WhyReef: A Virtual, Educational Program Analysis

Cody Jolin, University of Wisconsin - Stout, jolinc0607@my.uwstout.edu

Abstract: During the summer of 2012, The Field Museum of Natural History (FMNH) began a collaborative project with UW-Stout in order to analyze the effectiveness of the Museum's WhyReef program. WhyReef, an online, socially interactive coral reef simulation designed for youth ages 8-16, launched in March 2009 and has since reached over 160,000 unique players. This project focused upon a robust evaluation and analysis of WhyReef's learning goals and gameplay mechanics. This was made possible by a data set of player content and statistics provided by FMNH, as well as a personal trip to FMNH to interview the WhyReef educational team. Research was divided into three topics and determined that: 1.) WhyReef is very successful in increasing coral reef attention and appreciation, 2.) The best time to launch attention-grabbing, critical events is on weekdays during the summer, and 3.) Meaningful Motion is a key gameplay mechanic for increasing WhyReef player comprehension.

Purpose of the Research

WhyReef is a virtual, interactive coral reef simulation housed within Whyville.net that launched on March 30, 2009. It is accessible for free by anyone using an internet connected computer. The WhyReef project enables students to learn about the many diverse species living within coral reefs, as well as the scientific processes that are required to understand and conserve these reef ecosystems. The educational gameplay and design elements of WhyReef, coupled with its online, social architecture, make it a prime example of successfully combining educational and entertainment aspects in a video game.

The WhyReef project is made possible by a collaboration between The Field Museum of Natural History (FMNH) in Chicago, Illinois and learning-based virtual world developer Numedeon, Inc in Pasedena, California. Numedeon created Whyville.net in 1999, and since which more than 5 million registered users have accessed Whyville (*Numedeon, Inc.*, 2012), with over 160,000 unique users visiting WhyReef. FMNH continues to regulate WhyReef and institute changes and events in pursuit of their program and learning goals. These goals include: awareness of conservation biology, ecosystem ecology, stewardship and management, and science literacy (Babcock & Aronowsky, 2010, p. 3*)*.

Before development of WhyReef began, high priority was given to a list of 30 learning goals stemming from these four, broad educational goals. Both Numedeon and FMNH strove to find an optimal balance between online gameplay and scientific authenticity. Following several successful years, FMNH wishes to examine what aspects of WhyReef made the program so successful (Babcock & Aronowsky, 2010, p. 3*)*.

This led to the formation of a collaborative effort between The Field Museum of Natural History and UW-Stout. FMNH supplied me with a data set containing selected WhyReef user statistics, writings, and digital media created by some of the over 140,000 unique users that visited WhyReef over the time period of March 30, 2009 to April 1, 2010. During this timeframe, FMNH also conducted the Kids Advisory Council (KAC). Consisting of a group of on-site and off-site youth ages 10-14, the council aimed to better understand how content knowledge is acquired by youth through a virtual world and how this is supplemented by real interaction with specimens at The Field Museum. The data set supplied by FMNH includes a wealth of first-hand data gathered during the KAC, as well as kid-produced videos showcasing what they have learned.

Research Questions

1.) How do the WhyReef program goals align with Whyville's virtual world interface?

2.) Does social activism increase during critical events, such as WhyReef's "Save The Reef" events?

3.) What game play elements and information increase WhyReef user participation and comprehension?

Methodology

Analysis began with an in-depth evaluation of the electronic WhyReef data set and was further strengthened by a personal visit to The Field Museum to interview key WhyReef team members, learn the motives behind their game design decisions, and gain a better understanding of the science that influenced the development of WhyReef.

A comprehensive analysis of the WhyReef data set is comprised of two phases: qualitative and quantitative. Qualitative analysis was used to answer Research Question 1 by coding the WhyReef user data to the set of 30 WhyReef educational goals, as listed in the WhyReef Final Report (2010). The coding process is one common to many analysis efforts that draw from qualitative data (Zheng, Spires, & Meluso, 2011, p. 194), and is described as using one's own educated judgment to determine if a criteria is met. By closely coding 85 player-written articles and examining the Kids Advisory Council results, I was able to gain an understanding of how well WhyReef accomplished its educational goals. Quantitative analysis was used to answer Research Question 2 by utilizing the statistics program SPSS to analyze a list of unique WhyReef visitors organized by day of the year. Looking at trends between critical, "Save The Reef" days and normal, non-"Save the Reef" days, as well as trends between different days of the week, produced a statistically supported solution. A mixture of both qualitative and quantitative analysis was used to answer Research Question 3. I examined the number of players that played each game, read comments left about each of them, and drew upon my own past academic and gameplay experience to form my opinion of how to best improve gameplay mechanics of WhyReef.

Results/Conclusions

Through the analysis of the WhyReef data set, I found that WhyReef is very successful in increasing coral reef attention and appreciation among its players, but could improve upon its delivery of scientific knowledge. Then, I calculated that the optimal time to conduct critical, "Save The Reef" events is on weekdays during the summer months. Finally, I determined that the best way to improve WhyReef's gameplay mechanics is through the use of Meaningful Motion. This type of motion grabs the player's attention, while supplying clues as to what the player should focus upon. This project provided valuable feedback to the WhyReef development team, as well as opened the door for the possibility of continued collaboration between FMNH and UW-Stout.

References

Aronowsky, A., Sanzenbacher, B., Thompson, J., & Villanosa, K. (2010). Worked Example: How Scientific Accuracy in Game Design Stimulates Scientific Inquiry. *International Journal of Learning and Media*. http://synthesis.eol.org/projects/whyreefexample

Babcock, E., & Aronowsky, A. (2010). *WhyReef - Merging Natural Science with Virtual Learning for Youth: Final Report*. Chicago, IL: The Field Museum.

Numedeon, Inc. (2012). *Numedeon, Inc*. Retrieved September 17, 2012 from http://www.numedeon.com/smmk/frontOffice/aboutUs

Oceans5. (2009). Reef in a Dire Situation. *The WhyVille Times*. October 4, 2009 issue. http://j.whyville.net/smmk/whytimes/article?id=10694

The EOL Biodiversity Synthesis Group. (2009). *Beth Sanzenbacher*. Retrieved September 17, 2012 from http://synthesis.eol.org/users/bsanzenbacher

The Field Museum (2011). *YouTube Profile - WhyReef*. Retrieved September 17, 2012 from http://www.youtube.com/WhyReef

The Field Museum. (2012). *WhyReef*. Retrieved September 17, 2012 from http://fieldmuseum.org/schools/whyreef

The Field Museum Education Department & Biodiversity Synthesis Group. *WhyReef Educator Guide*.

Retrieved September 17, 2012 from http://archive.fieldmuseum.org/education/guides/WhyReefEducatorGuide.pdf

Zheng, M., Spires, H. A., & Meluso, A. (2011). Examining upper elementary students' gameplay experience: A flow theory perspective. *Education in a technological world: communicating current and emerging research and technological efforts*. 190-198. http://www.formatex.info/ict/book/190-198.pdf