The Radix Endeavor

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The Radix Endeavor (radixendeavor.org) is an online multiplayer game designed to improve knowledge and engagement in high school math and science students. In a robust virtual world, players explain and solve problems by completing narrative driven quests to progress through the world. As they take on the roles of scientists and mathematicians in authentic situations, they develop inquiry, problem solving and critical thinking skills. Through a dashboard, the game allows teachers to monitor student progress as well as access resources that connect the gameplay to classroom instruction. Radix began a research pilot in February 2014 that continues through the end of the school year.

Game Experience

When you enter the game, you find yourself on an island in an Earth-like world with a technical and social situation similar to our 1400s (see Figure 1). The leader of the island is making arbitrary and greedy decisions that threaten the health of the island and its inhabi tants. You come to join a group called The Curiosi who asks you to help find solutions to some of the island's worst problems, both environmental and societal. If you can figure out what is causing the problems, how the natural systems work, and which factors need to be changed, you may be able to improve the lives of the people and even save the island from destruction. An overview of the game's narrative and curriculum is presented at http://youtu.be/1pYr3R3BTVU.

Figure 1: Two of the regions on the island of Ysola, the forest and the marketplace.

One example of an adventure you have while exploring the world is when you learn that the leader of the island has decided to plant only extremely tall palunculus trees for cosmetic regions and is unconcerned that it may cause problems for local birds who use it as a food source. You learn that he believes the birds, within a few days, will simply grow longer necks to adjust. Your job is to collect historical evidence from all over the island to convince him that evolution takes place on a much larger time scale. In another area of the world, the Curiosi ask you to help them create plans to build a new city. To do this, you must find the architect of the old city, help her measure the ruins of her city and create a brand new set of scale maps that can be used in building a new city. The process of completing this project can be seen here: http://youtu.be/kZLrFUTBjpA. In both of these cases and many others in the game, you must determine for yourself what tools to use and how best to solve the problem.

Benefits of a Multiplayer World-based Game

In The Radix Endeavor game, players' avatars exist in a shared and persistent world. Players work together to understand how the world works, then use that knowledge to accomplish task-based goals. This MMO-like game structure has affordances that integrate well with inquiry based learning and scientific ways of thinking, creating a framework uniquely suited for STEM learning. Players will need to explore the virtual world and conduct their own

“experiments” to develop hypotheses about how the biological and mathematical systems function. They are able to collaborate with other players in the game to compare ideas and solve problems using scientific reasoning, while being motivated by the social and contextual nature of the in-game goals.

Curriculum

The game covers content from high school math and biology. In biology, topics covered include evolution, ecosystems, human body systems and genetics. A walkthrough of the genetics quest line can be found here: http://youtu.be/7TgCrdOonyI. In math, topics covered include algebra, geometry and statistics. The content is aligned with the Common Core standards in mathematics and Next Generation Science Standards. In addition, for both content areas, we are placing particular emphasis on including opportunities for students to develop key STEM practices and 21st century skills such as using models, analyzing data (see Figure 2) and communicating information.

Figure 2: The Data Library and Data Explorer tools used for analysis in both content areas.

Assessment and Teacher Tools

Innovative task-based assessments are embedded into the game for each topic area. The data logging system collects information on players’ actions and progress in the game. Through this we can gather information on players’ strategies and that can determine if learning objectives and met and whether potential misconceptions may be present. This information will be synthesized and displayed in real time on the teacher dashboard, a tool to help teachers monitor student progress and tailor their lessons to students’ needs. Additionally, using the dashboard, teachers can manage classes, assign quests and access bridge curriculum that includes learning standards, implementation recommendations and questions to connect game play to traditional classroom instruction.

Research

Between February and June 2014, Radix will be in a pilot research phase. During this time we will have thousands of students playing from across the United States. All teachers using the game will be asked to complete surveys to give us information about usage and implementation. A subset of the teachers will be using external pre and post assessments designed to measure learning gains associated with the game. Additionally, we will be doing classroom observations and student interviews in order to measure interest and engagement. This research will give us insight into the feasibility of implementing such games in a classroom setting, as well as the potential of game-based assessments in STEM courses.

Radix in the GLS Arcade

The Radix Endeavor is a living game and changes based on feedback from students and teachers. However, we are always interested in feedback from colleagues in the educational games community. In June of 2014, Radix will be finishing up the research pilot and we will be thinking about future directions for the game. We believe that GLS attendees will be able to provide us with valuable feedback both on the content of the game and well as suggestions for pathways to pursue in order to grow the game.