Project Proposal and Requirements Definition

Team 4

The purpose of this project is to create an educational game for children in grades one through four. There will be content targeted for each grade based on the education standards for each grade. The benefit of this game is that it provides students with an opportunity to learn mathematics in a different style than they’re exposed to during school. Each grade will be given a separate option which gives the benefit of changing the content based on the user’s proficiency.

The goal of this game is to help elementary students visualize mathematical operations to supplement their learning. The program should not feel tedious and be able to keep the user’s attention. We want first and second graders to feel confident in addition and subtraction operations. Third graders should be confident with the multiplication operation and the distributive property. Fourth graders should be able to analyze patterns such as multiplicative factors as well as solidifying concepts of mathematical equality.

One of the main systems which will be used in the implementation of the project will be the free collaboration tool Github. Github has the necessary functionality to allow us to work on different parts simultaneously and keep track of the changes being made to the source code over the duration of the project. This includes the implementation of different components of the system as well as documentation of these components. Not only will the Github repository be used to aid in collaboration, but it will also be used to turn in the assignment.

In this project, Python will be the primary language used to implement the relevant components. Due to its powerful and high level syntax, overall portability, and familiarity with each of our group members, Python appeared to be the best choice. The necessary graphical components of the project can be implemented feasibly through the use of media libraries already written for the language.

Required terms, definitions, and abbreviations:

User: The player of the game

Main menu: The main menu of the game contains various actions that the user can make. These actions include selecting a level(see levels), seeing current score(see score), and a basic about section(about section).

Levels: there will be various levels that the user can choose to play. Each level teaches something fundamental about multiplication and division. Some levels may have multiple choice questions, or numeric keyboard input.

Score: each time the user correctly passes a level their score will increase. Some levels may be unlocked by a higher score.

About section: a general section defining what the game is about, the developers of the game, and other useful information for parental figures.

Mouse and keyboard: peripherals to interact with the game. The game may ask the user to use the mouse to make a selection. The game may also ask for user input

It is common to say that mathematics is the language of the universe. It is the center of all sciences and as such learning the basics of mathematics is a must for all thriving children. Computers are based on math, physics is based on math, chemistry, engineering, and more fields are based on math. Multiplication and division are the most used operations in everyday life, therefore the system will attempt to teach these core theorems and perhaps other suitable theorems.

An acceptable solution will be usable for children in grades 1 through 4. The mathematical content in the game must abide by the Massachusetts Department of Education standards for mathematical practice. All problems must have a solution that can be found using the standard algorithms described by the Massachusetts Department of Education. All values in problems presented to the users must be whole numbers. For content related to grade 1, all numbers must be equal to or less than 20. For content related to grades 2 and 3, all numbers must be equal to or less than 100. Content for grades 1 and 2 should only contain addition and subtraction operations. Content for grades 3 and 4 may contain addition, subtraction, multiplication and division. The solution must provide feedback to the user on correct or incorrect answers. The solution must operate in the environment described below.

The media libraries written for Python will allow for feasible implementation across Mac, Linux, and Windows. The game is meant to be played on a keyboard and is not intended to be played on a phone or console. When the prototype is completed, anybody with the Github link should be able to download the necessary files as well as find instructions to install all of the required media libraries. After installing Python, the required libraries, and the project source code, anybody will be able to run the game and play it right on their computer.