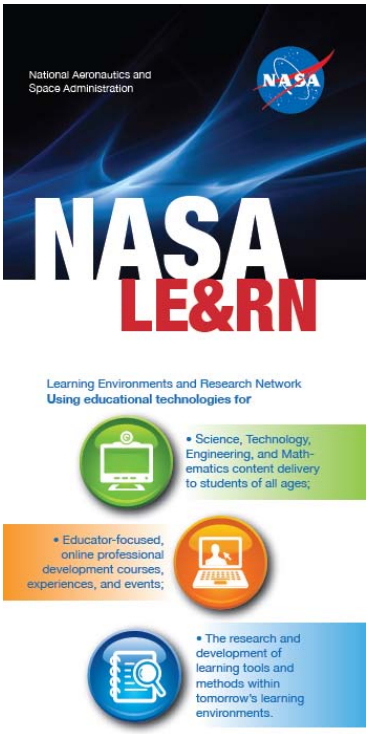
NASA LE&RN
2011 Annual Report

Administered by
OSU (DLN), GA TECH (ePDN), WJU (COTF)
Type of Agreement
3 Cooperative Agreements
Project Manager:
Dr. Robert Starr
Center:
NASA Langley Research Center
Telephone Number:
(757) 864 9492



PROJECT DESCRIPTION

The NASA Learning Environments and Research Network (**LEARN**) is a suite of three E-education activities within the K-12 STEM Education Program that provides distance learning and online educational opportunities to students and educators. LEARN also conducts research and development initiatives in educational technology. LEARN activities are the NASA Digital Learning Network™ (**DLN** - Oklahoma State University), The NASA-sponsored Classroom of the Future (COTF - Wheeling Jesuit University), and the NASA Electronic Professional Development Network (**ePDN** - GA Tech).

PROJECT GOALS

• Provide the NASA Office of Education with eEducation infrastructures used to inspire, engage, and educate K12 students and educators.

• Conduct research into existing and emerging learning environments and associated technologies.

• Plan, prepare, produce, deliver, and evaluate distance learning events that feature NASA-related research and missions.

• Collaborate with other NASA Education Projects to further the effective use of distance learning and online learning technologies.

PROJECT BENEFIT TO OUTCOME

Outcome 2: LEARN makes use of instructional technologies that overcome the barriers of time and distance to significantly increase the number of students and educators who are exposed to NASA-related STEM content. LEARN also conducts research into existing and emerging technologies to better inform the NASA Office of Education of their usefulness in meeting its goals and objectives.

PROJECT ACCOMPLISHMENTS

LEARN's three activities, DLN, COTF, and ePDN, work together and independently to optimize services and maximize outcomes for NASA Education across broad geographic areas and time zones. Each activity carries out its organization's objectives based its individual cooperative agreement with NASA. This section provides a summary highlighting LEARN accomplishments across all three activities. The list of accomplishments is organized to show synergy among the three organizations and successful leveraging of funding to broaden the reach of each activity's services. The highlights show how each LEARN activity supported the NASA Summer of Innovation project to provide cross-cutting support and enhancements to this STEM education initiative. Another section shows how LEARN services expanded geographically and technologically with integration of new and emerging technical capabilities.

LEARN support for STEM-related educational research and professional development is demonstrated by the description of research publications, DLN-related dissertation, professional conference presentations, and dissemination of NASA-related content to educators through workshops and wide area communications—including use of virtual professional communities.

LEARN Synergies Among Activities

- Conducted first LEARN Workshop Dec. 6-10, 2010 at GA Tech's Global Learning Center in Atlanta. Sixty attendees representing all three LEARN activities participated in the 3-day workshop focused on building synergies across the project.
- LEARN provided weekly Webinars for the NASA Explorer Schools Project (http://explorerschools.nasa.gov) new model implementation.
- NASA Langley LEARN Manager, DLN Manager, DLN Coordinator, DLN Technician received NASA Group Achievement Award for technical assistance with Joel Levine Lecture series for Alliance of Black School Educators webcast for 3 years on DLiNfo Channel (http://www.nasa.gov/offices/education/programs/national/dln/webcast/webcast.html).
- COTF Supported ePDN Robotics professional development by testing student activities to support the online NASA Professional Development Robotics Course series in hands-on workshops and online discussions featured in NASA*Talk* Robotics collaboratives.
- COTF partners with NASA ePDN to extend professional development activities to teachers who have completed ePDN courses.
- ePDN partnered with NASA's Aerospace Education Services Project (AESP) to promote courses.
- ePDN has added NASA*Talk* as a course tool to their programs in T-Square (An online collaborative platform) to help facilitate discussion outside the classroom.

NASA Summer of Innovation Support

- Managed training and production of Summer of Innovation PD learning modules in cooperation with Aerospace Education Services Project (AESP) Curriculum Specialists. Worked with NASA Education Technology Services (NETS) to post and organize training modules.
- COTF supported the Summer of Innovation Project with virtual worlds activities and distance learning delivery, and by offering a 4-day summer workshop for underserved middle schoolers that featured many SOI activities. For more information see discussion in NASATalk at: http://j.mp/qIRKaI.
- ePDN provided a full time Summer of Innovation instructional designer to work with the curriculum specialists to develop training modules via the Tegrity platform to teach SoI educators how to integrate NASA educational materials into their summer programs.
- ePDN contributed expertise in the software platform, Tegrity, and in developing videos that support teacher and camp leader development across the U.S. in collaboration with Summer of Innovation and AESP.
- DLN completed several connections with SoI summer camps providing distance learning events for participants.

Service Expansion and New Technology Initiatives

- Expanded DLN Virtual Visits to include all sites with management facilitated through JSC DLN site. http://www.nasa.gov/offices/education/programs/national/dln/special/NASA_DLN_Virtual_Visits.html
- LEARN Manager conceived, designed, and implemented "Do It Again" – Engineering/Science video program funded by Aeronautics Research Network (http://www.nasa.gov/offices/education/programs/national/dln/special/DoItAgain.html).
- COTF maintained 24/7 operations and programming of NASA's DLiNfo Channel http://www.nasa.gov/offices/education/programs/national/dln/webcast/webcast.html which hosted 20,015 unique IP addresses with multiple viewers for each connection, facilitated 108 live shows for schools, and added 1,421 program features to the DLiNfo Channel including 57 (STEM) special curriculum featured program hours. NASA TV web streaming support from COTF from Oct.2010 through Sep. 2011 to all states and international totaled 4,420,916 unique hits, including all Shuttle launches, NASA press conferences and special programs for AESP, ePDN and other NASA Education projects. COTF also tested new streaming technologies.
- COTF collaborated with West Virginia Public Broadcasting to produce weekly radio news stories promoting NASA Education activities. Additionally, WVPB produced a 9 minute segment of an EPSCoR-funded Mountain State Science program on COTF's MoonWorld and Selene learning games.
- LEARN Manger invented mobile device presentation tool now going through patent process through LaRC Legal Office. This was part of a NASA Langley Innovative Ideas grant that involved research into the use of mobile devices for connecting to students and teachers through the Digital Learning Network's distance learning infrastructure. As part of this initiative, using mobile phone astronauts connected from the Rock Yard at JSC with Summer of Innovation students at summer camps in Virginia for interactive presentations and tours via the DLN infrastructure.
- Georgia Tech's Center for Education Integrating Science, Mathematics and Computing (CEISMC), one of the three partners who work on the NASA ePDN, received the final signed contract for their work on the U.S. DOE's Georgia Race to the Top program. Both of the GT based partners on the ePDN project, CEISMC and DLPE will be involved in supporting the grant's initiatives. Among other things, they will be offering professional development courses on Robotics, PBIL and Statistics to Georgia STEM teachers each semester, in addition to each summer, that are based on the ePDN model. The ePDN Robotics instructors went to the launch of Juno as part of the Race to the Top development.

Instructional Technology Research and Development

- A former DLN Coordinator at Langley completed the first dissertation examining the comparative effectiveness of inquiry-base, distance learning instruction in the DLN's distance learning environment. Compared with teacher-focused instruction delivered through interactive television, an inquiry-focused approach had a statistically significant advantage between control and experimental groups of students. The findings of the study have been incorporated into DLN module development.
- MoonWorld (http://www.cet.edu/?cat=moonworld) virtual world (via COTF's secure OpenSim for youth and educators, and Second Life for the general public) had 2,659 unique avatar visits (aggregated monthly); 1897 individuals attended presentations, panels, broadcasts, or professional development workshops featuring MoonWorld as state-of-the-art design in education within virtual worlds. This is a 347% increase in avatar visits over last year. The COTF MoonWorld project has been widely presented to NASA education and especially AESP curriculum coordinators.
- NASATalk.com: Logged 23,351 visits from 17,312 unique visitors who viewed 51,737 web pages. Almost all visitors are teachers and NASA education developers. This is an increase of 217% in visits and 171% in visitors since FY 10. NASATalk hosted nine new professional development groups including: STS-133; NASA LE&RN Conference; People to People Science Delegation to China; ePDN Robotics Alum; NASA Partnerships; STS-134; NASA Vodcasts and Podcasts (ePDN students); Robotics and Engineering ePDN; and AEA GEDI Internship.
- NASA*Talk.com* research will be featured in: Piecka, D. C. B., Ruberg, L., & Ruckman, C. (in press) Self-discovery learning opportunities in NASATalk. In A. Hai-Jew (Ed.), *Constructing self-discovery learning spaces online: Scaffolding and decision making technologies.* Hershey, PA: IGI Global.

- ePDN is interfacing with the NSF-sponsored Georgia STEM Accessibility Alliance (GT and UGA) to plan an SDO on making STEM education accessible to students with disabilities.

Workshop/Conference Presentations, Publications

- The NASATalk collaborative was featured in a workshop - "Adding Value to Instruction with Strategic Use of Online Collaboratives" at the National Science Teachers Association Research Dissemination Conference in San Francisco March 11-12. The COTF Senior Researcher presented a 70-minute orientation to the MoonGazers suite of activities (http://selene.cet.edu/?page=moongazers) at the teacher professional development workshop "Afterschool Universe and Telescopes" at the Educator Resource Center at the NASA IV & V Facility in Fairmont, WV.
- Several NASA Electronic Professional Development Network (ePDN – GA Tech – http://nasaepdn.gatech.edu) team members participated in a variety of workshops and conferences, sponsored by both NASA and other organizations. Highlights of this participation include presenting at NSTA, Sloan-C, ASEE, NCTM, STEM Day, GSTA, NASA RERC workshop, AREES Earthquake monitoring workshop and Center for 21st Century Universities (C21U).
- ePDN members presented at the NSTA 2011 Research Dissemination Conference on Emerging Technologies. The presentation featured several of the ePDN courses, with the emphasis on the effectiveness of the online courses in reproducing the type of interactions typical (and effective) in face-to-face teacher professional development.
- Several of the ePDN team members presented at the American Society for Engineering Education (ASEE) conference in Vancouver. The papers presented were "Engaging K-12 Teachers in Technology Tools to Support Electronic and Mobile Learning Through an Online Professional Development Course", as well as the paper, entitled “Introducing K-12 Teachers to LEGO Mindstorm Robotics Through a Collaborative Online Professional Development Course”, describes the ePDN’s collaborative online courses and their impact on teachers’ professional development.
- ePDN presented two posters at Sloan C in Orlando - "The Impact of Online Collaborative Spaces: an Exploratory Analysis of NASA ePDN Courses", "From E-Learning to M-Learning: the Use of Augmented Reality in Online Courses,"
- An article highlighting ePDN was released to GT publications in early January. This prompted the local NPR station, WABE, to request an interview with our team. http://www.publicbroadcasting.net/wabe/news.newsmain/article/1/0/1747182/Atlanta./GA.Tech..NASA.Teach.Teachers

DLN Center-specific Accomplishments

In this section, we present highlights from each Digital Learning Network (DLN) centers’ contributions to national, regional, center, and DLN initiatives. Our DLN events supported military families, administration/legislative initiatives, and other Science Technology Engineering Mathematics organizations. We are serving the visually impaired, African Americans, Hispanics and women with DLN events. We engage our audiences with mission-related events, mission directorate launches, career events, and engineering design challenges. We continue to expand our work with informal audiences and professional development for educators. We have begun to successfully use new technologies to broaden our event locations and audience reach with tablets, smart phones, and VOIP.

Military Support

- Spaced Out Sports Special program with 2nd Place Team – Department Of Defense School in Japan (Stennis Space Center - SSC)
- April 8, 2011 – “Hometown Heroes” Campaign (Johnson Space Center - JSC)
- April 20, 2011 – Department of Defense Schools talk with Astronaut Panel (JSC)

Administration/Legislative initiatives

- Virginia Space Grant Consortium/Virginia Aerospace Science and Technology Scholars lecture series & professional development showcase at Teacher Institute (Langley Research Center - LRC)
- Virtual Visits w/ Leland Melvin, Senator Rockefeller & other local Subject Matter Experts (LRC)
- Summer of Innovation Tegrity Training (LRC and Jet Propulsion Laboratory - JPL)
- Information Technology Summit - August 8, 2011 – Information Technology Summit Education Blast Off (JSC), Glenn Research Center (GRC) Drop Tower, JPL DLN at Los Cerritos Elementary

Underrepresented Populations

- Visually impaired - Special presentation for students that were attending Space Camp for Interested Visually Impaired Students. The program focused on NASA Careers and featured four NASA employees with visual impairments sharing their experiences working for NASA. This presentation was also streamed as a webcast at the NASA Digital Learning Network's website. (Marshall Space Flight Center - MSFC)
- African American - On February 15th and 16th, GSFC connected with schools from across the country as students and teachers learned the achievements of African Americans in STEM careers at Goddard Space Flight Center (GSFC).
- Women in STEM - NASA Women in Engineering Career Panel in March 2011 (GRC)
- Hispanic Planet Hopping and Magnificent Sun Modules redone in Spanish. Used Spanish versions of Planet Hopping and Magnificent Sun events to Spanish-speaking audiences (11 events, 25 teachers, 402 students) (LRC)

Organizations supported

- Busch Gardens Physics Day (KSC)
- Center for Interactive Learning and Collaboration support with events (KSC)
- Completed a Global Learning and Observations Benefiting the Environment Atmosphere workshop in conjunction with KSC. This program was part of the General Electric Middle School Teacher Grant and was conducted by videoconference. Worked with 58 teachers and 10 VIPs. (SSC)
- September 22, 2011 – Teaching From Space &American Chemistry Society Water Recycling Event
- National Alliance of Black School Educators Planetary Science video conference/webcast lecture series (LRC)
- Partnered with the National Park Service on a series of DLN events and webcasts featuring STEM careers at NASA and the National Park Service (MSFC)
- Indiana University of Pennsylvania summer optics camp (JPL)

Challenges *(DLN Events that require students to present findings/projects back to NASA)*

- July 19, 2011 – Engineering Challenge Series with Charlie Camarda (JSC)
- 5th Grade Rocket Science Intro and Student return presentations with Susan Simmons 5th grade class at Birches Elementary, NJ (GRC)

Special Events

- STS-135 Space Shuttle LaunchCast w/Elmo (KSC)
- STS-134 Space Shuttle LaunchCast (KSC)
- Assisted on STS 134 Space Shuttle program at KSC (Spaced Out Sports Webcast for May - SSC)
- October 13, 2010 – International Space Station Expedition 26 Event with Cady Coleman &Paolo Nespoli
- May 10-11, 2011 – NASA Extreme Environment Missions Operations Event (JSC)

Mission Directorate support

- On April 21, the DLN celebrated Earth Day with students and teachers from Pennsylvania, Florida, and Kansas in a special event honoring the Landsat missions (Science Mission Directorate).
- GRC - NASA Engineer Joseph Connely and Wright Brothers (Tom Benson, Roger Storm with Dr. Doit for "Do It Again" pilot program (Aeronautics Mission Directorate)
- KSC Gravity Recovery And Interior Laboratory LaunchCast
- KSC Juno LaunchCast (Science Mission Directorate)
- Spaced Out Sports Webcast with Clay Anderson hosted by JSC (SSC)
- Vesta Fiesta webcast – Dawn Mission scientists, Bill Nye presentation, comet demo with Dr. Claudia Alexander (JPL - Science Mission Directorate)

Informal Education

- Lorain County, Ohio Public Library NASA Nights (GRC)
- Westville, Ohio NASA Night Family Experience (GRC)
- Forest Heights Elementary Columbia, SC NASA Family Science Night (JPL)

Career-focused Events

- Astronaut / KSC Center Director Bob Cabana on DLN (KSC)
- Virtual visits program highlights careers in NASA (DLN wide)

Professional Development

- In August, the GSFC DLN introduced DC-area teachers to the DLN in a series of professional development sessions.
- Completed a Pre-Service Educator Workshop with University of Southern Mississippi (SSC)
- Completed an electronic-Professional Development (e-PD) with Mississippi State University (SSC)
- Presented at the 2010 Global Education Conference via Elluminate to the education and technology community about NASA's Digital Learning Network, implementation of the 5E Education Model and best practices for International Videoconferencing (Dryden Flight Research Center - DFRC)
- NASA Digital Learning Network™ presented at the Northwest Council for Computer Education conference and highlighted benefits of videoconferencing and classroom integration (DFRC)
- Completed an e-PD with the South Dakota Gifted Teachers Conference (SSC)
- Global Climate Change Education Professional Development videoconference/webcast (LRC)
- National Lab Day professional development video conference/webcasts
- Aerospace Education Specialist Project/ModSim professional development Summer Workshop (LRC)
- Education Alley at Space 2011 – DLN connections and webcasts of NASA events: Solar Dynamics Observatory from GSFC, STS-135 Crew chat, JSC spacesuit presentation, DLN Overview (JPL)

Prototype integration of new technologies

- DLN used Skype successfully aboard Cessna Aircraft at 3,500-5,000 Feet for Digital Learning Network Programs (DFRC)
- Mobile technologies tested included use of tablets and smart phonesfor events (Desert Rats program through smartphone connected to DLN videoconferencing system as an example.)

PROJECT CONTRIBUTIONS

NASA Digital Learning Network™

1. Percentage increase in # of students.	FY '11 Students - 124,458 FY'10 Students - 114,930 This reflects a 7.65 % increase from FY 10 - FY 11.
2. Level of student interest in STEM	STEM Question: As a result of this experience, I am more interested in a career at NASA or in science, technology, engineering, or mathematics. Of 5,508 students, a total of 2,943 students strongly agreed or agreed to this question or 57%.
3. Page views / $ spent.	Total webpage hits for FY'11 - 299,475 $ spent/hit: $.18 Total webpage hits for FY'10 - 45,240 This shows an increase between FY'10-FY '11 of 562%

4. Cost Per Participant.

Educators 12089
Parents 1314
VIPs 772
K-4 Students 52949
5-8 Students 60736
9-12 Students 10773
Total 138633

Total FY'11 interactive participants: 138,633.
Total cost/participant: $12.98/participant

NASA-sponsored Classroom of the Future

- DLiNfo Channel: 20,015 unique IP addresses with multiple viewers for each connection
- LIVE Webcasts: 108
- Added 1,421 program features to the DLiNfo Channel including 57 (STEM) special curriculum featured program hours.
- NASA TV web streaming support from COTF to all states and international totaled 4,420,916 unique hits, including all Shuttle launches, NASA press conferences and special programs for AESP, ePDN and other NASA Education projects.
- Approved 40 educational products from 13 NASA Centers and other organizations;
- More than 200 educators served as reviewers.
- MoonWorld: 2,659 unique avatar visits (aggregated monthly);

- 1897 individuals attended presentations, panels, broadcasts, or professional development workshops featuring MoonWorld as state-of-the-art design in education within virtual worlds, a 347% increase in avatar visits over last year
- NASATalk.com: Logged 23,351 visits from 17,312 unique visitors who viewed 51,737 web pages. Almost all visitors are teachers and NASA education developers. This is an increase of 217% in visits and 171% in visitors since FY 10.

NASA Electronic Professional Development Network

One of the many goals of the Electronic Professional Development Network (ePDN) is to create, implement and evaluate distance learning courses and workshops for the K-12 STEM teachers using NASA resources. These courses emphasize best practices through incorporating problem-based inquiry learning, case-based scenarios, and data analysis. During FY11, ePDN continued to develop new data and technology courses for the certificate series as well as updated current course offerings based on new technology. Additional instructors were hired to implement and evaluate courses offered through ePDN and new self-directed courses were created and launched based on partnerships formed within the NASA community.

- Page Views: 46,367 (http://nasaepdn.gatech.edu)
- Courses and Enrollments for FY11 (617 educators enrolled

Hours	Dates	Course Title	# Enrolled
		2011 sections	
15	10/20/10 - 11/16/10	Manipulators and End Effectors	35
20	9/18/10 - 10/12/10	Observations, Experiments & Two Variable Data	43
20	10/27/10 - 11/30/10	Vodcasts	50
20	10/13/10 - 11/9/10	Creating a Project-Based Inquiry Learning Experience	19
10	11/17/10 - 12/7/10	Advanced Programming and Sensors	22
10	12/15/10 - 1/11/11	Grand Challenge with the NXT Robot	18
		Spring 2011 sections	
10	2/9/11 - 2/22/11	Implementing Your PBIL Experience	9
10	2/23/11 - 5/17/11	Share & Evaluate Your PBIL Experience	6
30	2/2/11 - 3/15/11	Getting Started in Robotics	33
20	2/23/11 - 3/22/11	Probability	11
25	2/23/11 - 3/29/11	What is Project-Based Inquiry Learning?	33
20	3/23/11 - 4/19/11	Manipulators and End Effectors	23
20	4/6/11 - 5/3/11	Creating a Project-Based Inquiry Learning Experience	17
10	4/27/11 -	Advanced Programming and Sensors	17

	5/10/11		
10	5/18/11 - 5/31/11	Grand Challenge with the NXT Robot	16
		Summer 2011 sections	
25	6/8/11 - 7/12/11	Engage and Educate - Podcasts in the Classroom	50
25	7/20/11 - 8/23/11	Vodcasts	50
		Fall 2011 sections	
25	9/28/11 - 11/1/11	What is Project-Based Inquiry Learning?	56
10	9/7/11 - 9/20/11	Implementing Your PBIL Experience	6
10	9/21/11 - 12/13/11	Share & Evaluate Your PBIL Experience	6
25	9/14/11 - 10/18/11	How To Represent & Interpret One Variable Data	32
30	8/31/11 - 10/11/11	Getting Started in Robotics	62

2011 NASA Office of Education Performance Measurement (OEPM) System survey responses for ePDN Long-duration Professional Development

The NASA end of course survey results are used to determine the impact of the ePDN courses on teacher's practice. Particularly, the use of NASA materials in the classroom is measured through this instrument and the results are shared with ePDN instructors periodically.

- Question: This experience has inspired me to bring NASA content in my classroom.
  106 strongly agree, 43 agree, 1 neutral, 6 did not respond
- Question: I can immediately apply what I learned to my STEM teaching.
  106 strongly agree, 36 agree, 7 neutral, 7 did not respond
- Question: I will be more effective in teaching STEM concepts due to this experience.
  99 strongly agree, 45 agree, 6 neutral, 6 did not respond
- Question: Based on my NASA experience, I will make changes to my teaching activities.
  88 strongly agree, 53 agree, 9 neutral, 6 did not respond
- Question: The NASA materials used in this experience align well with what I teach.
  82 strongly agree, 57 agree, 11 neutral, 6 did not respond
- Question: These resources will be effective in increasing my students' interest in STEM topics.
  92 strongly agree, 47 agree, 7 neutral, 10 did not respond
- Question: This NASA experience provided ideas for encouraging student exploration, discussion and participation.
  101 strongly agree, 42 agree, 5 neutral, 8 did not respond

- **LEARN Project unique website page views** (dln.nasa.gov, cet.edu, nasaepdn.gatech.edu) total page views: 4,790,000

IMPROVEMENTS (e.g. project management, efficiencies, etc.) MADE IN THE PAST YEAR

During FY11, LEARN made improvements in its web presence by redesigning the Digital Learning Network (DLN) website, and launching a new electronic Professional Development Network (ePDN) website. These redesigns

were based on customer feedback, staff experience, and analysis of successful models. Changes to scheduling will improve our responsiveness and versatility. Curriculum development in DLN is now based on a gap analysis and a common template was developed and used for events. We extended our formative evaluation efforts in DLN with the development of a staff survey, and our summative evaluation efforts with a user survey. The results led to ad hoc groups to address the recommendations from the reports. ePDN made strides in assessing the effects of professional development on teachers with tools to assess inquiry teaching and teacher self-efficacy. As we strive to create and sustain partnerships, we focused on potential areas for collaboration at the LE&RN conference, and in subsequent telecons. Classroom Of The Future (COTF) is working with Duquesne University Foundations in Educational Leadership to explore ways to document the process of collaboration for us and with others. Our evaluation efforts have also been expanding to gain better ongoing feedback and documentation of results.

Web presence

- DLN Website complete redesign in 2011 with improved functionality, reporting, and ease of use
- ePDN launched a new website in July 2011. The focus of the new design was on cleaning up the overall site design, creating more organized information for the certificate courses as well as our Self Directed Courses, and adding more information about ePDN and our partners.

Scheduling

- DLN centralized scheduling, testing, and module evaluation with Oklahoma State University (OSU) resident staff
- DLN centralized management of Virtual Visits at Johnson Space Center (JSC) for all DLN sites
- DLN cross training procedures implemented to increase exposure of most requested module presentations across multiple time zones.

Curriculum

- DLN curriculum module developer conducted gap analyses in grade levels, subject matter, and National Science and Mathematics standards of all modules.
- DLN curriculum module developer completed and trained staff on module template to enhance presentation consistency.

Evaluation

- DLN surveys for customers and employees collected and analyzed for improvement needs. Surveys will be implemented yearly and assessed for progress. (A first in DLN history.)
- DLN adhoc groups identified core areas of improvement of the project and implemented improvement plans.
- ePDN improved and adapted new evaluation instruments to measure the impact of the courses on teacher's professional development (e.g.: inquiry-based teaching survey, teacher self efficacy)

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT

Key collaborations were formed in development, delivery, audience development, synergies, technology development and evaluation. From MoonWorld in SecondLife to the creation of the Outer Space Environment Self Directed Courses, LEARN continues to seek partnerships for development of content and curriculum. COTF established a relationship with Pittsburg Science Center to explore partnership opportunities. To extend the delivery of our products and services, Digital Learning Network is in discussion with Federal Government Distance Learning Association (FGDLA) and electronic Professional Development Network (ePDN) is working with Georgia DOE on their Race to the Top grant. For new audiences, we partnered with Ten80 with our webcast series on “Rockets to Racecars.” DLN is also discussing a partnership with Faraday Studios and Ace Hardware to support audiences in their Saturday Science series. We have also developed in-house synergies between Classroom Of The Future (COTF) and NASA ePDN to extend professional development opportunities to teachers who have completed ePDN courses. ePDN has partnered with Aersospace Education Specialist Project (AESP)

to promote their programs, and added NASA*Talk* as a course tool. ePDN contributed expertise in using Tegrity to Summer of Innovation (SoI) and AESP.

Content/curriculum development

- COTF contracts with the Avatrian metaverse development company for refinements and expansions to the development of MoonWorld as a presence in Second Life and OpenSim.
- COTF established a relationship with the Pittsburgh Science of Learning Center (jointly sponsored by Carnegie Mellon and the University of Pittsburgh) to extend NASA*Talk* discussions about strategies to promote robust STEM learning by leveraging software tools, instructional design resources, and current research based on links to PSLC resources.
- ePDN partnered with Johnson Space Center and Teaching from Space to create the Outer Space Environment SDC

Delivery

- DLN partnership investigation with members of FGDLA with several interested parties. Continuing plans have been put on hold until the future of the project is more certain.
- ePDN is partnered with the Georgia Department of Education, to expand STEM programs through the U.S. Department of Education's Race to the Top Program based on the ePDN model.

Audience development

- NASA research. In development are webcast series using Ten80's already established professional development program on forces of motion and connecting this with NASA's newly released R2R (Rockets to Racecars - http://www.nasa.gov/externalflash/Rockets2Racecars/) site. Additionally, the DLN has released a special events page that gives R2R a STEM activity connection allowing teachers to view short video clips about activities that tie in with the R2R's spinoff focus (http://www.nasa.gov/offices/education/programs/national/dln/special/R2R_Ed_Res.html). Finally, a series of modules is being developed that tie NASA and NASCAR concepts together and will be offered in our regular catalog.
- DLN partnership investigation with Faraday Studios and Ace Hardware to create a series of webcast events to support their Saturday Science series in their hardware stores across the country using NASA Education materials.

Partnership processes

- Focused on areas of potential collaboration at the LEARN conference.
- COTF NASA*Talk* consulted with the Duquesne University Foundations in Educational Leadership to explore ways to document the process of collaboration and partnership in matters related to STEM education.

Evaluation

- COTF contracts with renowned statistician Dr. Barbara Tabachnik for guidance on evaluation of MoonWorld results.
- DLN contracts with TLC Inc. to expand formative and summative evaluation efforts.