Learning Technologies
Project Manager James Harrington
Goddard Space Flight Center
301.286.4063

PROJECT DESCRIPTION

NASA's Learning Technologies Project (LT) is a NASA-wide education technology development initiative. LT supports the development of projects that deliver NASA content through revolutionary technologies to enhance education in the areas of science, technology, engineering and mathematics (STEM). Research and development are at the core of the LTP mission. The Learning Technologies Project is part of NASA's e-Education Project and is NASA's educational technology incubator. LTP seeks to enhance formal and informal education in STEM fields with the goal of increasing the number of students in those fields of study. The Learning Technologies Project combines 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. In FY12, there were 2 WYEs and 1 FTE on the project.

PROJECT GOALS

The LT project goal is to place primary focus on advance use of technologies to help address the Agency goal to increase the completion of STEM degrees and "Strengthen NASA and the Nation's future workforce." LT has established a research and development direction for joint public/private industry-education ventures that target research in games and virtual worlds for learning and training, and has developed a research expertise on innovation in response to a request from the NASA Office of Education. LT's research falls into the three broad categories of games, virtual worlds and cyberlearning (with considerable necessary overlap).

ACTIVITIES

NASA-themed Massively Mulitplayer Online STEM Learning Game Project is an effort to tap the power of virtual world and games for the benefit of STEM learning and career exploration. This project is being developed in partnership with the Innovative Partnership Program Office and through a non-reimbursable space act agreement with Astronaut: Moon, Mars and Beyond, LLC. The development team has to raise funds for the project from private and public investors and is expected to generate a revenue stream from the game when it goes live. NASA is committed to providing subject matter experts and content review for the project. The agreement calls for NASA to fund education and evaluation experts with work with the developers, but those plans are currently suspended due to budgetary considerations.

WisdomTools Game Development Agreement: The Office of Education has signed a non-reimbursable Space Act Agreement with WisdomTools Enterprises, Inc. to collaboratively develop a series of thematically linked NASA inspired video games that convey the spirit and excitement of NASA missions and explorations to middle school students, embed students in authentic content and learning, and promote career exploration. The partners will collaborate in the design, development, and dissemination of serious games designed to teach science, technology, engineering and mathematics (STEM) concepts and to inspire interest in STEM careers. Though solicited and selected under the Summer of Innovation program, Learning Technologies was selected to manage and support this agreement. NASA is committed to providing subject matter experts and content review for the project

Moonbase Alpha was developed as a proof of concept demonstration game to show that NASA content (Lunar Architecture) could be combined with a state-of-the-art game engine (Unreal Engine 3) to create and engaging game that is commercial quality, STEM-inspiring and fun. The game consists of two missions of 20 minutes each and a free play "sandbox" mode that allows players to explore the lunar environment and scenario resources with unlimited time. Since its release in July 2010, Moonbase Alpha has been downloaded more than 600,000 times.

Support materials for using Moonbase Alpha with students in class were developed in FY11 by For Inspiration and Recognition of Science and Technology (**FIRST**). (spell out FIRST acronym) engineers and scientists working with teachers at LARC. The draft curriculum was reviewed externally through the Immersive Education Initiative lead by Boston College in FY 12. Modifications based on input from that review still need to be made to the document before it can receive official NASA approval as a support educational document.

The Interagency Working Group on Digital Game Technologies (DGT) was established by the National Science and Technology Council (NSTC), Committee on Technology in March, 2012. The DGT serves as a forum for coordinating interagency activities related to basic and applied research and development efforts that leverage digital gaming technologies and game-based techniques toward national priority areas. For the purposes of the DGT, digital gaming technologies include educational games, virtual worlds, and electronic games. NASA (Leland Melvin) co-chairs the DGT with the HHS (Erin Poetter) and DARPA (Russ Shilling) and provides support through the executive secretary post (Daniel Laughlin).

Federal Games Working Group (FGG) is a grassroots support effort for the DGT that is made up of nearly two hundred self-identified members working with 38 Federal agencies, White House offices and Federal entities. Launched by the White House Office of Science and Technology Policy (OSTP) in November, 2011, the FGG is co-chaired by OSTP games lead and the DGT executive secretary. The FFG seeks to foster an interagency community of individuals working with, funding, developing or implementing games for government purposes. Collaboration, better informed

deployment and sharing experiences and reduced redundant efforts are primary goals of the group.

NASA Education Innovation Benchmarking Report was delivered to the senior leadership. This report was designed to benchmark best practices of innovation initiatives from sample organizations from the "innovation ecosystem" as described by the Commerce Department as the driving synergies for innovation in our economy. They include federal agencies, industry, universities/foundations. The benchmarking study focused on three primary areas for best practices: (1) Program Ideology and Design as related to a national priority; (2) Outcome Strategies and Evaluation; and (3) IT Infrastructure Interface Design for transparency between governing agencies and the general public.

Digital Badges Initiative as a collaborative project with other federal agencies and the MacArthur Foundation administered by HASTAC, a network of individuals and institutions inspired by the possibilities that new technologies offer us for shaping how we learn, teach, communicate, create, and organize our local and global communities.

A *badge* is a validated indicator of accomplishment, skill, quality or interest that can be earned in any of these learning environments. Badges can support learning, validate education, help build reputation, and confirm the acquisition of knowledge. They can signal traditional academic attainment or the acquisition of skills such collaboration, teamwork, leadership, and other 21st century skills.

Badges are used successfully in games, social network sites, and interest-driven programs to set goals, represent achievements and communicate success. A *digital badge* is an online record of achievements, the work required, and information about the organization, individual or other entity that issued the badge. Badges make the accomplishments and experiences of individuals, in online and offline spaces, visible to anyone and everyone, including potential employers, teachers, and peer communities.

PROJECT BENEFIT TO OUTCOME

The project currently benefits 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

The NASA-based massively multiplayer online STEM learning game project will contribute to Outcome 2 in the area of providing NASA resources for students.

PROJECT ACCOMPLISHMENTS

Evidence that Learning Technologies has helped develop NASA's leadership role in national STEM improvement efforts can be seen through our increased role in national innovations in education initiatives such as the Federal Games Working Group, The Interagency Working Group on Digital Game Technologies, collaboration with the Digital Badges Initiative, collaborative discussions with the Department of Education's Office of Education Technology and synergies with their National Education Technology Plan (NETP) 2010.

PROJECT CONTRIBUTIONS TO 2012 APGs

Due to budget reductions in 2011, the LT Research and Evaluation Cooperative Agreements that were responsible for producing the 2010 APG outcomes were cancelled. Therefore, LT could only conduct collaborative activities to further strengthen its infrastructure for innovations in education.

IMPROVEMENTS MADE IN THE PAST YEAR

Learning Technologies has better defined its role as described by the Administration's call for America to regain its standing as the world leader in education by supporting the development of game changing educational technologies. At the center of the President's strategy to —"win the future" is the intersection of education, innovation and infrastructure. **A federal focus on learning technologies as an area of national priority**, described in the President's *Strategy for American Innovation, will help ensure that demand exists for innovators bold enough to pursue transformative improvement.* The LT accomplishments for FY12 mentioned above are increasingly more relevant to our national priorities for STEM education.

PROJECT COLLABORATORS AND ROLE OF COLLABORATORS IN PROJECT EXECUTION

- Astronaut: Moon, Mars and Beyond, LLC (Virtual Heroes/ARA, Project Whitecard and Wisdom Tools, Inc.) are partner with LT develop the NASA-based massively multiplayer online STEM learning game.
- Valve, the owner of the Steam game distribution and support network. LT has an agreement with Valve to distribute Moonbase Alpha.
- Miami Science Museum on their NASA Informal Education grant to facilitate wrap up, shutdown and archiving of their Second Life project *NASA Youth Expo*.
- The GSFC Innovative Partnership Program Office partners with LT on the NASA-themed MMO project.
- The ARA Virtual Heroes Division collaborated on the development and public relations surrounding Moonbase Alpha.

- Wisdom Tools, Inc is partnered with NASA to develop “serious games” for learning based on NASA content. The partnership was solicited under the Summer of Innovation project and is managed by Learning Technologies.
- White House Office of Science and Technology Policy collaborates with Learning Technologies on game-based initiatives. LT works closely with OSTP to provide support to the National Science and Technology Council subcommittee on Digital Gaming Technology and the Federal Games Working Group. Through those two groups, LT has contact and working relationships with 34 federal agencies and entities and four White House offices working in the area of games.
- Little Planet Learning plan to evaluate the way we inspire and engage students in STEM careers via game play technologies.
- Department of Education-Education Technology Office is the driving policy office for establishing a platform from which (NASA instead of the agency?) resources fit into a national effort as described by the 2010 NETP. Discussions have been held to plan joint initiatives to leverage NASA games and other infrastructures to be evaluated in collaboration with NSF.
- LT is collaborating with the National Science Teacher Association to better understand how to build online learning communities for teachers and students.