Martian Boneyards: Scientific Inquiry in an MMO Game

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ABSTRACT

This paper reports on research of a game designed for scientific inquiry in a new and publicly available massively-multiplayer online environment (MMO). Educators and game designers worked together to create a highly immersive environment, a compelling storyline, and research-grounded tools for scientific inquiry within the game. The designers also played characters within the game that allowed them to deliver an evolving and responsive game narrative while also serving as participant observers for the research. Researchers integrated these observations with survey data, log data, artifact review, and interviews, to provide a broad picture of the player experience and the gaming environment. This study provides evidence that sustained scientific inquiry can be nurtured in an MMO game and that gamers’ relationships with characters in the game and other players may help facilitate that inquiry.

Keywords: Gaming, Martian Boneyards, Massively-Multiplayer Online (MMO) Environment, Scientific Inquiry, Virtual Learning Environments

INTRODUCTION

The authors are looking beyond today’s schools toward learning environments that transcend formal and informal boundaries, leveraging the learning that takes place in peoples’ everyday lives. Internet-based free-choice environments are becoming a major source of science learning and social activity for an increasing portion of the population (Falk & Dierking, 2010; Ito et al., 2008; Lenhart, Purcell, Smith, & Zickuhr, 2010). This research examines if and how a combination of professional-quality game design and well-grounded models for science learning is able to harness the passion, inquisitiveness, and “blissful productivity” (McGonigal, 2011, p.53) that some gamers exhibit, to engage a player community in sustained and productive scientific inquiry.

The authors have designed and studied a prototype game in a massively-multiplayer
online (MMO) environment using tools for scientific inquiry in an immersive, aesthetically-pleasing environment, with designers playing game characters to facilitate the game. This paper reports on the theory behind the game design and the findings of what types of players were attracted to the game and what types of design features were important to support sustained inquiry among those players. The paper also considers what design strategies might carry over to new games and where further research is recommended.

THE POTENTIAL FOR SCIENTIFIC INQUIRY IN SOCIAL GAMES

Youth and adults, both male and female, are spending increasing amounts of time playing computer games (Ito et al., 2008; Lenhart, 2010). These games often use high-end graphical engines, creating realistic and spectacular imagery. MMO environments, where players use avatars to represent themselves in online communities, are becoming a popular new venue for socializing (Castronova, 2007; Gartner, 2008).

A growing body of research is examining innovative ways of learning that may occur in social digital gaming environments (Barab, Arcici, & Jackson, 2005; de Freitas, Rebolledo-Mendez, Liarokapis, Magoulas, & Poulovassilis, 2010; Gee, 2003; Ketelhut, 2007). In many popular role-playing games (e.g., World of Warcraft), practices such as peer-review, collaboration, sharing and analysis of data, and evidence-based reasoning take place among the players (Steinkuehler & Duncan, 2008). These gaming activities appear similar to the habits of practicing scientists in professional communities who share data and observations, challenge and confirm each others’ claims, and work together to build theories through a well-recognized and explicit peer-review system (Dunbar, 2000).

Gamers’ activities are also suggestive of well-established situated learning models such as communities of practice. In a community of practice, people work together on domain-specific knowledge-building using common habits, language, and communally-accepted rules of engagement (Lave, 1988; Lave & Wenger, 1991; Scardamalia & Bereiter, 1996). Vygotsky (1978) recognized the mediating affects of a community and tools, and the inextricability of environment and community as they mediate the learning process. Vygotsky also described a zone of proximal development (ZPD) that is the difference between what a learner can do individually and what s/he could do with assistance from others. Interestingly, a similar tenet of many game-design models is that tasks must be just outside the current grasp of a player—doable, yet challenging—and often requiring the assistance of other players and/or tools within the game (McGonigal, 2011). A good social game always has a new task to be accomplished and a group of people to help.

“In a good computer or video game you’re always playing on the very edge of your skill level, always on the brink of falling off. When you do fall off, you feel the urge to climb back on. That’s because there is virtually nothing as engaging as this state of working at the very limits of your ability.” (McGonigal, 2011, p. 24)

In game design there is a constant tension between what is enough scaffolding to get players motivated and able to pursue the mystery and how much can be left open-ended for players to learn on their own. Too much scaffolding can easily feel “school-like” and procedural, taking away from players’ initiative to tinker around to discover things on their own. Too little scaffolding may leave players lost and disengaged.

Reaching out to a gaming audience may open up opportunities for people who do not consider themselves as science-oriented to engage in scientific inquiry through a different venue. Nearly all youth and 67% heads of households play electronic games (Ito et al., 2008; McGonigal, 2011). Though the typical video gamer is often reported to be a 37-year old white male (Entertainment Software Association, 2011), market research commissioned by...
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