Quiz* page for the final question the user shall be directed to the *Results* page. | High |
| 8 | Upon selecting the ‘HIGHSCORES’ button on the *Home* page, the user shall be directed to the *High Scores* page. | High |
| 9 | Upon selecting the ‘ON’ button on the *Home* page, the music shall turn on and the ‘OFF’ button shall be toggled off. | Medium |
| 10 | Upon selecting the ‘OFF’ button on the *Home* page, the music shall turn off and ‘ON’ button shall be toggled off. | Medium |
| 11 | Upon selecting the ‘EXIT’ button in the *Home* page, the application shall close. | High |

**3.2 Non-Functional Requirements**

|  |  |  |
| --- | --- | --- |
| **No.** | **Description** | **Priority Weight** |
| 12 | The application shall consist of the following pages: *Home, Select Age, Select Level, Quiz, Results,* and *High Scores.* | High |
| 13 | The *Home* page shall consist of the application logo at the top of the page with a button below it labelled as ‘PLAY’ followed by another labelled ‘HIGHSCORES’. Below this shall be a text view reading ‘MUSIC:’ adjacent to two buttons labelled ‘ON’ and ‘OFF’. There shall be another button below this labelled ‘EXIT’. The logo and the buttons shall all be aligned along the vertical centre. | High |
| 14 | Music shall play throughout the application while the ‘ON’ button is toggled on. | Medium |
| 15 | The *Select Age* page shall consist of the application logo at the top of the page with a text view instructing the user to select their age group below it. Below the text view shall be a button labelled as ‘3-5YRS’ followed by another button labelled ‘5-7YRS’. The logo, text view, and buttons shall all be aligned along the vertical centre. | High |
| 16 | The *Select Level* page shall consist of the application logo at the top of the page with three buttons labelled as ‘LEVEL 1’, ‘LEVEL 2’, and ‘LEVEL 3’ below it. The logo and the buttons shall all be aligned along the vertical centre. | High |
| 17 | Upon first use of the application, only the ‘LEVEL 1’ button shall be enabled. Completing ‘LEVEL 1’ successfully shall enable the ‘LEVEL 2’ button and completing ‘LEVEL 2’ successfully shall enable the ‘LEVEL 3’ button. | High |
| 18 | The *Quiz* page |  |

1. **Functional Requirements Specification**
   1. **Stakeholders**

Potential stakeholders that may express an interest in our application could include, but are not limited to:

|  |  |
| --- | --- |
| * Product owners | * Testers |
| * Developers | * Young children |
| * Parents of young children | * Local primary schools |
| * Primary school teachers | * Northern Ireland Education and Library Board |
| * After school clubs |  |

* 1. **Actors and Goals**

*Identify the roles of people or devices that will directly interact with the system, their types (initiating vs. participating) and the goals of the initiating actors.*

Our application will be made openly available for download to the general public. There are a number of different actors expected to interact with our application, each with different motivations. The users who we expect will directly interact with the system the most, are children aged three to seven. We are aware, however, that our app will be used by individuals who will use this system for educational purposes.

However, we are aware that varying degrees exist regardless of age.

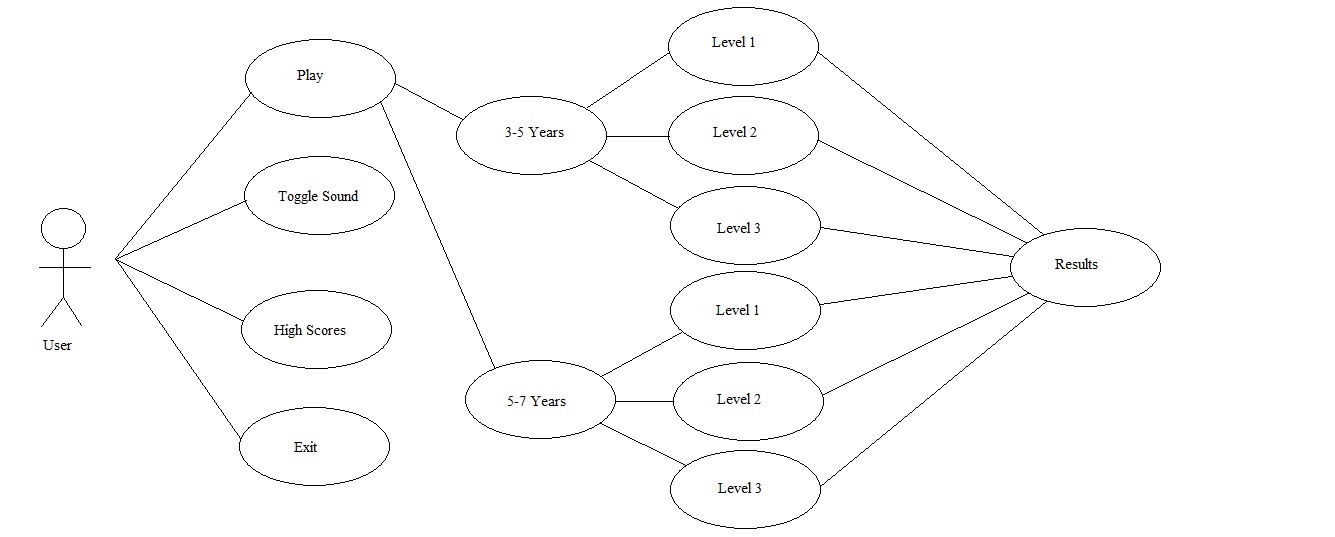
Their goal will be to complete all of the levels of their age range with as high a score as possible.

**4.3 Use Cases**

**4.3.1 Casual Description**

|  |  |  |
| --- | --- | --- |
| **No.** | **Description** | **Related Requirement(s)** |
| 1 | User wants to select a quiz to do based on their age and level. | 1, 2, 3, 4, 12, 13, 15, 16, 17. |
| 2 | User wants to attempt to complete a level and find out their results of that level. | 5, 6, 7, |
| 3 | User wants to view their high scores. | 1, 8, |
| 4 | User wants to toggle the music on or off. | 1, 9, 10, 12, 14. |
| 5 | User wants to exit the application. | 1, 11. |

**4.3.2 Use Case Diagram**

**

**4.3.3 Traceability Matrix**

*Show how your system requirements map to your use cases. Calculate the priority weights of your use cases. The use cases with the highest priority should be elaborated and planned.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **System Requirements:** | **Use Cases:** | | | | |
| 1 | 2 | 3 | 4 | 5 |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 7 |  |  |  |  |  |
| 8 |  |  |  |  |  |
| 9 |  |  |  |  |  |
| 10 |  |  |  |  |  |
| 11 |  |  |  |  |  |
| 12 |  |  |  |  |  |
| 13 |  |  |  |  |  |
| 14 |  |  |  |  |  |
| 15 |  |  |  |  |  |
| 16 |  |  |  |  |  |
| 17 |  |  |  |  |  |

**4.3.4 Fully-Dressed Description**

*Select a few most important use cases and provide detailed (“fully dressed”) description. The “most important” use cases are indicated by your traceability matrix. Your event flows must show step-by-step every action that the initiating actor (“user”) can take while running the given use case.*

1. User wants to select a quiz to do based on their age and level.
   1. Given that our application is designed to cater for the educational needs of a range of users, in addition to the customer’s request to have such a system aligned to the user’s age – it was imperative that we present to the user a screen to achieve this. To do this, we agreed that displaying buttons with varying age brackets, that when clicked would take the user to the quiz best suited to the user of that particular age. Each quiz from this point on will follow the same format, despite the age difference; with only the question content and difficulty varying between age levels.
2. User wants to attempt to complete a level and find out their results of that level.
   1. To complete a level in any of the quizzes, a user must answer five questions. It is not necessary for the user to answer each of the five questions correctly in order to be able to proceed to the next level, but rather just attempt them. The format of the questions, for every level, will have a question followed by a corresponding image, with four possible answers to the given question. The user must select one answer per question and hit the arrow in order to gain access to the next question. The user will the end of each level a user will be presented with a screen that displays how many question were answered correctly and how many were answered in incorrectly.

**4.4 System Sequence Diagrams**

*Draw the system sequence diagrams for the few most important use cases selected above.*

1. **User Interface Specification**

*The user interface should be specified only for the use cases elaborated in the previous section (“fully dressed” use cases).*

**5.1 Preliminary Design**

*For a given use case, show step-by-step how the user enters information and how the results appear on the screen.*

*Use screen mock-ups and describe exactly what fields the user enters and buttons the user presses. Describe navigational paths that the user will follow.*

The given use case for the preliminary design is use case 2: User wants to attempt to complete a level and find out their results of that level.

**5.2 User Effort Estimation**

*Select several typical usage scenarios and, as you walk through the flow of events, count and report the number of mouse clicks and/or keystrokes that are needed to accomplish the task. What fraction of these goes to user-interface navigation vs. clerical data entry?*

[*http://www.ece.rutgers.edu/~marsic/Teaching/SE1/report1-appA.html*](http://www.ece.rutgers.edu/~marsic/Teaching/SE1/report1-appA.html)

1. **Domain Analysis**

**6.1 Domain Model**

*Show the process of deriving the domain model and then draw the diagram. Provide text description of:*

* *Concept definitions*
* *Association definitions*
* *Attribute definitions*
* *Traceability matrix - show how your use cases map to your domain concepts.*

**6.2 System Operation Contracts**

*Should be provided only for the operations of the fully-dressed use cases elaborated in Section 3.c), (Use Cases) for their system operations identified in Section 3.d). (System Sequence Diagrams)*

**6.3 Mathematical Model**

*Do you use any mathematical models? E.g., you may use a statistical model for stock price prediction, or a geometric model for computing the trajectories for animate figures in a video game. If NO, skip to the next item; if YES, describe precisely your model.*

1. **Plan of Work**

*Preferably, you should use Gantt charts for planning and scheduling your project. Also include the product ownership description from your project proposal, and provide the breakdown of responsibilities: what each member did so far, is currently doing, will do in the future, including management and coordination activities.*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Project Deliverables** | **Week beginning:** | | | | | | | |
| 02/03 | 09/03 | 16/03 | 23/03 | 30/03 | 06/04 | 13/04 | 20/04 |
| Customer Statement of Requirements |  |  |  |  |  |  |  |  |
| System Requirements |  |  |  |  |  |  |  |  |
| Functional Requirements Specification |  |  |  |  |  |  |  |  |
| User Interface Specification |  |  |  |  |  |  |  |  |
| Domain Analysis |  |  |  |  |  |  |  |  |
| *Home* page |  |  |  |  |  |  |  |  |
| Application music |  |  |  |  |  |  |  |  |
| *Select Age* page |  |  |  |  |  |  |  |  |
| *Select Level* pages |  |  |  |  |  |  |  |  |
| *Quiz* pages |  |  |  |  |  |  |  |  |
| Create Questions |  |  |  |  |  |  |  |  |
| Count Down Timer |  |  |  |  |  |  |  |  |
| *Results* page |  |  |  |  |  |  |  |  |
| *High Scores* page |  |  |  |  |  |  |  |  |
| Background music |  |  |  |  |  |  |  |  |

1. **References**

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| [1] | Education Reform Act 1988, Chapter 40. [Available at]: http://www.legislation.gov.uk/ukpga/1988/40/pdfs/ukpga\_19880040\_en.pdf [Accessed]: 10 March 2015. |
| [2] | The Northern Ireland Curriculum: Understanding the Foundation Stage (2006) Belfast: Department for Education: The Council for the Curriculum, Examinations & Assessment (CCEA). [Available at]: http://www.nicurriculum.org.uk/docs/foundation\_stage/UF\_web.pdf [Accessed]: 9 March 2015. |
| [3] | The Northern Ireland Curriculum: Primary (2007) Belfast: Department for Education: The Council for the Curriculum, Examinations & Assessment (CCEA). [Available at]: http://www.nicurriculum.org.uk/docs/key\_stages\_1\_and\_2/northern\_ireland\_curriculum\_primary.pdf [Accessed]: 9 March 2015. |
| [4] |  |