
Teachers Positively Affecting Student Learning - Continuous Engagement in NASA STEM EPDC PD can change the culture of the STEM classroom.

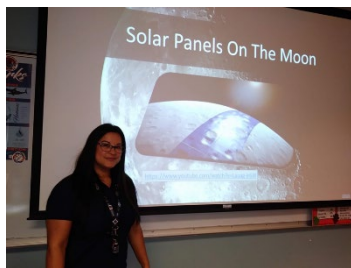
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March 2019

This Publication Should Be Cited as Follows: Morales, Lester (2018). Teachers Positively Affecting Student Learning - Continuous Engagement in NASA STEM EPDC PD can change the culture of the STEM classroom. (STEM Research White Paper Series, Vol. 3, No.3). Texas State University: LBJ Institute for STEM Education and Research.



(Credit: Dr. Lester Morales)

Educator 1, getting ready to present a technology application for Space Exploration with a Moon connection.

The use of professional development programs for teachers is one strategy for facilitating changes in classroom practices. Professional development can provide opportunities for teachers to reflect critically on their practice and to construct new understandings about content, pedagogy, and learners (Darling-Hammond and McLaughlin 1995; Sparks and Hirsh 2000). In recent years, concern about the mathematics and science achievement of U.S. students has led to increasing interest in STEM education. The present literature regarding the effects of teacher PD on student achievement outcomes indicates differential effects depending on the quality and the specific features of PD provided (Capraro, Capraro, Scheurich, Jones, Morgan, Huggins, Han 2016). Staff development helps prepare teachers for the complexities of educating the millennial generation with the advanced skills and knowledge they will need for the unknown future. It helps teachers enhance their knowledge of content, so they are better able to answer students' questions, enliven lessons, and help students solve problems (Sparks, Hirsh, & National Staff Development Council, O. O. 2000).

In the summer of 2016, 41 pre-service educators attended the National Aeronautics and Space Administration (NASA) Kennedy Space Center Minority University Research and Education Projects (MUREP) Educator Institute (MEI). The opportunity was facilitated by a collaborative effort between Texas State University and NASA Kennedy Education office. The institute was comprised of a blended educational model with pre and post work done through online platforms. These

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platforms provided web-based trainings and electronic-micro-credential badges.

During the face-face experience at NASA Kennedy participants were shown NASA resources in all STEM disciplines including integration of the Arts (Language Arts and History). Furthermore, pedagogy focused on STEM best practices, diverse learners, and culturally relevancy. In addition, all participants were immersed in “real world” applications of emerging technologies, engineering design, and exploration through a behind the scene tour at NASA Kennedy Space Center.

The 41 pre-service educators and 7 university faculty members came from 7 Minority Serving Institutions (MSI) across NASA Kennedy Region’s that includes the states of Florida, Georgia, and the Territories of Puerto Rico and US Virgin Islands (refer to Table 1). I followed up with three Florida licensed educators currently teaching in diverse schools in two of the largest school districts in the country. All three educators are graduates of Broward College and these are their stories.

Where are they now? Three years post their NASA MEI 2016 experience, have they used what they learned, and do they continue to participate in other NASA PD related experiences? Through the Florida Department of Education public records website, I found their licenses, contacted all 25 Florida graduates and with a swift response three Broward College Alumni responded.

Table 1: NASA MUREP Educator Institute 2016 Participants

| NASA MEI 2016 | |
|--|-----------------------|
| College/University | Number of Participant |
| Florida | |
| Broward College | 9 |
| Florida Agricultural & Mechanical University | 12 |
| Valencia College | 8 |
| Georgia | |
| Albany State University | 4 |
| Savannah State University | 5 |
| Puerto Rico | |
| Universidad Metropolitana | 4 |
| University of Puerto Rico- Mayaguez | 6 |
| US Virgin Islands | 0 |

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“MEI was an amazing experience, a community environment, it felt like home.”

- Educator 1

Past MEI Participants Classroom Observations and Interviews

Case Study 1

Educator 1 is currently teaching in Miami-Dade County Public Schools, the 4th largest school district in the nation ranked 64th of the 100 largest school districts in the nation in 2015 on the amount of funding per pupil (Cornman, Zhou, Howell, Young, National Center for Education Statistics (ED), & US Census Bureau 2018). Our Educator 1 is currently teaching high school Honors Biology and Environmental Science at a public magnet school. In the educator’s own words “MEI was an amazing experience, a community environment, it felt like home.” “A week-long experience that I will always cherish.” Thanks to the experience, Educator 1 created a “Space Club” at her school and invites different scientist and business world professional to speak to student about careers.

The usage of the many NASA hands-on activities modeled at MEI 2016 have come in handy in many settings such as summer programs, after school events, and Science Club. The experience also propelled Educator 1 to pass on the knowledge and train all the summer school instructors in the same manner it was taught at MEI. Our Educator 1 prove to be an advocate of Culturally Responsive Pedagogy, teaching in a “melting pot of cultures in Miami.” With the believe that even if you have the highest of degrees an educator never stops growing and learning. Professional development in this particular school is controlled by both the administration and the educator, Educator 1 values duration(length) of the PD as the number one priority. An educator needs time to really understand the content and context. Now as a classroom professional Educator 1 wishes to sign up to similar NASA programs if the opportunity ever rises and plans to attend the

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“With MEI it caused me to look at education a little bit differently, not always trying to get the connect across but also connect with the student and then take it from there.”

- Educator 2

SPACE conference held at Kennedy Space Center this Summer 2019.

Case Study 2

Educator 2 is currently teaching in Broward County at a private K-12 International Academy. Educator 2 has the most experience teaching now in the 5th year, teaching experience includes Biology, Physics, and Earth Space Science. Educator 2, had three different summer experiences from 2014-2016 including a full summer internship with the office of education at Kennedy Space Center. A positive influence of MEI included the 5E Lesson Plan and hands-on activities, and to this day our educator keeps all the notes from this week-long experience. In our educator words’ “[W]ith MEI it caused me to look at education a little bit differently, not always trying to get the content across but also connect with the student and then take it from there”... “There is no one take away, there are many.” Educator 2 sees the importance of keeping up with the pedagogy and to always look for new opportunities to bring back to the classroom. The experience has allowed the educator to incorporate NASA content and always seeking new NASA related opportunities for educators. Our Educator has learned to modify activities to suit the needs of the student and not intimidated by NASA curricula. Last year our educator shared the NASA MEI knowledge with two newly hired physics teachers at the school.

Culturally Responsive Pedagogy could not be more important at this school where students come from all parts of the world as residential students from South America, Asia, Africa, and Europe. Professional Development is at the forefront in this school with different level of engagement from grade level departmentalized, school wide, and online self-directed



(Credits: Dr. Lester Morales)

Image of the lab concepts students are about to performed in the Educator 3 classroom. The classroom was immersed with images like these all around.

courses. Our Educator considered time as a primary factor when participating in PDs not to be rushed in the learning process. Our educator enjoys being part of the large community of MEI alumni and looks for more NASA web-based trainings.

Case Study 3

Educator 3 is currently teaching in the 6th largest district in the nation, Broward Public School System (Cornman, Zhou, Howell, Young, National Center for Education Statistics (ED), & US Census Bureau 2018). Our Educator currently teaches 8th grade science at public middle school in the south west part of the district. The school has over 60% Latino students and is over 90% minority-majority student population. With an undergraduate degree in Education and currently perusing a Masters in STEM Education from our Educator own words “The MEI week experience was amazing and wish it was longer.” The Educator realized that an increase in rigor in the labs was “okay” because an engaging hands-on lab is fun and student would still understand the concepts. The biggest take away from the MEI experience was the “I can do this attitude” and not be afraid to use the NASA curricula. With this experience our Educator obtained the courage to be a Co-Coach for the school robotics team and even more enthuse to find out the theme is “Into Orbit.” The educator wants to continue the participating in NASA related webinar and activities whenever possible. Our Educator has shared all the curriculum with the Math and Science staff and has allow for integration of the subjects.

When it comes to Culturally Responsive Teaching a profound understanding of what it means to teach a diverse student body

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in the way they learn and not the way you want to teach is paramount. As I walked around the class, culture was on displays on the walls, vocabulary, class instruction, images, and overall a class where diverse learning was taking place, and it was very relatable to students and their backgrounds. Our Educator values continued education so much so that Educator 3 continues to add certifications to the state license, most recently Gifted Certification, and almost finished with Reading Endorsement Certification as well. For future opportunities our educator hopes that NASA creates similar experiences for in-service educators, offered in the Summer time, and for a long period of time.

Remarks

These remarks corroborate anecdotal information obtained from participants through direct classroom visitation, observations, and interviews. These three educators today are impacting and making a difference in the lives of hundreds of students through formal and informal settings, public and private institutions. The sample was only of three former pre-service educators but it shows the impact the program seeks out to do. These educators saw the value in perusing further PD from a reputable, trusted source, NASA.

For more information about NASA STEM EPDC, please visit txstate-epdc.net.

This work was supported by NASA STEM EPDC Collaborative agreement NNX14AQ30A

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