

# Project Overview

*This document details the ACS Laboratory/Chemistry Department Chemtutor Project. It contains an introduction to the project as well as some different game representations that we are looking for feedback on. Please review this document prior to completing the Player Survey. You will be asked to answer questions based on this document. We appreciate your participation.*

## Introduction

IST's Applied Cognitive Science Laboratory is working with the Chemistry department to develop a gamified chemistry tutor designed to help students who lack the knowledge and concepts necessary to succeed in introductory chemistry courses. Areas of focus include but are not limited to units and dimensional analysis, and net ionic equations. We are looking for feedback from prospective students on our early game representations. Mainly:

- Which game representation do you think you would enjoy playing the most?
- Which gameplay do you think would be the most engaging and informative?
- What – if any – ideas of improvement on these game variations could you provide?

We ask that you keep these questions in mind as you explore the following game variations, which have been narrowed to several choices in no specific order:

1. Football
2. Science Center

Read on to learn about the different game options.

# Football

You play as the Penn State Nittany Lions football team in this turn based, simplified football game. While typical football games have many rules, this version simplifies them to basic back and forth gameplay between you and a computer controlled opposing team. Each team is represented by only a few players (5 in this visualization).

## Rules of the Game

### 1. Turn-based Play.

- In this game, you take turns answering questions (Image 2), much like how football teams exchange possession of the ball.
- Each time you answer a question correctly, it's akin to the offense in a football game moving the ball down the field.

### 2. Offense & Defense.

- As in a real football match, your movement down the field comes from the accuracy of your answers. If you answer correctly, you move further down the field, closer to the endzone (Image 1).
- To defend you must guess which play the opponent is running (Image 3). The guessing part in the defense phase introduces an element of unpredictability, similar to a real game where the defense is trying to anticipate the offense's moves.

### 3. Winning Conditions.

- The game ends when a team reaches the endzone, which in this game equates to you answering enough questions correctly. This mirrors the aim in a football game to reach the opponent's endzone. Players can expect to answer a minimum of around 8 questions if they are 100% correct.

Image 1) Gameplay screen of football game



Image 2) Quiz screen for football game.

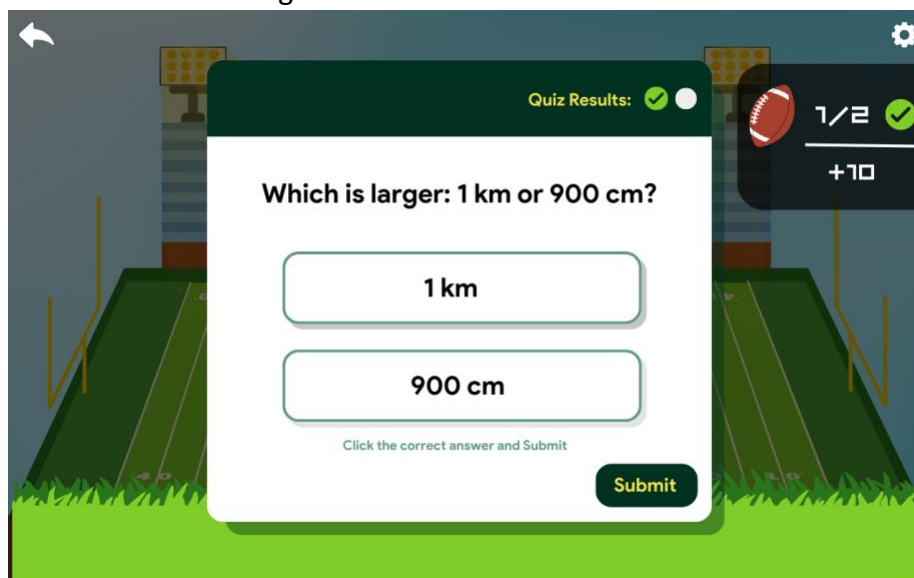
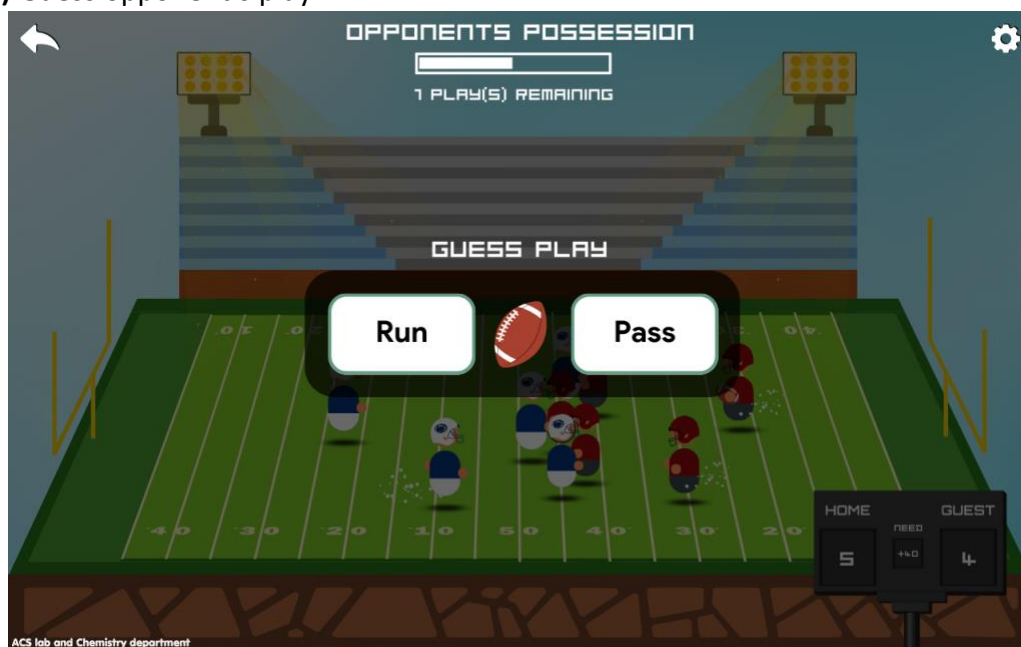


Image 3) Guess opponent's play



## Science Center

The goal is to create the Penn State University Science Center. You start the game when there are no laboratories in it yet. After studying each chapter of chemistry, the corresponding laboratory will open in the Center, which you can then use.

### Rules of the game

#### 1. Gameplay Options.

- The player has the right to choose one of the three main options: "Lectures", "Test" and "Simulator".

#### 2. Lectures.

- When studying theoretical material, you will, in accordance with the scenario, solve quests, interact with famous scientists and solve tasks based on real events (perhaps thrilling or humorous).
- For correct decisions, you will be awarded additional points in the discipline, earn various virtual rewards, and increase your ranking on the leaderboard.

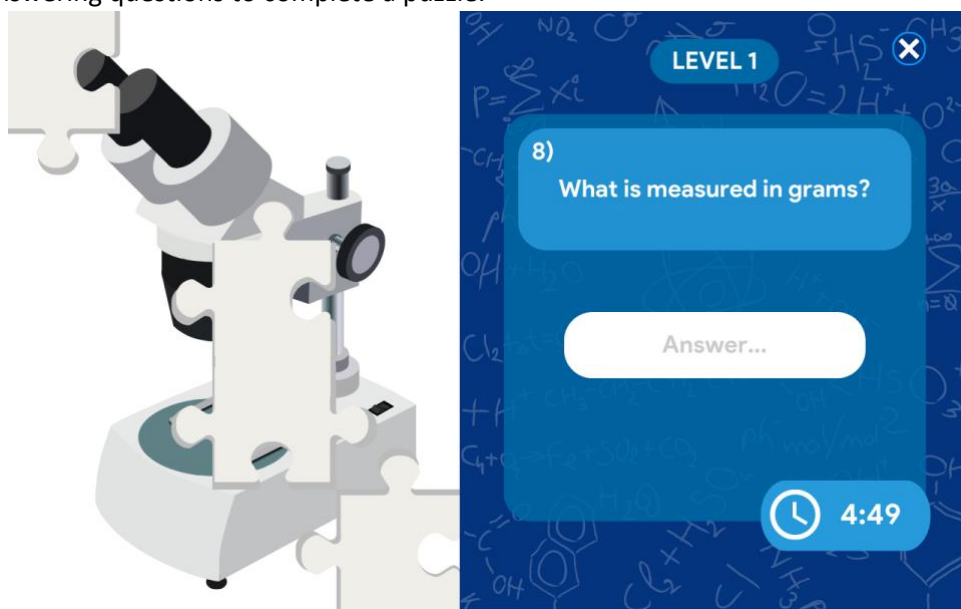
#### 3. Test (knowledge assessment).

- You will need to answer questions to unlock puzzle pieces (image 1). After each correct answer, a puzzle with the image of the equipment will open, that is, it will be unlocked (image 2).
- Once unlocked, the hardware will be added for use in your new lab (image 3). Once you have collected all the available items, your lab will be completed.
- Progression: in the future, after each successful test, in the next chapter you will receive another equipped laboratory.

#### 4. Simulator.

- You get access to a 2D/3D virtual chemistry lab where you can do hands-on experiments that simulate actual experiments.

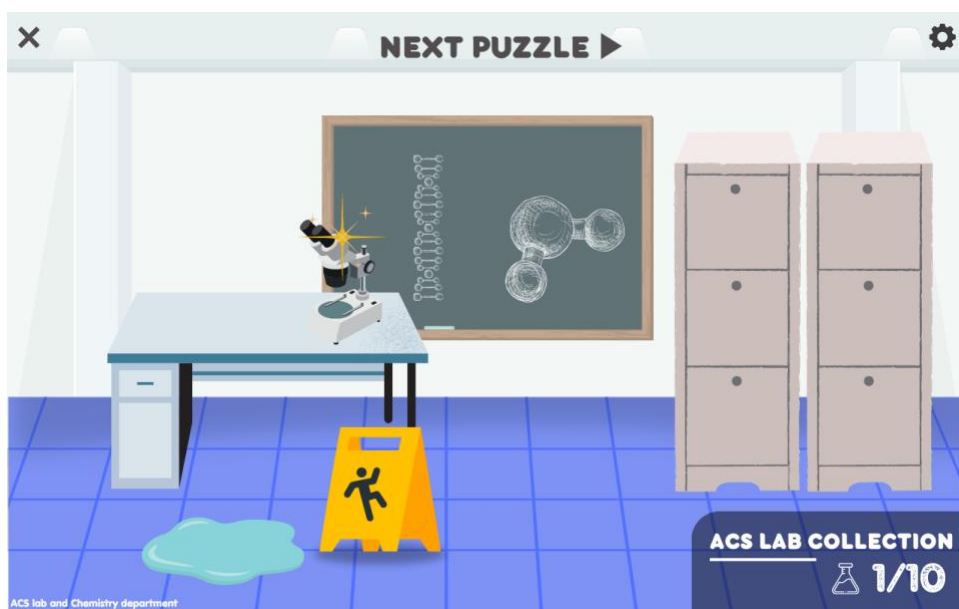
**Image 1)** Answering questions to complete a puzzle.



**Image 2)** Puzzle completed. New equipment unlocked.



**Image 3)** Equipment added to lab



## Elemental Peaks (hiking)

Welcome to "Elemental Peaks," an innovative game fusing chemistry learning with hiking adventure. As a player, you are an explorer, scaling a series of mountains by answering chemistry quizzes. With ten questions per level, you'll move forward by answering eight correctly. (see Figure hiking game and Figure hiking quiz)

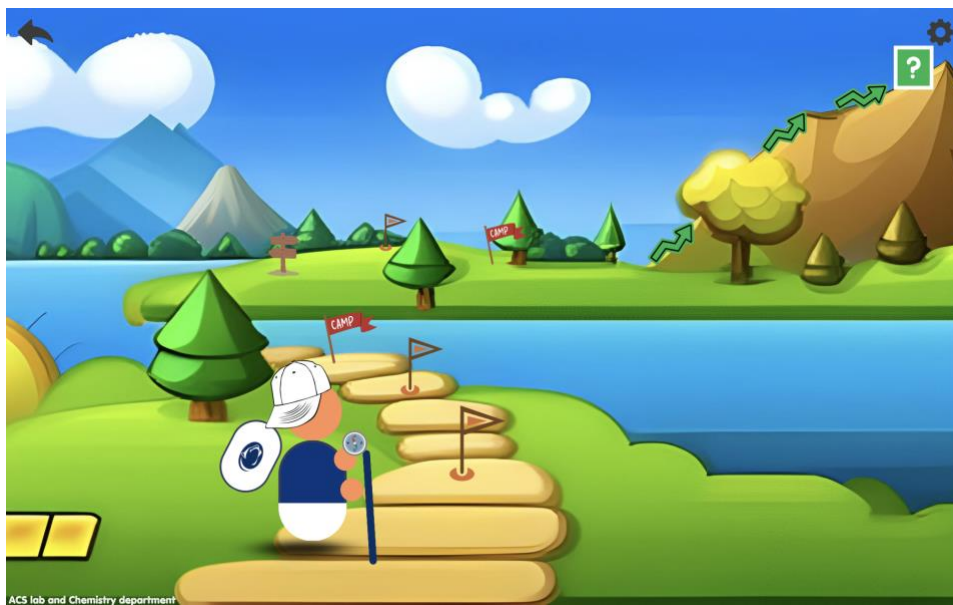


Figure: hiking game

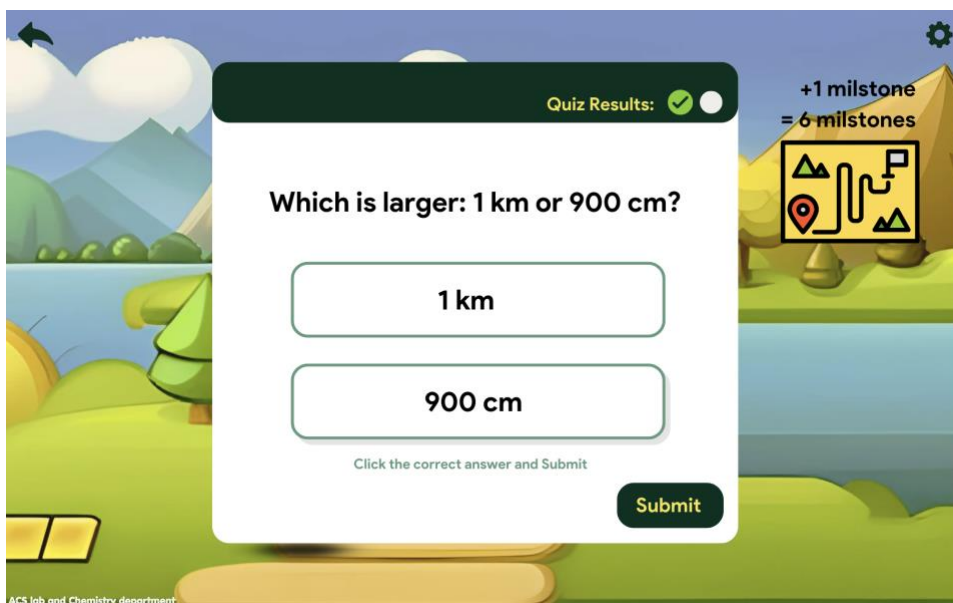


Figure: hiking quiz

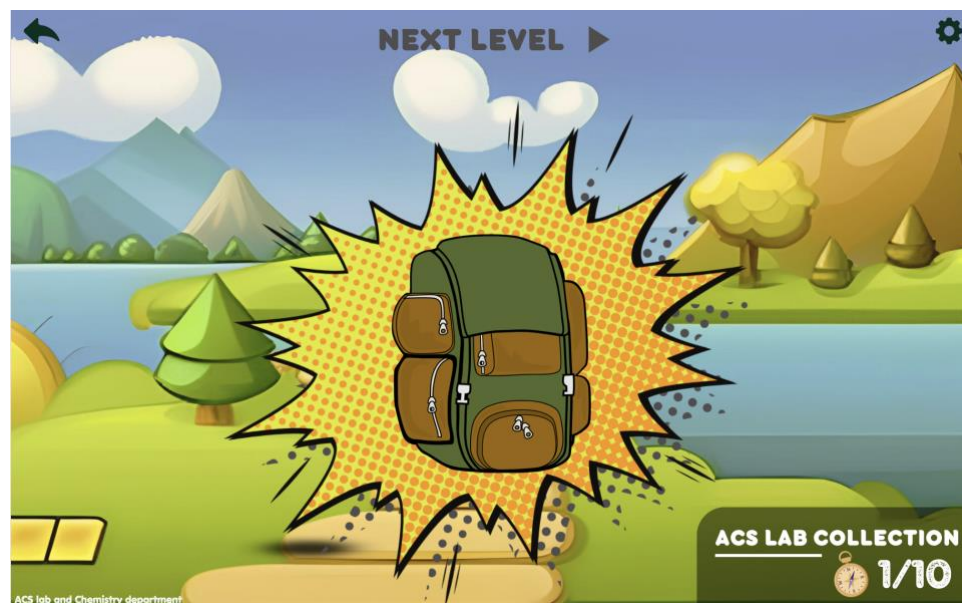
Each completed level brings you closer to the summit and rewards you with unique hiking gear, symbolizing your expanding chemistry knowledge. (See Figure unlock gear)





**Figure: unlock gear**

Collect all gears to tackle the final challenge - the highest mountain. Failing to meet the score keeps you in place for a retry (see Figure: collect gear(s))



"Elemental Peaks" reinvents learning as an exciting quest, merging scientific discovery with the thrill of hiking. Strap on your boots, gather your chemistry kit, and embark on this epic educational adventure!

## Bojan's Apprentice

You play as a wizard in training. Your goal is to master the ancient spells and abilities of Chemistry and adventure across dangerous terrain to defeat Kiloghaul, a warlord who is wreaking havoc on the land.

### Rules of the Game

#### 1. Gameplay Options:

- From your home base (Image 1), you will have the option of choosing between Lessons, Training, and Adventure.

#### 2. Lessons:

- Lessons are where you learn the art of chemistry from your master, a retired wizard well versed in its ways.
- Lessons could come in the form of videos, readings, and simulations.

#### 3. Training:

- Training is where you hone your skills and practice what you've learned by answering chemistry questions like those that you may encounter while adventuring.
- You will be fighting a training dummy that doesn't retaliate, so there is no penalty for incorrect answers.
- Training offers you the opportunity to choose areas where you may be struggling and get practice with them.

#### 4. Adventure:

- Adventuring is how you progress through the game (Image 2). You will move through different areas with multiple encounters where you will need to apply your chemistry skills to move on.
- Some encounters may be peaceful such as a merchant offering you a health potion if you can help him figure out his chemistry question.
- Other encounters may be hostile and will require you to enter combat. You must outlive the opponent to win. To do this, you must deal damage by casting spells and throwing potions which can be done by answering questions (Image 3).

Image 1) Home base



Image 2) Adventure Screen

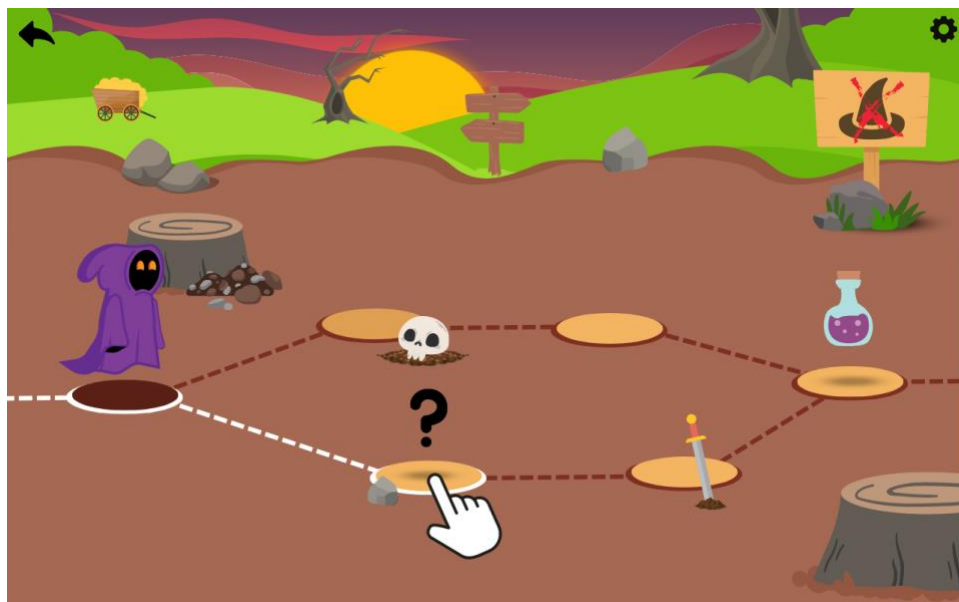


Image 3) Combat Screen

