Serious Games in Chemistry

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Computer Games Development

Introduction

- About Serious Games
- Focusing on Chemistry
  - Using 1st Year Material of UWS Chemistry students
  - The Periodic Table – First 18 elements
- Are Serious Games too serious?

Literature Review: Video Games

- A Brief History
- The Characteristics
- Why People Play
  - “Being in Flow”, achievements, rewards, and advancement
- The Genres
  - Action, Adventure, RPG< Simulation, Strategy, Sports, Idle, Purpose

Literature Review: Serious Games

- Serious Games
- Gamification
- Education
- Serious Games in Chemistry

Serious Games in Chemistry

- 1st Person Shooter presented chemistry challenges in practical way.

- Concepts presented
  - Chemical–equilibrium
  - Stoichiometry – calculation of reactants and products
  - Using the Haber–Bosch process to make ammonia, to allow players to grow food.

- Results – none presented in the paper as the game was still undergoing evaluation.

Serious Games in Chemistry

- Interactive Puzzles to learn microscopic phenomena by making the invisible, visible.

- Virtual Chemistry lab made to interact with concepts
  - Mole
  - Chemical bonding
  - Chemical equilibria

- Results – Test group and control group each did a pre–test and post–test.
  Test group scored higher than control group.

Research Question

- Research question
  - Using 1st Year Material of UWS Chemistry students
  - Material is from 1st semester
  - For their exams, revise old 1st semester and new 2nd semester

- “Traditional studying or playing a video game, which is more effective for revising?

Hypothesis

- H0: The student's score will not change after playing the video game
- H1: The student will score higher after playing the video game

Methodology

- Quantitative
- Pre–test and Post Test

- Dr Iain McLellan – Year Leader of 1st Year Chemistry

- Chemistry students and friends

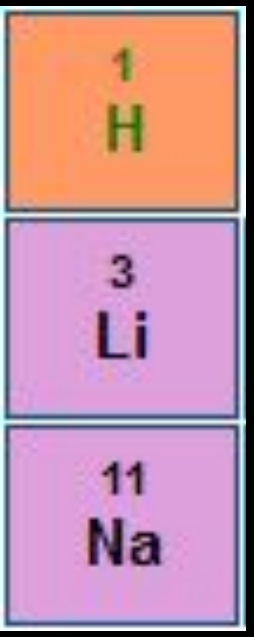
- To gather experiment results
  - 10 questions about Chemistry related to the game
  - Play the game (10–20 minutes)
  - 10 different questions about Chemistry related to the game

Game Design

- Fun first, education second
- Replayability
- Traditional Tower Defense Games take too long
- Instead of defending… Player is attacking
- Periodic Table + Tower Defense
  - Educational Parts are highlighted

Game Design : Periodic Table Units

Game Design: Help Screen



- Allies, Enemies, grabbing
- What effect each Element does
- What the Unit can look like
- Education aspects highlighted
  - Why the UI is like that
  - Cost is related to Atomic number
  - Upgrades
  - Colour of Upgrades

Demonstration

Future Work: To Completion

- Completed half of the elements, complete other half
- Audio effects, Menus
- Balancing Units and Game
  - Damage
  - Range
  - Gold
  - Score
- Local high score

Questions