

Learning Technologies Project
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PROJECT DESCRIPTION

NASA Learning Technologies (LT) supports the development of projects that deliver NASA content through innovative applications of technology to enhance education in the areas of science, technology, engineering and mathematics (STEM). Research and development are at the core of the LT mission. Learning Technologies is part of NASA's eEducation program and is NASA's educational technology incubator. LT seeks to enhance formal and informal education in STEM fields with the goal of increasing the number of students who pursue careers in those fields. NASA Learning Technologies couples the talents of educators, industry, academia, non-profit organizations and NASA's Mission Directorates to develop educational technologies that enable, empower, and educate learners of diverse backgrounds, characteristics, and abilities.

The Learning Technologies project office is located at Goddard Space Flight Center in Greenbelt, Maryland. LT is a NASA-wide initiative with representatives and projects at several NASA Centers and an administrative structure incorporating each of the ten Centers in the decision making process.

In FY2008, LT had two project areas under development: a request for proposals to partner with NASA to develop a massively multiplayer online STEM learning game (NASA MMO for easy reference) under a non-reimbursable space act agreement, and the acquisition of space in the virtual world Second Life to be a platform for FY09 eEducation efforts in virtual worlds. In FY09, LT will be funding 1/10 of an FTE at each Center to act as liaison for that Center's Education Office. This will enable LT to better serve the needs of NASA Education at the Center level and engage the Center's in LT efforts.

PROJECT GOALS

MMO Solicitation: Solicit proposals for a non-reimbursable space act agreement make an award to develop a STEM-based massively multiplayer online (MMO) game using NASA missions and data to draw more students to STEM fields and foster greater completion rates in STEM courses of study. (An overwhelming response to the request for information for this project and deep involvement with GSFC Legal delayed the solicitation process. Selection will be made in the first quarter of FY09.)

Education Solicitation: Release a cooperative agreement call in conjunction with the space act agreement solicitation to bring higher education organization to collaborate on pedagogical enhancement of the MMOG project and to provide educational evaluation. This solicitation released and award in FY09 pending the results of the MMO request for proposals.

eEducation Roadmap: Support the continued dissemination and use of the eEducation strategic research roadmap identify key e-Education research questions and technical requirements. Continue to build networks and partnerships across NASA, with other Federal agencies and commercial and academic organizations in the area of virtual worlds.

Projects:

- NASA game prototype development in collaboration with the Federation of American Scientists and the *America's Army* team was delayed by licensing issues until FY09.
- Experimental Second Life Educator Resource Center being developed through LT team at JSC in collaboration with CORE and ERCN.
- Teen Grid Presence in Second Life. Investigating the viability and appropriateness of a permanent NASA presence in the Second Life Teen Grid as a means of reaching students directly.
- Collaboration with other eEducation projects to develop a technology advising presence to support Elementary and Secondary and Higher Education adoption and implementation of appropriate technologies (in response to NRC recommendations).

Push-Pull:

The LT Higher Education liaison worked directly with Higher Education outcome and project managers to make them aware of Learning Technologies goals and resources to foster collaboration. Opportunities for Higher Education to leverage LT resources are expected in Second Life and in the MMO project.

PROJECT BENEFIT TO OUTCOME

The NASA-based massively multiplayer online STEM learning game project will eventually contribute to Outcome 2 in the area of providing NASA resources for students. The timetable for implementation will be established depending on the proposal selection and space act agreement negotiation in FY09. The project is expected to benefit Outcome 2 in the following areas:

- 2.3.3 Number of approved materials that are electronically accessible
- 2.3.4 Customer satisfaction data regarding relevance of NASA educational resources.
- 2.3.5 Customer satisfaction data regarding effectiveness of NASA educational resources.
- 2.3.6 Use of technology to improve data collection, reporting strategies & dissemination

In addition, this solicitation will result in a project addressing objectives 1.3 and 3.1 and PART measures regarding the number of individuals reached through eEducation media.

The education solicitation will provide research opportunities that should impact Higher Education's objective 1.1 on faculty and research support.

PROJECT ACCOMPLISHMENTS

Learning Technologies worked closely with the Innovative Partnerships Program Office to craft an original strategy for finding a partner to develop a NASA-based massively multiplayer online STEM learning game. The first step was for LT and IPP to issue a request for information on the topic. That RFI drew 168 responses totaling more than 800 pages of input. All ten Center Education Directors, most of the Center IPP Directors appointed representatives to participate in the RFI review and drafting of the RFP that followed. The Science, Exploration Systems and Space Operations Mission Directorates also designated participants. In all, 35 reviewers participated in the process. The resulting request for proposals was vetted by GSFC Legal, the Office of Communication Planning and the Office of Education before it was released at a joint LT-IPP workshop which drew 200 interested individuals. The combined RFI and RFP efforts attracted significant media attention. The proposed project to enhance STEM through a NASA-based MMO game was covered in print, video, electronic text and virtual space by more than sixty media sources. The most prominent include the cover of Federal Times, the front page of the BBC news website, WIRED Online, BBC Focus Magazine, Game™ Magazine, Slashdot, Space.Com and NASA Watch. The RFP resulted in 13 proposals which were reviewed by a nine

member panel representing LT, IPP, Legal, ESMD, SMD, SOMD and three external experts working in the field of online games.

In support of the eEducation research roadmap, the JSC LT team led experimental research efforts in Second Life to better understand how that virtual environment might support NASA's education objectives. Prototypes for a virtual Educator Resource Center a media platform to support the Digital Learning Network were created on NASA Colab Island sponsored by ARC. The JSC LT team also worked extensively with JPL Second Life expert Charles White on setting up NASA eEducation Island in Second Life. That site will provide a place to provide professional development in a virtual environment and point of access for teachers to NASA resources. It will be available to start supporting these efforts in the first quarter of FY09. In a supporting effort, the NASA-sponsored Classroom of the Future began work efforts to evaluate the impact and effectiveness of education using NASA content in Second Life. LT's virtual worlds work has been facilitated by the development of the NASA Immersive Synthetic Environments Research team as an agency-wide vehicle for idea, information and resource sharing. Active participation in the Federal Consortium on Virtual Worlds has also enhanced inter-agency cooperation. In FY08, LT co-chaired the FCVW Education and Training working group.

The LT Higher Education liaison worked throughout FY08 to support the LT solicitation efforts, make Higher Education aware of the virtual resources coming online and lead the development of the education research and evaluation solicitation to be released in FY09 to support the MMO project. Opportunities for internships and research on the projects have been identified and are being cultivated.

Since the release of the LT-IPP request for information, the RFI and accompanying review process have been used as a model for other RFIs by the Office of Education, the IPP Office, the organizing committee for the 2012 London Olympics and the City of Decatur Georgia.

PROJECT CONTRIBUTIONS TO PART MEASURES

Individuals reached through NASA eEducation Resources

1. Experimental Streaming Media Platform "Arroyo" in Second Life at Colab Island:
 - 5250 unique visitors
 - 36912 visitor minutes
 - 232 days of monitoring(There are no gaps in monitoring. There is no recounting.)
2. Experimental Education Resource Center in Second Life at Colab Island:
 - 3785 unique visitors
 - 34268 visitor minutes
 - 281 days of monitoring(There are no gaps in monitoring. There is no recounting.)
3. The Learning Technologies website:
 - 10836 unique visitors
 - 1610 downloads of "A guide to Games for NASA" PDF
 - 1087 downloads of the "NASA eEducation Roadmap" PDF
 - 289 downloads of the "Roadmap Implementation Guide" PDF

Items 1 and 2 are numbers of visitors in the form of avatars visiting 3D virtual sites in Second Life.

IMPROVEMENTS MADE IN THE PAST YEAR

Learning Technologies worked very closely with the Innovative Partnerships Program Office and the Legal Patent Office and General Counsel's Office at GSFC to develop a solicitation for a non-reimbursable space act agreement to develop a NASA-based massively multiplayer online STEM learning game. The concept and approach are both innovative and the process has required an extensive amount of interaction between the offices involved in this pioneering effort.

Bringing all ten Center Education Offices and three of the Mission Directorates into the planning and implementation process for LT's solicitation was a rewarding effort that is an improvement over more insular strategies in the past. The LT office intends to build on that foundation in FY09, by identifying liaisons at each Center who will act as the local LT point of contact.

The *NASA eEducation Roadmap: Research Challenges in the Design of Persistent Immersive Synthetic Environments for Education & Training* release in FY07 continued to guide LT planning and development in FY08. Other eEducation projects have also been using the roadmap to help guide their work, as have several external groups including the Defense Acquisition University, the Federation of American Scientists and Miami Science Museum.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

In FY08, Learning Technologies worked closely with the following partners:

- The *America's Army* Project Team in collaboration on the design of a NASA-based, commercial quality game prototype.
- The *Federation of American Scientists* in collaboration on the NASA eEducation research roadmap follow up and design of a NASA-based, commercial quality game prototype.
- The *Federal Consortium for Virtual Worlds* as an active member building resource and information sharing networks for virtual worlds between government agencies.
- The JSC Learning Technologies team on all elements of Second Life work and research and virtual worlds' accessibility research.
- The GSFC Innovative Partnership Program Office and GSFC Patent Law Office and General Counsel's Office were invaluable partners in the developing and executing the concept of a targeted, non-reimbursable space act agreement for a solicitation tool for an innovative education project.
- All ten Center Education Offices, seven Center IPP Offices and three Mission Directorates (SMD, ESMD and SOMD) contributed the time and talent of representatives to review and process the 800 pages of responses to the LT request for information. The same Mission Directorates, IPP and GSFC Legal have contributed representatives to the RFP review panel.
 - This should be captured in some way under accomplishments.

During FY08, the LT project office shared information and insights in the areas of game and virtual world technology with or on behalf of Informal, Formal and Higher Education, the Exploration Systems and Space Operations Mission Directorates, the Digital Learning Network, Classroom of the Future, INSPIRE, Goddard, Langley, Marshall and Ames.