

NASA LE&RN 2012 Annual Report

Administered by
OSU (DLN), GA TECH (ePDN), WJU (COTF)
Type of Agreement
3 Cooperative Agreements
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Learning Environments and Research Network
Using educational technologies for



• Science, Technology, Engineering, and Mathematics content delivery to students of all ages;



• Educator-focused, online professional development courses, experiences, and events;



• The research and development of learning tools and methods within tomorrow's learning environments.

PROJECT DESCRIPTION

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

- LE&RN Achieved 100% Obligation of 2012 funding.
- LE&RN provided weekly Webinars for the NASA Explorer Schools Project new model implementation.
- The LE&RN Project Manager was chosen to lead the Office of Education's new Educational Dissemination Networks and to lead a writing team in the development of its implementation roadmap. Additionally, he served on the Educator Professional Development writing team for this new NASA Education Line of Business.
- Digital Badges for Lifelong Learners, and initiative of the McArthur Foundation and Mozilla, Inc., awarded developers assigned to work with NASA \$150,000. In order to develop a digital badges system during the 2012-2013 pilot period in which a number of other organizations were chosen to do likewise. A Space Act Agreement was signed during the summer of 2012. The LE&RN Project Manager is serving as the chairman of the NASA group which includes Project Whitecard Studios INC, a Canadian Serious Games development company and the Center for Educational Technologies at Wheeling Jesuit University. The developers released their first NASA-related Curiosity Badge the day before the rover landed on Mars. www.starlightbadges.com.

2012 Accomplishments by LE&RN Activity (COTF, ePDN, DLN, Rockets to Racecars)

COTF Accomplishments

- 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 has hosted 158,210 unique IP addresses with multiple viewers for each connection. COTF supported three of NASA's major educational outreach activities; the transit of Venus, Curiosity landing and movement of Endeavor shuttle to the Intrepid science museum in New York harbor. COTF hosted programming for the Intrepid event and streamed webcasts of all three to millions of Internet viewers. NASA TV web streaming support from COTF from Oct 2011 through Sep. 2012 to all states and internationally totaled 11,838,325 unique hits, including all Shuttle launches, NASA press conferences and special programs for AESP, ePDN and other NASA Education projects.
- Improvements with NASA DLiNfo Channel: Over the past year COTF has improved the DLiNfo Channel in many aspects. COTF added 475 new video program elements to the webcast channel that are subject specific and STEM based. COTF added an additional HD video conferencing system to expand the programming outreach and allow COTF to provide a dual stream on two different web providers (NASA ETouch/Akamai contract and NASA's Ustream Super Channel). COTF added special programming outreach for NASA Projects like NASA NICE, AESP, NES, First Robotics, LunaBotics, Inspire, IGES, Teaching From Space, NASA Education Stakeholders Summit, and NASA CORE. COTF also improved the DLiNfo Channel's public outreach by over 200%.
- COTF created MoonWorld as a virtual lunar surface in Second Life as a platform for students and educators to viscerally experience exploration of the Moon as space-suited avatars. It proved to be engaging but limited by restrictions of the platform; reformatting as a video exploration using Unity or similar game engine is recommended as a more powerful and flexible learning approach.
- NASATalk.com: Logged 30,272 visits from 22,542 unique visitors who viewed 75,877 web pages. Almost all visitors are teachers or NASA education developers. This is an increase of 30% in visits and new visitors, and a 47% increase in page views in comparison with FY 11. NASATalk hosts active online collaborative groups in the following topics: Science (5), Robotics (4), Engineering Education (1), K-4 STEM (1), Mathematics (2), Technology Education (2), Research & Evaluation (2), and Project Planning (1). In FY 12, 531 articles were published on individual blogs or in one of the 18 active collaborative group areas.
- COTF expanded its social media outreach component for NASATalk and coordinated its social media outreach with LEARN and NASA Education partners. COTF created and presented in NASATalk hands-on workshops and online discussions of student activities to support the online NASA ePDN Professional Development Robotics Courses. ePDN students (in-service and pre-service teachers) participated in the NASATalk NXT-Tweetup offered during the 2012 National Robotics Week.
- NASATalk.com recent research publications include: (1) Ruberg, L. F., Kimberly, K., & Wood, C. A. (in press). Guidelines for selecting mobile devices and applications to enhance STEM learning. In N. T. O. Reis (Ed.), *Pedagogical analyses of space sciences education practices at NASA and the Brazilian Space Agency*. (2) Ruberg, L. F., Cummings, M., Piecka, D. C. B., Ruckman, C., & Seward, R. (December, 2011). A logical approach to supporting professional learning communities. *Knowledge Management & E-Learning: An International Journal*, 3(4), 599-620.

- COTF's Laurie Ruberg, Ph.D., participated in a Technical Review Forum II for the Summer of Innovation (SOI), JUNE 18 – 20, 2012 at NASA Headquarters. The objective of this forum panel was to develop an evidence-based program model of support and engagement to assist external partners in the delivery of high-quality STEM programming to underserved/underrepresented students in order to improve interest in STEM and support student learning during the summer. Specific deliverables included: (1) A logic model with resources/inputs, participants, strategies/activities, outputs, outcomes and impacts; and required evidence-based attributes. (2) Evidence-based attributes to inform development of framework for future Program Solicitation and/or Cooperative Agreement Notices (CAN). Each of these deliverables was met.
- COTF/CET contributed to the NASA collaboration portion of the Digital Media and Learning Badges for Lifelong Learning Competition with a proposal title: Badging Project: Robotics and STEM Badges Using NASA Content submitted collaboratively by CET and Project Whitecard Studios, which was selected for funding by Mozilla and the MacArthur Foundation. The CET and Project Whitecard's first badge, **the Curiosity Game**, was released the weekend of Curiosity's landing. This badge successfully interfaced with the Mozilla badge distribution backpack. CET badging leader Dr Meri Cummings attended the **Badges for Lifelong Learning Workshop** at Duke University Sept. 20-21, and facilitated a high-interest session on using artifacts as evidence for earning badges.
- ePDN instructor, Storm Robinson and Project-Based Inquiry Learning (PBIL) ePDN instructor, Sabrina Grossman hosted Live Chats on the NASATalk website about the relationship between PBIL and Robotics. They discussed how Project Based Learning works and also how to use Project-Based Inquiry Learning Pedagogy in order to teach different challenges in Robotics. Participants from different areas of the country examined how to integrate robotics and PBIL. They also discussed different robotics challenges to create a more interdisciplinary curriculum and the benefits of using PBIL in a Robotics Classroom.
- COTF Developed **BLISS Sim** iPad App pulling data from the NASA-funded *BioBLAST* Plant Production simulation, which was based upon NASA Advanced Life Support research. The BLISS Sim App has been downloaded 2,567 times since its publication May 14, 2012, and has an average rating of 4 stars.

DLiNfo Channel Accomplishments:

- November 2011: NASA DLiNfo Channel facilitated a live webcast from NASA HQ on short notice. Working in collaboration with Caryn Long, DLN Manager at LaRC, the DLiNfo Channel provide a Flash, Windows Media, and Ustream service for The NASA Education Stakeholders Summit highlighting a wide variety of topics that will assist NASA Education team members in planning STEM-based programs. Attendees learned about new features of the NASA LaunchPad pertaining to each constituency's role in OSSI.
- Jan 2012: (1) COTF's DLiNfo Channel provided resources for a television interview on solar flares and their cause and effects. Stacy Keller identified DLiNfo Channel video segments on solar flares and Don Watson edited these into a background video for an interview conducted at the Center for Educational Technologies by WTRF Channel 7 News. (2) COTF also completed the migration of NASA TV Public Channel to HD by Feb.15th. As part of this change NASA's USTREAM offerings will expand. COTF DLiNfo collaborated with Bryan Walls at MSFC to add the DLiNfo Channel USTREAM to the NASA USTREAM offering thus greatly expanding the channel exposure and showcase of NASA's DLN outreach.
- Feb 2012: COTF worked with NASA Teaching From Space program to produce a webcast event to enhance the live satellite downlinks with the ISS. Called "DLiNspace", COTF added pre and post event programming to the astronauts' live Q & A segment to enhance student/teacher/school experiences.
- April 2012: Don Watson attended the National Association of Broadcasters Convention from April 15th through April 18th to research technical options for NASA Digital Learning Network, NASA DLiNfo Channel, and future technical directions for both.
- May 2012: NASA DLiNfo Channel re-broadcast the US Distance Learning Association's Annual Awards where NASA Digital Learning Network received the 2012 Best Practices Award for Excellence in Distance Learning Teaching. Webcast was live from St. Louis, Mo.

- June 2012: NASA COTF provided 48hr live coverage of the Venus transit, in part from NASA EDGE, Mount Wilson Observatory, Fairbanks Alaska, Alice Springs, Australia, Norway, Much Hoole, Horrocks, IAO, Hanle , Ladakh, European Space Agency and from GRC/GSFC/HQ <http://venustransit.nasa.gov>
- July 2012: NASA DLIInfo Channel completed 6 hours of live educational programming from New York City and the grand opening of the Shuttle Enterprise at the Intrepid Sea, Air and Space Museum. On July 20th, NASA COTF and NASA's Digital Learning Network presented at 3 teacher workshops sessions via IP Videoconferencing and showcased educational materials and technology options via Ipad/IPhone. Over 300 teachers attended onsite in NYC, 54 in the Rocket to Race Cars sessions, 5,055 via NASA's DLIInfo Channel, and 318 via NASA Talks.
- Aug 2012: NASA COTF provided HD streaming service as part of NASA Web Streaming Group for the MARS Mission, MSL landing on Mars on Aug, 6th with over 1.2 Million streams. COTF had 583,522 HD viewers and 80,000 iPhone viewers for the event.
- Sept 2012: NASA DLIInfo Channel broadcast the Teach for America, a 3 hour live webcast event held by Honorary Host Congresswoman Eddie Bernice Johnson at the Washington Convention Center.

ePDN Accomplishments

- ePDN has launched a new Self-Directed Course for Airborne Research on Improving Earthquake Monitoring. NASA is studying and learning more about earth science processes such as earthquakes through airborne research vehicles, particularly a specially modified Gulfstream III. Linking this resource with classroom teachers is done at NASA's Dryden Flight Research Center in California, through the Airborne Research Experiences for Educators and Students, AREES. This self-directed course provides access to all educators to participate in the collection of data, which may eventually help scientists predict earthquakes and other earth system science processes. This self-directed course is a standards-based program that will provide you and your students the opportunity to investigate, evaluate, design, and present a solution to a real world problem that will expand our understanding of environmental hazards at the global level.
- ePDN has also launched a new Self-Directed Course for Astrobiology. This course addresses three fundamental questions: How does Life begin and evolve? Is there life beyond Earth and, if so, how can we detect it? What is the future of life on Earth and beyond? Educators who access this free, self-paced course will learn about Astrobiology and what NASA is doing to search for life in the universe and understand the origins of life on Earth as well as learn about extremophiles found on Earth and how they adapt to UV Radiation and lack of water. Teachers will also gain an understanding of how astrobiologists analyze DNA using various techniques that can be incorporated into classroom activities. The astrobiology resources section of the ePDN will provide a web-based tool to provide electronic programming, workshops, video, presentations, and other materials relevant to the education objectives of the NASA Astrobiology Institute (NAI). The ePDN will also promote updating and contextualization of existing NASA curriculum materials to encourage problem-based inquiry learning. The Astrobiology section will also highlight a week-long Astrobiology summer enrichment program for high school students including a curriculum aligned with learning objectives based on National Science Education Standards, faculty presentations, and techniques used throughout the camp at Georgia Tech. [CLH: extra space] Additional educational information created by other NASA NAI teams will be added to the library of materials and content to foster the inclusion of Astrobiology instruction and activities in K-12 science classrooms.
- Susan Hall who participated in the NASA Electronic Professional Development Network (ePDN) PBIL and Robotics courses received the 11 Alive News (Atlanta NBC affiliate) "Class Act" Teacher Award for excellence in teaching. Susan, a teacher at Atlanta Public school's only all-girl middle school, Coretta Scott King Young Women's Leadership Academy, developed a PBIL plan as a course assignment, transformed her teaching to include more inquiry lessons, and was able to implement her new PBIL lesson plan and start a robotics team to create self-directed and motivated learners. The video that aired on 11 Alive news demonstrates how Susan has been able to apply her PBIL plan in her classroom to create self-directed and motivated learners engaged in STEM subjects. <http://www.11alive.com/news/education/classact/default.aspx>
- The NASA Electronic Professional Development Network (ePDN) has formed a partnership with the Department of Defense Education Activity (DODEA) Domestic Dependent Elementary and Secondary Schools (DDESS). About 100 of their teachers have taken and are currently taking our Robotics and Project-Based Inquiry Learning (PBIL) certificate courses. Each of these teachers has taken up to four of the certificate courses to complete a series.
- NASA Electronic Professional Development Network team members participated in a variety of workshops, conference and meetings sponsored by both NASA and outside organizations over the past year. Highlights include presenting at

SEEC, Georgia NASA STEM Day conference, Next Generation Sub-orbital Researchers Conference, First National Conference for Centers of Science and Mathematics Education, American Society for Engineering Education, GE Foundation Developing Futures Conference, FIRST LEGO League Partner Conference and the Innovation in Learning Summit. Tony Docal, ORBIT Education Inc., one of the three Georgia Institute of Technology partners collaborating on the NASA Electronic Professional Development Network (ePDN) program, presented the ePDN portfolio at several Regional Educator Resource Center (RERC) locations including Kennedy Space Center (KSC), Glenn and Warner Robins.

- Robotics instructor, Storm Robinson, introduced the NASA ePDN Certificates and Self-Directed Courses through a robotics hands-on activity and the course "Using Robotics to Enhance STEM Learning" at the Space Exploration Educators Conference (SEEC).
- ePDN Robotics instructor, Jeff Rosen hosted a session at the Next Generation Sub-orbital Researchers Conference titled *Impacting the Future of Space Exploration Through Education: Online Teacher Professional Development to Increase Student Interest in Space*.
- Robotics course instructors, Jeff Rosen and Storm Robinson, attended the American Society for Engineering Education Annual Conference in San Antonio and also the FIRST LEGO League Partner Conference in Manchester, NH. At both of these conferences they had the opportunity to guide many state FLL partners and University Professional Development folks to the ePDN on-line courses to begin the understanding of the programming of NXT robots
- ePDN team members, Marion Usselman, Co-PI and Meltem Aldemar, Evaluator promoted ePDN on their poster presented at the "First National Conference for Centers of Science and Mathematics Education". This conference brought together more than 60 U.S. colleges and universities who have centers that promote science and math education.

DLN Accomplishments

- The DLN was awarded the 2012 United States Distance Learning (USDLA Platinum Award for Best Distance Learning Provider. This is an annual award given to exemplary organizations that demonstrate excellence in various distance learning category and are considered by the USDLA as the best in the world. It is the world's premiere distance learning professional organization with thousands of national and international members.
- The White House report: Keeping America's Women Moving Forward has been released with a special mention about the DLN on page 53. http://www.whitehouse.gov/sites/default/files/email-files/womens_report_final_for_print.pdf
- Berrien RESA honored the DLN for the sixth year in a row. This year our recognition falls under the category of Best Space Science Museums & Organizations. In the spring of 2012, Berrien RESA hosted Teacher's Favorite Awards to select the Best Content Providers for the 2011-2012 school year. Berrien RESA is an education service agency serving 26,000 students in Berrien County, Michigan. The schools they serve include 16 public school districts, 20 parochial schools, and four public school academies.
- How do you share something with thousands of educators from all over the world without physically being present? Through web conferencing. DLN Education specialists from 3 centers did that at the International Society of Technology in Education (ISTE) conference recently at the Vidyo booth in the Exhibitor's Hall. The company's Vidyo Conferencing solutions are the first in the videoconferencing industry to take advantage of the most recent enhancement to the H.264 standard for video compression, Scalable Video Coding (SVC). Education Specialists at DFRC, MSFC, KSC, and JPL shared the modules that NASA's DLN offers without cost to the educators that were present at ISTE and Vidyo's product booth.
- Caryn Long, DLN Manager, and Dr. Gamaliel Cherry, NASA Training Specialist, were accepted to present Dr. Cherry's research regarding the DLN and integration of inquiry at NSTA's national conference March 30 in Indianapolis.
- Caryn Long and Brandy Close, DLN Curriculum Developer, have co-authored a paper for USDLA's publication on the DLN's Virtual Visits program and the support it can provide through e-mentoring concepts. The paper was used as research support for Associate Administrator for Education Leland Melvin's meeting at the White House on the same topic.

NASA Center-specific DLN Accomplishments

Stennis Space Center

- NASA Administrator Charles Bolden conducted a student program from SSC DLN Lab
- The SSC DLN Coordinator, Dr. Kelly Witherspoon, completed 3 new modules - Mass vs. Weight, Spaced Out Sports, and Food for Thought.
- Pre-Service Teacher Institutes e-PD were conducted with Southeastern Louisiana University, Louisiana State University, Xavier University, Nicholls State, University of Southern Mississippi and Miss State.

Jet Propulsion Lab

- Mars Science Laboratory special event series – over 10 events surrounding launch and landing of the Mars Science Laboratory including interviews with scientists and engineers working on the project, mission status updates, and collaborations with MSFC and GSFC.
- Women's History Month special event series – Six events focusing on Women in STEM careers, including in-studio guests and a special guest panel as part of JPL's International Women's Day events.
- Virtual Visit Programs – Over 20 virtual visits were conducted connecting students with scientists and engineers involved in the Mars Science Laboratory, GRAIL, Dawn, MER, Rosetta, Cassini, Juno, and other missions.
(<http://www.nasa.gov/offices/education/programs/national/dln/special/index.html>)

Glenn Research Center

- Glenn DLN set a new yearly record for completed events and students reached in a FY.
- GRC added a second fully functional studio with a webcast streaming capability to its capabilities.
- Studio #1's Tricaster was upgraded to provide connectivity using Skype and Vidyo web-conferencing capabilities.

Goddard Space Flight Center

- GSFC participated in a Special event featuring the Venus Transit in June 2012.
- CSFC collaborated with Marshall, Glenn, and JPL for Women's History Month/Engineer's Week entitled "Women in STEM", March 2012.
- GSFC teamed up with JPS to delivery special events highlighting Curiosity's landing and mission throughout August and September.

Dryden Flight Research Center

- April 30, 2012-The DFRC DLN Presented" Introduction to Robotics" and encouraged over 80 middle school female students to enter STEM careers at the second annual Aurora Public Schools (Colorado) – Hewlett Packard 6th grade Girl's Technology Camp.
- On Friday, July 13, 2012, David Alexander presented a Digital Learning Network Overview and Careers at NASA for fifty Pre- Service Institute Educators for California State University at the AERO-Institute, Palmdale, CA. Students were informed about how to integrate technology in to their classrooms, virtual classroom pedagogy, and how to develop their technological skill sets as an educator in the 21st century.
- On September 20, 2012, Vintage Magnet(North Hills, CA.), Amargosa Creek Middle School (Lancaster, CA.), Columbia Middle School(Adelanto, California), Joe Walker Middle School (Quartz Hill, CA.), and Boron High School (Boron, CA.) joined NASA's DLN live from the Dryden Flight Research Center as the Space Shuttle Endeavour landed on the back of the Shuttle Carrier Aircraft in preparation to its final destination at the Samuel Oschin Air and Space Center at the California Science Center in Los Angeles. Over 500 students and 15 educators were in attendance and interacted with NASA's DLN program "Exploring Aeronautics," and spoke with Dr. Christian Gelzer, Chief Historian at the NASA DFRC through a virtual videoconferencing connection.

Kennedy Space Center

- KSC Increased from 20,071 K-12 students and teachers in FY '11 to 22,724 in FY '12.
- KSC produced and hosted live webcast from Shuttle Landing Facility for Discovery fly-out with STS-133 crew, Stephanie Stilson, Larry Parker, and Brian Emond. Included schools connected via videoconferencing and webcast.
- KSC Partnered with NASA Explorer Schools for video web chat with KSC Center Director Bob Cabana - connected with two schools directly, 239 DLInfo channel IP hits, 43 DLInfo Ustream Channel IP hits, and simulcast on NES Virtual Campus.

Marshall Space Flight Center

- The DLN Education Specialist at the Marshall Space Flight Center led in the submission of video examples and descriptions leading to the DLN receiving an award from the United States Distance Learning Association (Platinum, Best Practices in Distance Learning Programming).
- MSFC Co-presented a series of webcasts with JPL providing an overview of the Curiosity mission to Mars.
- MSFC Hosted a series of webcasts highlighting NASA careers in the STEM fields, including several "special events" featuring Women at NASA Working in STEM.

Langley Research Center

- LaRC DLN hosted a four part series featuring the Tuskegee Airmen and their experiences serving in this unit as a special for African American History Month. Wind Tunnels at NASA Langley tested the P51's that the Tuskegee Airmen flew and they discussed the importance of the science behind their missions.
- For Women's Appreciation Month in March, LaRC center director, Lesa Roe came to the studio to share with girls in middle school what it was like to be the only female center director for NASA.
- LaRC DLN supported Summer of Innovation with presentations led by the NASA LARSS (Langley Aerospace Summer Scholars) program. LARSS interns made presentations to educators virtually about STEM concepts and the purpose of NASA's DLN.

Johnson Space Center

- The JSC DLN partnered with the JSC PAO Office in March of 2012 to deliver a weekly Mission Control experience to students and educators who received a lesson about ISS research from a DLN Specialist and then connect live to the Public Affairs console at the ISS Flight Control Center! The JSC DLN Mission Control Events have reached 1052 students and 133 adults from March-September 2012.
- The JSC DLN partnered with the Teaching From Space office to develop and provide a special event series that highlights up-coming International Space Station Expeditions beginning with Astronaut Joe Acaba connecting to students prior to his mission in the JSC DLN studio. Other topics the Soyuz trainer in the Space Vehicle Mock-up Facility with a Russian Soyuz trainer to talk about astronaut training and the launch experience of the Soyuz and also featured the Japanese Experiment Module mock-up where Astronaut Sandra Magnus discussed what it is like to live and work in space including the benefits of conducting research on the ISS. The JSC DLN Space Cast Series reached a total 529 students and 54 adults.
- The JSC DLN partnered with four analog mission teams to produce a series of video-conference connections that highlighted LIVE analog missions including nine events with the NASA Extreme Environment Mission Operations in Florida (NEEMO), two events with the In Situ Resource Utilization (ISRU) team in Hawaii, five events with the Research and Technology Studies (RATS) team at JSC and 6 events with the Deep Space Habitat (DSH) team at JSC. The JSC DLN Analog Mission events have reached a total of 1716 students and 616 adults.

Rockets to Racecars Special Project (DLN) Accomplishments

The R2R program highlights the correlations between the science of flight and racing, and educates the public about the many NASA technologies that are currently used in the racing industry. The program focuses on Teacher Professional Development delivered both through the DLN and face to face at unique locations near racetracks. These experiences provide teachers with training and experience delivering the activities using the train the trainer model.

- Eighteen educators participated in the 4-part R2R Professional Development Series delivered through the Digital Learning Network™. Each session was 1.4 hours in length for a total of 5 hours of PD for each participant. Educators gathered necessary materials ahead of time so they could work through the STEM activities during the session. Use of the DLN allowed teachers to interact with the presenter, and also with the group which included educators from across the US, Australia and Israel.
- Twelve educators participated in the Professional Development workshop, and over 2,000 children and their families participated in hands on education activities in the Kids Zone area during the two-day trackside event at Richmond International Raceway on April 26 – 28, 2012. This program of activities was made possible through collaborations with The Science Museum of VA, VA529 College Savings Plan, Ten80 Education, NASCAR Drive for Diversity (D4D), and Richmond International Raceway (RIR). A similar event was implemented during the Sept. NASCAR event at RIR.
- Over 85,000 race fans in attendance at Pocono Raceway an opportunity to explore science, technology, engineering and math (STEM) and to learn about the Mars Science Laboratory (MSL) and landing of the Curiosity Rover on Mars. The event was held on Aug. 3-5 at Pocono Raceway in Long Pond, Pa. Fans watched NASA's 7 Minutes of Terror video clip on the Sprint Fan View screen, and had the opportunity to interact with NASA hands-on activities in the Kids Zone. On Thursday, prior to the event, a teacher professional development workshop was broadcast from the raceway via NASA's Digital Learning Network™ The NASA events at Pocono Raceway were featured in a local news article in the Express-Times News, and on the local TV news, WNEP16 Good Morning Show, on Friday; Aug. 3rd.
- During the Welcome Discovery event at the Udvar-Hazy Center April 19th through 22nd, Over 50,000 people engaged in activities at the R2R exhibit area during the 4 day period. One of the items included in the R2R exhibit is a Main Landing Gear tire from STS-60, a Discovery flight completed in 1994. It was exciting to educate participants about the tire and it's function, and to have Space Shuttle Discovery there as well! The R2R program was included in this event at the request of VA Delegate David I. Ramadan.
- Data recorded in The Office of Education Performance Management system (OEPM) reflects the following totals of unique participants directly engaged in R2R Education activities during FY12:
 - Teachers - 928
 - Students – 11,931
 - Parents and other adults – 4,801

In addition, over 175,000 participants were introduced to unique NASA content through indirect participation with the project. Examples of indirect participation include webcasts and viewing of the MSL landing video on the Sprint Fan View Screen at NASCAR race events.

PROJECT CONTRIBUTIONS TO APG MEASURES BY LE&RN Activity

DLN

-
- APG 6.1.1.1: EDU-11-3
75,000 educators participate in NASA education programs

FY'11 TOTAL EDUCATORS -
11,944
FY'12 TOTAL EDUCATORS -
15,601

- APG 6.1.2.2: ED-11-5
600,000 elementary and secondary students participate in NASA instructional and enrichment activities.

*FY'11 TOTAL STUDENTS -
123,028*
**FY'12 TOTAL STUDENTS -
127,779**

- APG 6.1.2.2: ED-11-6
75 percent of elementary and secondary students express interest in STEM careers following involvement in NASA education programs.

TOTAL OEPM FY'12 SURVEYS (OEPM student surveys from FY'12 reflect a percentage of 55% of students (3,335 of 6,360 students) who agree or strongly agree that they may be interested in careers in STEM following their involvement in a DLN experience.)

- APG 6.2.1.1: ED-11-7
5,000 educators use NASA resources in their curricula after participating in NASA professional development.

TOTAL FY'12 - (OEPM educator surveys from FY'12 reflect a percentage of 95% or 866 of 930 educators agree or strongly agree that they will use NASA resources in their curricula following their involvement in a DLN experience.)

COTF

- DLiInfo Channel: 158,210 unique IP addresses with multiple viewers for each connection
- LIVE Webcasts: 108
- NASA TV web streaming support from COTF to all states and international totaled 11,838,325 unique hits, including all Shuttle launches, NASA press conferences and special programs for AESP, ePDN and other NASA Education projects.
- NASATalk.com: Logged 30,272 visits from 22,542 unique visitors who viewed 75,877 web pages. Almost all visitors are teachers or NASA education developers.
- APG 6.1.1.1: EDU-11-3: 75,000 educators participate in NASA education programs: 61,504
- APG 6.1.2.2: ED-11-5: 600,000 elementary and secondary students participate in NASA instructional and enrichment activities: 84,341

ePDN

- Page Views: 93,015 (<http://nasaepdn.gatech.edu>) – **101% increase over FY11**
- 1310 educators enrolled in FY12 – **112% increase over FY11**

Fall 2011			
Hours	Dates	Course Title	# Enrolled
20	10/19/11 - 1/15/11	Manipulators and End Effectors	64
10	11/30/11 - 2/13/11	Advanced Programming and Sensors	34

15	12/14/11 - 1/10/12	Grand Challenge with the NXT Robot	16
25	10/5/11 - 11/8/11	Engage and Educate - Podcasts in the Classroom	46
25	10/12/11 - 11/15/11	3D Visualization	24
20	10/26/11 - 11/29/11	Observations, Experiments & Two Variable Data	21
20	11/8/11 - 12/13/11	Creating a Project-Based Inquiry Learning Experience	46
25	11/2/11 - 12/13/11	Turn Your Classroom Digital	43
Spring 2012			
30	1/18/12 - 2/28/12	Getting Started in Robotics	101
20	3/7/12 - 4/3/12	Manipulators and End Effectors	74
10	4/11/12 - 4/24/12	Advanced Programming and Sensors	58
15	5/2/12 - 5/22/12	Grand Challenge with the NXT Robot	41
20	1/25/12 - 2/21/12	Probability	46
25	2/29/12 - 4/3/12	How To Represent & Interpret One Variable Data	34
20	4/18/12 - 5/15/12	Observations, Experiments & Two Variable Data	13
10	2/1/12 - 2/14 12	Implementing Your PBIL Experience	20
10	2/15/12 - 5/15/12	Share & Evaluate Your PBIL Experience	17
25	3/14/12 - 4/17/12	What is Project-Based Inquiry Learning?	88
20	4/25/12 - 5/22/12	Creating a Project-Based Inquiry Learning Experience	49
25	2/8/12 - 3/13/12	Vodcasts	39
25	4/4/12 - 5/8/12	Turn Your Classroom Digital	51
25	3/21/12 - 4/24/12	3D Visualization	42
Summer 2012			
25	5/30/12 - 7/3/12	Engage and Educate - Podcasts in the Classroom	61
25	7/11/12 - 8/14/12	Vodcasts	50
Fall 2012			
30	8/29/12 - 10/9/12	Getting Started in Robotics	81
10	9/5/12 - 9/18/12	Implementing Your PBIL Experience	38
10	9/19/12 - 12/11/12	Share & Evaluate Your PBIL Experience	33

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

- ePDN facilitated and self-directed courses were transitioned to Georgia Tech Professional Education's new online learning management system, HELIX; Higher Education Ladder to Innovative Expertise. This system is based on the Moodle platform with hosting services and enhancements made by Moodlerooms Inc. This allows ePDN courses to have a more professional look and feel, more robust features and functions, and a more intuitive and customizable interface, in addition to platform reliability and scalability.
- Georgia Tech Professional Education (GTPE), one of the three partners on the NASA Electronic Professional Development Network (ePDN) is working with the Center for Assistive Technology and Environmental Access (CATEA) at Georgia Tech to test the accessibility and usability of our new LMS, Moodle, for people with disabilities. Staff with expertise in accessibility and usability testing of web applications will be using one of the NASA ePDN courses to evaluate pages using approximations of the common obstacles experienced by people with low or no vision, color blindness, dexterity limitations, and deafness. It is expected that through this testing CATEA and GTPE staff will be able to identify the strengths and weaknesses of the Moodle platform and offer further evaluation and suggestions for improvement of the software.
- The ePDN website was redesigned with Responsive Theming that optimizes content for every screen size. <https://nasaepdn.gatech.edu/> A testimonials page was added to the website
- The DLN implemented improvements based on its internal evaluation efforts. These included formation of ad hoc groups to address various aspects of DLN operation; analysis and alignment of all DLN modules to standard rubric; and use of OSU's Desire to Learn (Learning Management System) to conduct internal professional development and communication among ad hoc groups.
- A major improvement was added to the Rockets to Racecars program through creation of the Digital Learning Network™ R2R STEM Education Resource page. The page was added to the main R2R website which was created by NASA HQ. A button labeled "EDUCATION" was added to that website, the STEM Education resource page is linked through that button. The EDUCATION page includes a compilation of NASA resources related to the Science, Technology, Engineering and Math of racing. It includes video descriptions of each activity and links to each NASA resource listed. In addition, links to the NSF Science of Speed video series are included. The web page has had a total of 17,525 hits since its launch in the Fall of 2011.
http://www.nasa.gov/offices/education/programs/national/dln/special/R2R_Ed_Res.html

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT

Partnerships:

- Through the Georgia Race to the Top partnership, a group of 18 teachers from Bear Creek Middle School, a NASA Explorer School, are participating in the NASA Electronic Professional Development Network's (ePDN) Project-Based Inquiry Learning certificate series. With this group of teachers we are, for the first time, working with a single-building cohort, and helping the lead teacher design a parallel support infrastructure to keep teachers motivated and enable them to work as a group. These Bear Creek teachers are benefiting from the interface with other teachers from around the country in their online forums and groups, enabling them to expand their horizons about what is possible

- A NASA Electronic Professional Development Network (ePDN) promotional video was created focusing on our visit to Susan Hall's classroom where we were able to observe her students implementing her PBIL plan developed through the NASA ePDN & Race to the Top's courses. This video shows Hall's success story.
<http://play.media.gatech.edu/s/gtpe.gatech.edu/www/e71fac0e-baa0-5cd3-9637-def8dcd27da8>
- COTF mentored a Graduate Education Diversity Intern affiliated with the American Evaluation Association and Duquesne University to conduct evaluation research across COTF projects and provided guidelines for improving and expanding STEM education success among diverse K-14 students and teachers.
- The DLN is in a collaboration with Skype in the Classroom in order to promote its offerings to 35,000+ educators associated with the use of Skype in the Classroom websites and technologies in their learning environments.
- The International Society for Technology in Education (ISTE) professional organization provided a venue for Vidyo, Inc. to connect with DLN sites in order to communicate their offerings to attendees at ISTE's annual conference in San Diego, CA. Vidyo has been adopted by NASA as an agency-wide web conferencing tool for internal and external participants. The DLN is one of the NASA organizations assisting in the testing and deployment of the system.
- The DLN as continued various partnerships with internal NASA Education Projects to extend their outreach and education activities to greater numbers of students and teachers. These include Teaching from Space, NASA Explorer Schools, Aerospace Education Services Project, Kennedy Educator Resource Center, Summer of Innovation, and NASA's Central Operations of Resources for Educators.
- Rockets to Racecars Partners: Pocono International Raceway, Richmond International Raceway, Charlotte Motor Speedway, Ten80 Education, Indiana Space Grant Consortium, Virginia 529 College Savings Plan, NASCAR Drive for Diversity, Science Museum of Virginia. Partners provide a variety of resources making delivery and execution of project activities possible. Some examples include provision of trackside exhibit space, use of generator to power equipment, and funds to use for travel and payment for shipping of exhibits. The partners sometimes provide speakers for events. A Drive for Diversity driver was a featured speaker at the CIAA event in Charlotte, NC in Feb 2012. Ryan Gifford gave a presentation to the 2,500 students in attendance about the NASA technologies that benefit the racing industry. He also engaged them in activities and conversation at the NASA booth in the arena display area.