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FEDD Research - Educational Computer Game

A student’s success in higher education is directly correlated to their proficiency in foundational mathematics (Wilson 41). In order to facilitate the learning of these essential skills, our team intends to develop an educational computer game for students in grades 2 through 5 in which users will practice and develop skills in basic arithmetic. In accordance with common core standards (Wilson), our game teaches arithmetic through a linear, sequential teaching style.

The mathematical topics covered in our game need to be retained long after learning the topics as these mathematical functions form the foundation for all higher level mathematics. learning can be achieved by repetition of educational content with the assistance of visuals and structured models to guide youth to fully understand how various topics fit together into one interwoven idea (Orlich 159). In addition to visuals to engage the student, some may need extrinsic motivation such as a score or point system to boost productivity and center focus on the game (Orlich 15). The point system can also be utilized if there is a competitive mode where players compete in the same arena and encourage each player to try their best to achieve the highest ranking compared to others. The early years are important to education as it forms proper learning methods and dedication to studying, if the player chooses a wrong answer in practice mode then there can be a short tutorial on how to properly solve the problem.

Educational games have different designs which are dependent on the learning styles of the target audience. By catering toward specific learning styles, games can allow players to improve their learning experience and engagement. Learning styles, in this case, are either sequential or global: learning progressively in smaller increments or learning through whole concepts that are presented, respectively (Hwang 628). When it comes to the sequential-based styles of learning in this study, “the students learn one plant at a time in the Chinese character order. After the students complete the learning tasks of a plant, they are guided to the next plant; that is, they learn the details of individual plants sequentially” (628). While the topic in this section of the study does not share the same topic as our game, the learning process is still integral across topics. According to Hwang, “considering learning styles in the development of educational computer games has multiplied the effects of the computerized game-based learning approach and the personalized learning approach in the application of this study” (634). Since we intend our game to have a gradual progression, it will cater to gamers with sequential learning styles and enhance their overall experience.

The learning disability that the game works to combat and hopes to get rid of is anxiety in the classroom, specifically towards learning mathematics. Math anxiety is found to be most common in high school and college-aged students (Tobias, 1993), but early signs and symptoms can appear in students as young as seven during the beginning of elementary school (Wigfield and Meece, 3). If a student’s math anxiety is never identified or dealt with, a small and easily fixable obstacle can progress into a learning disability that may affect that student’s views towards mathematics well into adulthood (Burns, 1998). The target age for our game is children who are between the ages of seven and twelve. While our targeted audience is children who have any form of math anxiety, the game can benefit any elementary schooler learning early math skills in school.

Fortunately, there are many ways to overcome math anxiety in younger students that can and will be implemented in the final game. The first way of doing this is by creating short-term and attainable goals for the children to reach (Rossnan, 2). This method can come in many forms, such as a score increase or a bright animation whenever a question is answered correctly. A more general approach to a short-term goal is the structure of progression by creating numerous “levels” or stages that the student can go through. By making each level an appropriately long length, the student can play through the game with a meaningful feeling of progression or achievement.

A second method for reducing anxiety with solving math problems is by limiting any unnecessary time pressures. If a student feels rushed or pressured to complete a problem, the anxiety may worsen and create a negative association with simple problems that can reflect on his or her performance. By creating a “practice mode” free from any time constraints that gives the player an infinite amount of time to solve the problem, students will not have to worry about conjuring an answer in a set amount of time and can instead focus entirely on learning what the answer is and why.

Lastly, anxiety towards math can be overcome by simply making mathematics enjoyable. By disguising a dull math worksheet as a fun and animated game, children will hopefully create a positive association with working out math problems. While the other features in the game all play an important role in helping to combat math anxiety, by making the game fun to play, children will hopefully want to practice their math and not see the game as a way to improve test scores, but instead as a form of entertainment and a less serious environment to be able to learn their math skills.

A key tenant of common core math policies is that all students in elementary school should be regarded as “in the pipeline” for higher level mathematics. As defined by the US Department of Education, one of the mathematics priorities in elementary education is the whole number operations: addition, subtraction, multiplication, and division (Wilson 43). This priority builds the foundational skills that allow students to succeed in later classes. “In high school and college mathematics these very same algorithms get slightly modified and generalized and used in different settings with new mathematics” (43). The basic arithmetic operators are combined and manipulated to create the problems and environments of all sciences and are key in all STEM fields. “Core elementary mathematics is straightforward and focused” (46) and should be reinforced through practice and repetition. Our game will focus its teaching on this strategy.

Works Cited

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