Planetary Play with Sum Dog Pluto
Instructional Game Design Document

Introduction

1. Instructional Design

1.1. Elementary aged students from 5 to 6 years old are just beginning to learn their math facts and addition is the first thing the learn. In order to develop their skills in the process of addition, much practice is needed. By breaking apart the skill demand into levels using a single digit plus a double digit allows for a complex enough challenge, while not over-challenging the age group. As the child advance, the skill level increases. In fact, this game can be developed past the nine-planet number challenge to include subtraction and multiplication. As the child grows in their ability.

1.2. Before beginning play, students must be able to count to 100, which happens by mid to end of the year in kindergarten. Additionally, the must be able to understand adding two numbers. This process started at the beginning of kindergarten with imagery or tactile pieces and develops into the use of numbers by first grade. The learner will also need to have mouse skills in order to click on the speaker for auditory cues and to run the game. A subset of keyboard tools will allow the visually impaired to play along as well.

1.3. Instructional Goals:

1.3.1. The learner will utilize provided moon rocks to count.

1.3.2. The learner will add two numbers together to formulate an answer

1.3.3. The learner will follow directions in order to guide Pluto back home.

1.4. Instructional Objectives:

1.4.1. Using the mouse or their finger, the player will count the number of moon rocks on the screen in total to give the sum total.

1.4.2. The player will answer a series of addition questions in order to complete a level successfully in the game.

1.4.3. The player will choose appropriate clothing when shopping opportunities arise in order to properly dress Pluto

1.4.4. The player will use the keyboard and numbers in order to answer the questions for advancement.

1.5. Assessment Items:

1.5.1. The addition questions

1.5.2. The reading prompts for tasks along the planetary path

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      1.5.3. The appropriate clothing to meet the needs and challenges at the planets.

1.6.   Presentation Strategy: Using the moon rocks for the player to count, the player gradually builds up enough (moon rocks) to barter with the planetary pets Pluto meats along the way. The moon rocks act as money and provide an opportunity for Pluto to enjoy his tour through the universe.

2. Game Design

2.1.   Game Concept: This math game has been created to help students solidify their understanding of simple addition math skills while engaging players with interesting facts in science. These tasks will allow students opportunities to learn science facts in a non-pressured environment in order to enhance their STEM awareness, while strengthening their addition skills. The main goal of the game is for the Dog named Pluto to make it back home to his planet, as he is currently lost in space. He became lost when he mistakenly measured his daily planetary play and ended up lost and far from home.

2.2.   Game Description: Pluto finds himself lost in space and all the way at the other end of the solar system from his home after which he is named, Pluto. He must work with numbers and practice his math skills in order to find his way from Mercury all the way back to Pluto. As he gets better at math, the problems become more challenging, but with a little work and practice, he can certainly make it home.

2.3.   Genre: This puzzle-type game allows players to test the knowledge and skills in order to advance.

2.4.   Platform: PC, tablets and cellular devices

2.5.   Game Mechanics:

      2.5.1. Background
      The background of the game provides the player with the vantage point of space. Every level will take the player to a new location within space in order to share facts relating to that location upon successful level attempts.

      2.5.2. Character
      The character of the game is a dog. While dog's do not normally go to space, we chose the dog because he is a relatable friend in the life of a young person and can provide some humorous entertainment along the learning path.

      2.5.3. Text and Speaker
      The screen will host text and a speaker for clicking. While students with a sufficient reading level will be able to read the story and the directions, a speaker will be next to the text so that younger, less fluent readers can be read too. As the words are being read, they will become bolded and underlined to

allow the reader to follow along. This will allow a closed captioning aspect to the game.

2.5.4. Visually Impaired

For children who are visually impaired, additional auditory cues will be made available in order to guide them through. Additionally, in replacement of the mouse clicking, keyboard clicks will be provided and explained through an alternative set of directions.

2.5.5. Timer Mode

The player, upon completing the first level (which is game 1-3) successfully will have the option to turn on a timer mode in order to challenge their own skill set. This will encourage stronger players and may entice them to play multiple times. During timed play, the player can earn a two-for one amount of questions in order to earn more for player costume changes.

2.5.6. Tasks for level one

Mercury Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 0-9. Tactile moon rocks will be shown in the same quantities as the numbers provided. This will allow the student to physically count the moon rocks together on the screen to aid the younger learners.

2.5.7. Celebration/Rewards

Each time a student passes the level, they are provided a chance to play a game in order to move themselves to the next location for the following task. The next location is closer to home. This allows a bit of math practice, while also providing time to play for advancement. Students should have the option to skip the playtime and continue practicing if they prefer, however, they can't skip practice just to play.

2.5.8. Tasks for level two

Venus Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 10-20.

2.5.9. Tasks for level three

Earth Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 10-30.

2.5.10. Intermission Dance

Every three levels, Pluto completes a song and dance in space and changes his costume as a form of leveling up. The song has a space theme and allows Pluto to show off his smashing space moves.

2.5.11. Tasks for level four

Mars Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 10-40.

2.5.12. Tasks for level five

Jupiter Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 10-50.

2.5.13. Tasks for level six

Saturn Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 10-60.

2.5.14. Tasks for level seven

Uranus Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 10-70.

2.5.15. Tasks for level eight

Neptune Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 10-80.

2.5.16. Tasks for level nine

Pluto Level one will provide practice on addition skills where the first number is a single digit of 0-9 and the second number is a single digit of 10-99.

2.6. Core Gameplay: The player has the ability to ask for as many or as few practice questions as possible. For every moon rock the player earns in one level, an opportunity to purchase costumes and food becomes available when leveling up. The player can choose one new element of clothing to place on Pluto. In fact, this will become used full as the player levels up after level three and six. Without having answered enough questions, Pluto will not be able to move between levels until enough questions have been answered and Pluto has the right layers of clothing on.

2.7. Mode of play: Planetary Play will be a single-player game. After a player has completed the first level of play (through level 3), they will have the option to play against the clock in order to challenge their own math abilities.

2.8. Game Flow: The design will include space and all the 8 planets, including the dwarf planet of Pluto. Each planet will be its own level, which makes for nine levels. Each level will take the player one step closer to the dwarf planet of Pluto, which is where Pluto lives. There will be a level three intermission dance and level 6 intermission dance. At these points in the game, timer-play can be turned on the challenge the players skill set. At the end of level nine, Pluto's family comes out to great him with a bone and a family dance.

2.9. Types of Characters: Pluto is a silly dog that just needs help getting back home after a long day of playing. He wears nine different costumes and has about 25 different statures in each costume that represent him walking, running and dancing. He can also flip in the air. Each different stature has him with mouth opened and closed to show barking/talking. The player can also choose boy or girl. When choosing the girl, a bow is placed on the space helmet of the dog.

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2.10.   Gameplay Elements: The moon rocks used during the counting process act as a bartering tool to buy things along the way for Pluto. He will definitely need food and appropriate clothing and the moon rocks will give him a chance to buy those things.

2.11.   User Interface Functionality: A screen is necessary to view the game. An electronic device is necessary to host the game. The player will need a keyboard on the computer and on any device in order to answer the math problems and to answer the questions throughout the game. This may come in the form of a disappearing keyboard on tablets.

2.12.   Narrative: Pluto struggles with addition and apparently got himself lost on a day out playing in the solar system, because he mis-measured where he was going. It is up to the players to add up the sums and get Pluto the right distance back home.

2.13.   User Interface: The space elements change on each level to show the features of the planet that Pluto has reached. For instance, he may find himself with glowing red highlights when he is near Mars.

2.14.   Gameplay Elements: The player should be able to recognize some of the planetary features throughout the game play and should discuss related features of the planet such as the rings of Saturn or the red face of Mars. Since his home "planet" is Pluto, we will also discuss why it is called a dwarf planet and not considered one of the major planets anymore.

2.15.   Sound and Music: The music is very space oriented to include what we hear during movies with flowing air and the pings of the space suit. During intermissions between leveling up after each three levels, a more festive space song will play.

3. **Programming**

3.1.   Special Technical Requirements: The game will be app based and will not require and technical elements beyond what any basic computer or tablet provides.

3.2.   Game Engine: The app can be purchase in the app store, chrome store in STEAM and in other similar gaming engines.

3.3.   Rendering: The game can be darkened or brightened with the basic tools set on the computer or tablet.

3.4.   Artificial Intelligence: No artificial intelligence will be used.

3.5.   Physics: the game will not use elements such as accelerometers during play.

3.6.   Gameplay code: the code will be written in Swift, HTML and in JavaScript to accommodate different forms of play.