

VIRTUAL SPACE CAMP VIDEO GAME. E. J. Speyerer¹, K. A. Ferrari², L. L. Lowes², P. E. Raad³, T. Cuevas³, and J. A. Purdy⁴, ¹Northwestern University, Center for Planetary Sciences, espeyerer@earth.northwestern.edu, ²NASA Jet Propulsion Lab, kay.ferrari@jpl.nasa.gov, ³Southern Methodist University, Guildhall, ⁴InSite Interactive, jpurdy@insite.net.

Introduction: As a result of the NASA's initiative for a manned mission back to the Moon and to Mars, there is heightened interest in solar system exploration. In the realm of education and public outreach, there is not a direct method to share the experience of manned space travel. Up until now, still images, web sites and short videos have been utilized to share the experience. However, with advances in computers, graphics, and especially video games, these experiences can become real, by creating a safe, fun learning environment that allows players to explore their own backyard or distant moons, all from the comfort of their personal computers. In addition to an interactive learning environment, the game will also allow players to see actual planetary data as well as give them tools to analyze it for themselves. The video game will also provide a great way to integrate E/PO projects from the broad fleet of Solar System Exploration missions that are being sent to various planetary bodies in the upcoming years [1,2].

Concept: In the Virtual Space Camp Video Game, players start off by familiarizing themselves with the controls of the game and simple tasks to be accomplished. First, camping in a familiar place like a backyard allows the players to develop the needed skills for future missions in the game. As the user learns the basics of camping, the game advances to different environments such as the forest of a national park, the dry Australian Outback, or the cold climates of the Antarctic.

As the player progresses, opportunities will arise in the game to allow the player to join the space program and explore the Space Shuttle, International Space Station, Moon, Mars, Asteroids, and even several distant moons.

Benefits of the Gaming Environment: Because video games intrigue children, young adults and increasingly, more adults, there are many benefits for video games to be utilized in an educational setting. A video game provides a synthetic environment for interactive education. Games provide an immersive and intuitive framework for making decisions with real and immediate consequences in a safe environment.

Games can be educational because they assist in deep learning:

- *Learning by doing:* Players make decisions that have consequences; they actively participate in the environment.
- *Learning by experimenting:* Players can safely try out multiple solutions; explore and discover information and skills.
- *Life-like learning situations:* Virtual worlds can provide environments that look and act like the real world, allowing the player to transfer knowledge between the two.
- *Believing in abilities:* Rewards and levels in games foster the concept that if you believe you can do something, the likelihood of success is higher.
- *Clear objectives:* Well-defined game goals will allow the player to make more progress towards learning objectives.
- *Team learning and skills:* Multiplayer games allow for group problem solving, collaboration, social interaction, negotiation, etc. [3].

Southern Methodist University's Guildhall program is already developing video games as an educational tool for the U.S. Army to create an environment to train medical corps personnel in location-specific decision making prior to deployment. Other research projects are also being conducted in using game-based environments for virtual reality therapy.

Education: Throughout the game, it will be necessary for the players to know and understand the environments they are in and those they wish to explore. In order for the players to successfully pass a level, the users must be knowledgeable about the environment and the tasks they have been given. For example, if the user is exploring places far from the sun or in prolonged darkened regions, it might not be a good idea to bring tools that rely solely on solar power. Another example would be when getting ready to construct a lunar base to first consult mineral resource maps of the Moon to find the proper region to construct the lunar base.

Planetary Data: One of the key aspects to the Virtual Space Camp game is the environments that the players are immersed in are based on actual planetary data. For example, the maps in the game of the planetary bodies will be projections derived from topography and high resolution imaging from past and current NASA missions. In addition, if a player desires to analyze rocks on the moon that he or she

picks up, real images of actual moon rocks will be used along with actual data collected from real samples. In addition to using data collected from previous missions, the game may potentially receive 'Updates from Mission Control.' These updates, which could eventually be downloaded from the Internet, provide additional data that can be analyzed and additional assignments and missions for the player to explore.

Advantages of Using Modern Video Game Technology: Video game technology has increased rapidly in the last several years with games based in rich 3D worlds being the norm. More importantly, professional game "engines" can be licensed that provide all the built-in tools for rendering 3D worlds and characters, movement, networking, artificial intelligence, etc. This allows developers to create the game's content and story around a specific theme such as space exploration without having to perform a lot of custom programming.

Additionally, multiplayer online games have skyrocketed in popularity, with millions of total subscribers and tens of thousands of users playing at any one time [4,5]. The major reasons for this popularity are the highly immersive worlds, rewarding missions and engaging social aspect of collaborating with other live players to explore and solve problems. These are the same elements and technology that would make a Virtual Space Camp game popular as well as educational and entertaining.

This project will also allow us to build on current research related to discovery-based learning in a virtual learning environment, including the application of pedagogical agents to guide and reinforce the educational experience of game-based learning.

The Next Step: Over the coming months, the Solar System Exploration Forum, the Guildhall, as well as many other public outreach groups, will be exploring the development of the Virtual Space Camp Game.

References: [1] Lowes et al (2003) Reuniting the Solar System: Integrating E/PO Projects for SSE Missions and Programs. LPSC XXXIV. [2] Lowes et al (2004) Integrating Solar System Exploration Education and Public Outreach: Theme Products and Activities. LPSC XXXV. [3] Merrilea Mayo (2005), "Ender's Game for Science and Engineering: Games for Real, for Now, or We Lose the Brain War," and "How People Learn," National Academies Press (2000). [4] "World of Warcraft Surpasses Five Million Customers Worldwide," World of Warcraft Press Release, 12/19/2005, www.blizzard.com/

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