The ASPIRE Program:
Using Game-Based Learning to Reach Massive Audiences

Peter Christiansen
University of Utah, USA

EXECUTIVE SUMMARY

The ASPIRE Program is a science outreach program that was designed with the goal of teaching basic physics and math to middle school students and encouraging them to take an early interest in science. Our main tool in achieving this goal is a series of online games and activities that are designed to supplement classroom learning. The use of videogames as a teaching tool has enabled ASPIRE to reach thousands of students per day, while maintaining an average staff of only two or three employees. Although the games themselves are online, much of the success of ASPIRE can be attributed to connections with educators made through more traditional outreach activities. These connections serve as both a source of feedback for improving pro-learning behavioral effects in players and as a means of raising awareness for the games themselves.

BACKGROUND

Although public outreach is a significant part of many grant-funded research projects, limited resources often make it difficult to achieve high impact results on a large scale. Limited funds and staff can limit outreach efforts to small groups or create a reliance on large numbers of volunteers. The latter can also be unsustainable as volunteers may experience high turnover and often require additional management

in order to be effective. Thus, for many research groups, particularly smaller ones, designing sustainable, high impact outreach activities is an elusive goal.

The Astrophysics Science Project Integrating Research & Education (ASPIRE) is the outreach branch of the Telescope Array Project, an National Science Foundation (NSF) funded experiment studying ultra-high energy cosmic rays. For over 15 years, ASPIRE has utilized a program centered around web-based videogames and interactive lessons capable of reaching audiences of over 7,000 users in a single day. By utilizing game-based learning techniques and by working in collaboration with state and local education organizations, ASPIRE is able to reach massive audiences while maintaining an average staff of two or three people.

The ASPIRE Program was conceived in 1997 by Professor Gene Loh and other researchers from the High Resolution Fly's Eye Experiment (HiRes), the precursor to the Telescope Array Project. At the time, HiRes was the largest cosmic ray detector in the world and was on the cutting edge of astrophysics research. With considerable support from the NSF, ASPIRE was originally envisioned on a large scale, enlisting the help of 26 teachers from the Utah school system, as well as a number of artists and engineers. This was also a time when the idea of the Internet as an educational tool was growing in popularity across the United States. In Utah, public middle and high schools had finally achieved 100 percent Internet connectivity, making online lessons a natural choice for ASPIRE.

The first ASPIRE lessons were created in Java, which was a new technology at the time. This provided a number of benefits, including a high level of interactivity as compared to most web-based technologies of the time, as well as relatively reliable cross-platform functionality. The latter was especially important because while computers were beginning to be taken much more seriously in public schools, the technology being used in school computer labs ranged from cutting edge computers to barely passable machines.

There were also some drawbacks to using Java as a platform. Although the project was, at this time, well funded and staffed with both programmers and artists, there was often difficulty in coordinating between the two groups. Artists had no access to code and programmers had no access to art tools. This decreased the efficiency of the development process, making the release of new lessons somewhat slower than it could have been.

In 2000, Julie Callahan, the current project coordinator of ASPIRE, was brought into the project, just as the project's three year funding cycle was coming to an end. During these three years, the economic climate in the US had changed substantially. The "Dot Com Bubble" had just burst, and budgets were being slashed across the country. When the new budget for the HiRes experiment was approved, the funding