DigMaster 10,000

Justification

Although 53 million U.S. school children play digital games (Prensky), digital game-based learning is only slowly making its way into the classroom. But digital-based games engage students in a way that drill and practice cannot, through construction, discovery, logic and original thinking (Prensky). Game-based learning also supports visual literacy, a skill important in our increasingly visual society.

James Gee, a leading researcher in digital learning, believes that good games "encourage and facilitate active and critical learning and thinking." Students engage in dialogue with other players and non-players, and this metatalk results in critical thinking and action regarding "the design of the game, video games more generally, and of other semiotic domains and the complex interrelationships" (Gee). This type of learning is constructivist; students actually seek opportunities to learn more about the intricacies of not just the game, but the software behind the game, in an effort to achieve their desired outcome (Gee). Constructing knowledge in this way, distributed across people, space, and time, practices critical skills required for knowledge workers in a digital age.

This constructivist approach gives children the opportunity to collaborate with a new affinity group and to develop "Resources for future learning and problem solving in the semiotic domain to which the game is related" (Gee). Constructivist learning also promotes transfer of learning because learning stems from practice and understanding rather than merely memorize sets of facts or follow a fixed set of procedures (National Research Council).

Further, video games give children experience in quickly interpreting text and images, important skills in a society shifting from print literacy to visual literacy. Gee reports, "Images often communicate different things from words. And the combination of the two modes communicates things that neither of the modes does separately…both modes and multimodality go far beyond images and words to include sounds, music, movement, bodily sensations and smells".

Game Play

DigMaster 10,000 is online collaborative community, consisting of virtual graduate students, data analyst, laboratory analyst, resource mangers and a DigMaster. Each player will be able to choose an avatar to become while apart of the online community. Players will develop time management, resource management and research management skills at various levels of the game in order to advance.

Through a collaborative learning environment they will develop online social skills. Players will explore different region of the United States, and engage in virtual archeology processes. Difficulty of game play will increase at different archeology sites within each region. They will be able to acquire artifacts along the way and put them in chronological order to help them justify time periods that they are trying to define through analyzing the strata layers.

They eventually need to arrive at an overall conclusions of today's changing climate based on historical archaeological evidence and report back to the funder's of the digs in this case the museum curator, in order to gain the title of DigMaster and continue playing at the top level.

If others come to conclusions that satisfy the funder then the title of DigMaster can be taken away for each region.

Use environment

Our game will be implemented in a middle school (grades 6-8) and will be used as an in-school and after-school project. Students will play the game as a way of getting a deeper understanding of 10,000 years of climate change in the North-American continent. Specifically, in the game students will explore the five regions of the United States (the Northeast, Southeast, Midwest, Southwest, and the West) in order to enhance their learning and understanding of archeology as a way of doing scientific research. Students will learn a bout gathering archeological evidence, how to theorize and share evidence with others, how to review existing research, as well as how to macro- and micromanage actual archeological digs through the use of map reading, logistics, and motivating and sustaining crew members at the dig.

In playing the game in-class, students can join up with other students and work collaboratively. Students can also engage in online chat sessions with other students in order to get tips from more experienced players. A skill system indicates to students what level of expertise they have gained in doing archeological research. In turn, this ranking system helps students identify potential mentors in the class who can help them advance if they are having difficulty in completing a part of the game.

Because the game is online, students can also play it after school. Moreover, students that are distantly located can join up with others and test their skills in archeological digs and compare them with other students across the United States. Given that our game focuses on the United States' regions, we are asking students to make connections to larger climate changes over time and how these relate to current climate conditions.

In doing a dig, the students will need to be methodical: crew members should be well fed and motivated to do work, supplies should be filled, evidence needs to be analyzed, and archeological information will need to be located through interaction with other game characters and information resources. As time progresses, a student's skill will be refined in doing archeological digs, and less time is needed to micromanage digs and more time is spent on doing research and scientific processes.

Learning objectives

Participants in this game will collect data, select tools to analyze that data, and collaborate with other students to construct a picture of life since the beginning of human settlement throughout North America.

In this game, students will:

- Practice systematic investigation through searching an archaeological grid at several strata.
- Demonstrate 3-dimensional map reading and cartography skills.
- Analyze evidence found at each level through tools such as microscopy, spectroscopy, and dating techniques including dendrochronology and isotope analysis.
- Describe the environment at the area based on evidence found in each strata.
- Extend the archaeological and analytic evidence to develop a full picture of life for residents of an area at the time represented in that strata.
- Develop an overall picture of the changes in North American climate and environment for the past 10,000 years based on the evidence collected in each stratum.

Role play. Through these activities, students will demonstrate their mastery of roles of staff in this type of research. Some of the roles students can assume in this include graduate student, data analyst, laboratory analyst, resource manager, and, ultimately, dig master.

Relevant New Mexico 5–8 grade standards and benchmarks

Strand I Benchmarks

1. Use scientific methods to develop questions, design and conduct experiments using appropriate technologies, analyze and evaluate results, make predictions, and communicate findings.
2. Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge

Strand II Standard II

Benchmark

1. Explain the diverse structures and functions of living things and the complex relationships between living things and their environments.
    a. 6th Grade performance standard 2: Describe how species have responded to changing environmental conditions over time (e.g., extinction, adaptati
    b. 7th grade performance standard 12: Explain how species adapt to changes in the environment or become extinct and that extinction of species is common in the history of living things.

Strand II Standard III

Benchmark II 7th grade performance standard 3: Know that changes to ecosystems sometimes decrease the capacity of the environment to support some life forms and are difficult and/or costly to remediate

Strand III Standard I: Explain how scientific discoveries and inventions have changed individuals and societies

Target Audience

Our primary audience is middle school students 6–8th grade (12–14 years old). This game is designed specifically for a after-school program, but it supports standards and can be used in a classroom.

Case Study 1

Kimberly, a 12 year-old 7th grade student, at Sunshine Middle School in the Southwestern United states came to the realization of all the archaeological riches her home state of New Mexico had to offer through the use of the educational gaming environment of DigMaster 10,000 B.C.

Starting out as an archaeology graduate student in the game and working her way up to DigMaster, allowed Kimberly to experience first hand how students eventually become professionals in their fields. This virtual hands-on experience had such a great impact on Kimberly she now has set personal goals to pursue archaeology as a career.

At the onset of the game she began as a graduate student with somewhat of an apprentice role, assisting and following the lead of the current DigMaster. As she worked collaboratively with the other students in the online community driven environment she began devising her own hypothesis and eventually began developing her own theories not only scientifically, but regarding game play that eventually helped her advance quickly.

After analyzing the environment at various levels of the game and arriving at correct conclusions to help her solve increasing difficult levels of the game she was eventually promoted to DigMaster and held on to the top player mode for 2 months.

Though the game is entertaining, it blended in educational objectives so succinctly that as a player she tended not to be conscience of during play. However, in order to pass each level Kimberly had to gather enough knowledge to solve the increasingly difficult puzzles to determine the time periods and climate changes for her chosen geographical region.

Kimberly has acquired scientific investigation skills, used during archaeology digs. She learned how to analyze evidence obtained in each dig, through simulated microscopy, spectroscopy and dating techniques. She was able to describe the environment of the area based on evidence found in each stratum.

As she developed social skills in the online environment, she willing shared information with others so that they too could advance and experience different levels of game play just as she did. Kimberly was eventually able to gain an overall picture of climate and environmental changes for that past 10,000 years and compare them to current global changes to become DigMaster.