



NASA STEM EDUCATOR PROFESSIONAL DEVELOPMENT COLLABORATIVE (EPDC)

FY 2019 ANNUAL PERFORMANCE REPORT

FUNDING SOURCE:

OFFICE OF STEM ENGAGEMENT
MINORITY UNIVERSITY RESEARCH AND
EDUCATION PROJECT
(MUREP)/NEXT GENERATION STEM (NGS)

MANAGING ORGANIZATION:

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ACTIVITY DESCRIPTION

NASA STEM Educator Professional Development Collaborative (EPDC) is a transformative, diversity-focused STEM educator professional development system with a national scope. Funded under the direction of the Minority University Research and Education Program (MUREP) through a \$15 million five-year cooperative agreement between NASA and Texas State University, EPDC provides a multitude of face-to-face and online professional development opportunities and NASA resources for educators in K-12, university, and community settings (www.txstate-epdc.net).

EPDC utilizes NASA-unique resources to provide engaging, standards-aligned professional development for formal and informal educators. Specifically, EPDC serves educators in a variety of roles including in-service teachers, preservice teachers, university faculty, and community educators working in a variety of contexts such as after school programs, summer camps and museums. EPDC professional development provides educators with the content knowledge and NASA resources needed to provide students with rigorous and engaging STEM learning opportunities that will inspire students and propel them toward future STEM careers. With an EPDC specialist as each of the 10 NASA Centers, EPDC offers high quality face-to-face professional development as well as synchronous and asynchronous online learning opportunities utilizing NASA-unique assets.

ACTIVITY GOALS

NASA STEM EPDC advances NASA Strategic Objective 2.4 and Goal 1 of the federal STEM Education 5-Year Strategic Plan put forth by the National Science and Technology Council's Committee on STEM Education. These goals include:

- Advance understanding of Earth and develop technologies to improve the quality of life on our home planet. (NASA Strategic Goal 2).
- Advance the nation's STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers and faculty in NASA's missions and unique assets. (NASA objective 2.4).
- Improve STEM instruction by preparing 100,000 excellent new K-12 STEM teachers by 2020 and supporting the existing STEM teacher workforce (Committee on STEM Education Goal 1).

In support of the NASA Activity Goals, EPDC specifically has goals to:

- Impact STEM instruction nationwide through engaging, standards-aligned professional development and the utilization of NASA educational resources;
- Contribute to the research base related to the preparation and ongoing professional development of STEM educators and to investigate the impact of NASA's investment in education;
- Enrich educator learning by providing access to NASA-unique assets and innovative technologies; and
- Create powerful NASA partnerships with university, school district and community stakeholders.

ACTIVITY BENEFIT TO PERFORMANCE GOALS

FY 2019 Performance Goals

3.3.3: Provide opportunities for learners to engage with NASA's aeronautics, space, and science people, content, and facilities in support of a diverse future NASA and aerospace industry workforce.

The NASA STEM EPDC offered a total of 420 professional development and STEM engagement events in FY 2019. Of the 420 events offered, 131 were online webinars, 103 were on-site face-to-face events, and 186 were off-site face-to-face events.

FY 2019, educators earned 27 digital badges through the EPDC Digital Badging System totaling 154 hours of professional development credit. Since the inception of the EPDC Digital Badging System in February 2016, educators have earned a total of 3,403 digital badges, representing 25,312 hours of professional development credit

3.3.4: Enhance the effectiveness of education investments using performance assessment and evaluation-driven processes.

The NASA STEM EPDC has implemented a comprehensive evaluation model that identified the specific delivery mechanisms through which individual educators receive NASA STEM engagement and professional development services, as well as the content topics, frequency, and duration of the activity in which they are engaging. After an event through which participants have registered online, they receive an online follow-up survey to allow them to evaluate the presenter, the quality of the experience, and their likelihood for integrating the NASA content and resources into their teaching. These evaluation data are then used to inform planning for future events and the use of project resources.

3.3.5: Provide opportunities for learners to contribute to NASA's aeronautics, space, and science missions and work in exploration and discovery.

EPDC specialists frequently work with educators to recruit students to participate in the NASA-sponsored design challenges. In addition, they support these efforts in coordinating the competitions, supporting the judging of submissions, and managing students who visit a NASA Center in relation to these competitions.

ACTIVITY ACCOMPLISHMENTS

By fostering awareness, engagement and understanding of NASA-unique content through professional development for educators, NASA STEM EPDC positively influences the education of students across the nation. EPDC provides an educational specialist who works on-site at 8 NASA Centers and provides both on-site and off-site professional development for educators in the geographic region served by their Centers. EPDC specialists also provide professional development at the national level through presentations and exhibits at key national conferences and providing online professional development through a comprehensive set of webinar offerings and the offering of digital badges in STEM content areas that feature NASA content, activities and resources.

In addition, EPDC is committed to providing professional learning for educators throughout their careers spanning from preservice training through the induction and in-service years of teaching, and into educational leadership roles. Special emphasis is also provided to those educators who prepare STEM teachers as well as home school educators and informal educators who work in museums, afterschool and summer programs, and other community organizations.

Professional Development Events: In FY 2019 EPDC sponsored various types of online professional development as well as face-to-face professional development. These events have been wide spread and encompass all 50 states, the District of Columbia, Puerto Rico, and the US Virgin Islands. In FY 2019 NASA STEM EPDC delivered a total of 420 EPD events, including:

Online Webinars: 131
 On-site F2F: 103
 Off-site F2F: 186

Below is a summary of the types of professional development events conducted over the five years of operation of EPDC:

PD Events for Five Years of EPDC

PD Events by Type	Year 1 FY 2015	Yr. 2 FY 2016	Yr. 3 FY 2017	Yr. 4 FY 2018	Yr. 5 FY 2019	5-Year Total
Online EPD Webinar & Webshops	172	216	219	203	131	941
On-Site Face-to-Face PD Event	83	196	245	203	103	830
Off-Site Face-to-Face PD Event	39	52	159	207	186	643
Total events	294	464	623	613	420	2,414

Digital Badges: In addition, in FY 2019 the NASA STEM EPDC Digital Badging System awarded the following:

Digital Badges: 27
 Representing: 154 hours of PD credit

The badge numbers in FY 2019 were considerably lower than previous years because the EPDC badging system in the process of being transitioned from Penn State University to Pensar Learning. This transition has now been successfully accomplished. Below is a summary of the digital badges earned over the five years of operation of EPDC:

Digital Badges Earned

NASA Digital Badging System	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	5-Yr Total
Badges Earned		1,004	1,303	1,069	27	3,403
PD Hours Represented by Badges Earned		5,587	10,668	8,883	154	25,312

Educators Served: EPDC staff and specialists provide professional development to educators through EPDC-sponsored events, events sponsored by the NASA Centers, and through other collaborative initiatives. The table below shows the educators served in FY 2019 by quarter by educator type:

Quarter/ FY 2019	Elem. School Teachers	Middle School Teachers	High School Teachers	Pre- Service Teacher	Higher Ed. Faculty	Admins	Informal Educators	Students/ Other	Totals
Quarter #1	1,224	1,182	875	601	229	216	364	10,591	15,282
Quarter #2	786	502	668	216	581	119	128	5,161	8,161
Quarter #3	775	786	634	112	115	90	445	11,649	14,606
Quarter #4	1,999	1,968	1,509	713	344	306	809	22,240	29,888
Total FY 2019	4,784	4,438	3,686	1,642	1,269	731	1,746	49,641	67,937

Educators Served for Five Years of EPDC

Level	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	5-Yr Total
Pre-Service	992	2,109	2,726	1,813	1,642	9,282
Elementary	2,047	6,653	10,542	6,283	4,784	30,309
Middle School	2,430	8,198	12,639	5,894	4,438	33,599
High School	1,140	4,367	7,813	4,672	3,686	21,678
Higher Education	1,765	1,189	3,412	2,137	1,269	9,772
Administrator	101	535	1,136	705	731	3,208
Informal Educators	982	1,638	3,186	2,490	1,746	10,042
Students/Other	114,798	9,520	23,855	27,569	49,641	225,383
Totals	124,255	34,209	65,309	51,563	67,937	343,273

Performance Summary: In each year of the 5-year cooperative agreement, EPDC greatly exceeded NASA's goal of reaching more than 10,000 educators per year in professional learning ranging from 1-40 hours in duration. In addition, EPDC served educators from all 50 states, the District of Columbia, Puerto Rico, and the US Virgin Islands. In the section below, EPDC's contribution to each FY 2019 Annual Performance Indicator (API) is further delineated.

ACTIVITY CONTRIBUTION TO ANNUAL PERFORMANCE INDICATORS (APIs)

FY 2019 Annual Performance Indicators

API 3.3.3 STEM-19-1: Provide significant, direct student awards in higher education to (1) students across all institutional categories and levels (as defined by the U.S. Department of Education); (2) racially or ethnically underrepresented students, (3) women, and (4) persons with disabilities at percentages that meet or exceed the national percentages for these populations, as determined by the most recent, publicly available data from the U.S. Department of Education's National Center for Education Statistics for a minimum of two of the four categories.

EPDC has an ongoing emphasis on serving communities with the highest need and providing opportunities and resources available to populations that have traditionally been underrepresented in STEM fields. In addition, EPDC has established more than 100 partnerships with Minority Serving Institutions (MSIs) across the nation. Fifteen MSIs hold traditional partner sub-contracts and 117 MSIs are partners through the EPDC Emerging Stars Network. Collectively, these partnerships involve more than 1,000 faculty who actively share NASA content and resources with the colleagues and students.

MSI's are not only essential partners in the preparation of the next generation of STEM teachers, but faculty in these institutions have a wealth of expertise to share about working with diverse learners and the integration of culturally relevant instructional strategies that promote the STEM success of all students. The MSI Teacher Educator Network (MSI TEN) is comprised of STEM faculty members from Texas State University and fifteen partner universities that provide specialized expertise in the field of culturally responsive teaching in STEM. The MSI TEN faculty identify NASA curriculum activities that can be strengthened and develop new content for diverse student populations. They also revise undergraduate and graduate courses to include additional NASA resources and to emphasize culturally-responsive teaching.

API 3.3.4 STEM-19-2: Design a comprehensive data management system aligned to performance assessment and evaluation strategy to collect, analyze, and report data for STEM engagement investments.

A central online event registration system allows EPDC to easily track the number of professional development events delivered and the number of participants served by role group. The NASA STEM EPDC program has also implemented a comprehensive evaluation model that will help determine which educators are receiving NASA professional development services through what specific delivery mechanisms, as well as the topics, frequency and duration of the professional development in which they are engaging. After an event through which participants have registered online, they receive an online follow-up survey to allow them to evaluate the presenter, the quality of the experience, and their likelihood for integrating the NASA content and resources into their teaching. These evaluation data are then used by EPDC to inform planning for future events and the use of project resources and provide NASA with important insights on how best to expend resources in educator professional development to result in the desired impacts.

API 3.3.5 STEM-19-3: Conduct a multiple case study focused on NASA STEM engagement higher education challenges, competitions, and internships to build knowledge about how these activities: a) contribute to NASA's aeronautics, space, and science missions; b) align to evidence-based effective practices for STEM learning; and c) recruit and retain participants from groups historically underrepresented and/or underserved in STEM fields.

EPDC supports this API by including information about higher education challenges, competitions, and internships in the conference presentations and webinar presentations. Upon request, EPDC can tailor an entire webinar to feature the specific challenge and competition and include the challenge/competition leads as co-presenters in the webinar presentation. EPDC has distribution lists of Minority Serving Institutions (MSIs) that are members of the MSI Teacher Educator Network (MSI-TEN) and the EPDC Emerging Stars Network. These networks include 117 universities from 34 different states, the District of Columbia, Puerto Rico, and the US Virgin Islands.

Upon request, we have distributed information about challenges, competitions and internships directly to these institutions. Also, the EPDC Digital Badging System is a platform that can be used to support NASA initiatives such as education challenges, competitions, and internships. For example, currently EPDC is conducting a series of online presentations specifically for MSIs and is helping in the development of digital badges related to NASA M.U.S.I.C., a program designed to promote MSI capabilities to compete for funding to support NASA’s aeronautics, space and science missions. When developed, these M.U.S.I.C. badges will operate on the EPDC Digital Badging System.

API 3.3.6 STEM-19-4: Contribute to American technical capability by supporting the release of at least 1,300 paper presentations and peer-reviewed research publications through STEM engagement investments.

NASA STEM EPDC presents at a variety of professional conferences, with a special emphasis on conferences that serve populations that are under-represented in the STEM fields. NASA EPDC had presentations at the following conferences during FY 2019:

Conference	Date	Conference City	Presenter(s)
STEM Forum Conference	Oct. 22, 2018	Athens, GA	Lester Morales
California STEAM Symposium	Oct. 24, 2018	Long Beach, CA	Barbie Buckner
CA Math Council South State Conference	Nov. 2, 2018	Palm Springs, CA	Barbie Buckner
Society of Allied Weight Engineers (SAWE) Regional Conference	Nov. 30, 2018	Norfolk, VA	Anne Weiss
CA Math Council North State Conference	Dec. 1, 2018	Pacific Grove, CA	Barbie Buckner
Utah Science Teachers Association Conference	Feb. 8, 2019	Provo, UT	Sara Torres
Ohio Educational Technology Conference	Feb. 13, 2019	Columbus, OH	Susan Kohler
Association of Teacher Educators	Feb. 17-19, 2019	Atlanta, GA	Araceli Ortiz, Barbie Buckner, Samuel Garcia
Missouri Math Professional Development Conference	Feb. 22-25, 2019	Osage Beach, MO	John Weis
Scobee Challenger Center Conference	Mar. 2, 2019	San Antonio, TX	Steven Smith
Society of Allied Weight Engineers (SAWE) International Conference for Mass Properties Engineering	May 20, 2019	Norfolk, VA	Anne Weiss
STEMapalooza Summer Conference	June 19, 2019	Kennesaw, GA	Monica Uribe
SPACE Conference for Educators	July 24-26, 2019	Titusville, FL	Lester Morales, John Weis, Steve Culivan
National Science Teachers Association (NSTA) Conference	July 24-26, 2019	San Francisco, CA	Michelle Berry, Barbie Buckner

In addition, the leadership team and the EPDC specialists frequently publish their work in professional publications. EPDC also participates in the production of a “white paper” series in which various research efforts are highlighted and results are disseminated.

ACTIVITY IMPROVEMENTS MADE IN THE PAST YEAR

Increased interest in student badges as well as educator badges on the part of NASA and the educators we serve necessitated that we work through a variety of data security issues related to having K-12 students on the digital badging platform. The EPDC Digital Badging System has been successfully transitioned from Penn State University to Pensar Learning in order to accommodate the security issues related to the offering of student badges. This move was made when it was determined that Penn State University was not able to accommodate K-12 students earning badges in their system.

EPDC has continued to expand our scope of services to incorporate more STEM engagement activities for students to better align with NASA’s transition to the Office of STEM Engagement. Ongoing work has continued to provide digital training resources for the Next Gen STEM project and has resulted in both educator and student Next Gen digital badges on Moon to Mars; Small Steps, Giant Leaps; and the Commercial Crew Program. These badges are delivered through the EPDC Digital Badging System.

ACTIVITY PARTNERS AND ROLE OF PARTNERS IN ACTIVITY EXECUTION

NASA STEM EDPC has a number of partners that help operationalize the EPDC scope of work. A brief summary of their primary roles are as follows:

- **The MSI Teacher Educator Network (MSI TEN)** is comprised of 15 Minority Service Institutions that have EPDC subawards and provide faculty members with specialized expertise in the field of culturally responsive teaching in STEM. The MSI TEN faculty members:
 - develop new badges for the Digital Badging System;
 - identify NASA curriculum activities that can be strengthened;
 - develop new content for diverse student populations;
 - revise undergraduate and graduate courses to include additional NASA resources and to emphasize culturally-responsive teaching; and
 - provide professional development that incorporates NASA resources for public school educators and for university students and colleagues.

- **The Emerging Stars Network** members consist of institutions that sent teams of pre-service teachers and faculty sponsors to the week-long MUREP Educator Institutes conducted at each of the 10 NASA Centers. Through these partnerships, EPDC specialists frequently provide online and face-to-face professional development for the Emerging Stars institutions. Emerging Stars faculty also integrate NASA resources into their teacher preparation courses and disseminate information about various NASA opportunities to their students and fellow faculty members.

- **Duclos Management & Consulting**—provides coordination of the eTouches event registration system and corresponding reporting related to Quarterly progress reports, annual reports, and

OEPM reporting. Also assist with the oversight of the 10 EPDC specialists headquartered at the 10 NASA Centers.

- **Pensar Learning** provides the digital badging platform that hosts the NASA STEM Digital Badging System that allows educators to earn badges as a part of their ongoing professional development in many STEM content areas aligned to NASA Missions. The badges can be converted into CEUs for certified teachers, allowing educators to receive recognition for their employers and state teacher licensure boards. has developed a platform for creating, delivering and optimizing learning content in the form of microcourses based on decades of learning science research. Pensar’s leadership team members are experts in Cognitive Science, Machine Learning, Big Data and Educational Technology bringing together an unprecedented ability to predict and transform learning at scale.
- **EPDC School District Partnerships**—School districts that partner with EPDC to receiving ongoing NASA professional development specifically tailored for their district needs and priorities.

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