Chapter 2

Designing for Collaborative Play: Why Games Need MUVEs and MUVEs Need Games

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ABSTRACT

Games and MUVEs each have distinct features that make them rich environments for learning. The MIT Education Arcade has worked to capitalize on the affordances present in both genres by designing The Radix Endeavor, a multiplayer online game for STEM learning set in a rich virtual world. This chapter presents the game as an example of how collaborative learning theory can be applied to game design within a MUVE. It will discuss the process of intentionally designing game features and content with the goal of bringing about social experiences, as well as the concrete game features that resulted. Then it will describe the importance of implementation design and the ways that teachers can leverage a multiplayer educational game based on the Radix pilot project. More broadly, it will explore how this type of social game can lead to authentic scientific inquiry and deep STEM learning.

INTRODUCTION

Games can be rich environments for learning, given their playful qualities and opportunity for scaffolded experimentation. MUVEs can also be rich environments for learning, due to their immersive nature and support for collaboration. While the design of games often focuses on a set of rules and mechanics, MUVEs tend to be more open-ended and invite exploration of the virtual world. When it comes to designing for learning, many games could benefit from the exploratory affordances of a MUVE. Similarly, many MUVEs could benefit from the framing and scaffolding of a game. When we combine these characteristics into one digital experience, we get something like an educational MMO. An MMO, or massively multiplayer online game, is a game genre in which hundreds or thousands of players simultaneously interact with the game and with each other. They typically take place in a large, persistent, open...
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world in which players are given quests, or loosely guided tasks, to complete as they progress through the game. By incorporating key design elements of both games and MUVEs, the resulting MMO has the potential to provide a deep and authentic learning experience for its players.

To capitalize on the affordances present in both genres, and build on the commonalities between MMOs, science inquiry, and collaborative learning, the MIT Education Arcade set out to design a multi-user virtual environment that deeply integrates science and math practices as core game mechanics and allows players to learn by doing, in authentic contexts and in social ways. In this chapter, we will present this game, called The Radix Endeavor, as an example of how collaborative learning theory can be applied to game design within a MUVE. We will discuss the process of intentionally designing game features and content with the goal of bringing about social experiences, as well as the concrete game features that resulted from that design process. Then we will describe the importance of implementation design and the ways that teachers can leverage an educational MMO based on the Radix pilot project. Through this journey, we will explore how this type of social game can lead to authentic scientific inquiry and deep STEM learning.

Radix Background

The Radix Endeavor game is set in a virtual multiplayer world with embedded biological and mathematical systems that involve the world’s flora, fauna, and fictional civilizations. Players take on quests that guide them to probe the game’s systems and develop a firsthand understanding of math and biology concepts in a variety of topic areas. The game is exploratory, leaving a lot of experimenting and problem-solving up to the players, much of which they can do either individually or by working together. It incorporates a wide variety of content as well as STEM practices, such as problem-solving, and even soft skills, such as perseverance. Rather than teaching players directly, it builds a conceptual understanding, leaving students open to make connections between experiences in the game and experiences in their classroom and even their lives outside of school. It is a long-form game, meant to be played over the course of a semester and revisited during each relevant curricular unit. In addition, it presents opportunities for players to collaborate both in and outside of the game, leading to a unique deep learning experience.

The central Radix gameplay is designed around systems that players can interact with and manipulate, many of which are built upon the world’s biomes. Figure 1 shows players in the forest region, one of the five distinct biomes with unique fauna, flora, structures, and characters. In each of these biomes, players can engage in activities such as collecting data on the heights of plants in different regions, and using statistical tools to compare the means and medians. They can also experiment with simulations to see how a species in a biome has evolved over time and manipulate variables to test out changes in the environment, as seen in Figure 2. Engaging in these activities gives players a foundation to compare their findings and discuss their discoveries with each other, be it in the game or in person. To further engage players in the authentic practices of biologists and mathematicians, they have a set of tools available to them in the game. Some of the tools are open-ended and creative, allowing players to draw geometric objects on scale maps, build fences with appropriate areas and perimeters, or create and share food web diagrams. The gameplay is centered on quests that target specific content areas in biology and math. These quests are designed to encourage players to explore the different systems and biomes as well as to engage in inquiry, problem-solving, and collaborative learning in order to complete the task and provide evidence needed to support their solution.
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