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Endeavor Science Teaching Certificate Project
Administered by U.S. Satellite Laboratory, Inc.
Cooperative Agreement – Year IV Report
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PROJECT DESCRIPTION

The Endeavor Science Teaching Certificate Project (ESTCP) is a highly competitive, national Fellowship project making nearly 200 awards to K-12 educators, NASA Endeavor Fellows, during a five-year grant lifetime. More than half of Endeavor educators serve underrepresented student populations. Endeavor engages educators and their students in NASA-related STEM content and career possibilities in the STEM areas.

ESTCP, through grantee U.S. Satellite Laboratory, enhances educators' content knowledge and understanding of pedagogical strategies for teaching STEM content through participation in a 15+ graduate credit certificate initiative. Endeavor participants include in-service, pre-service, and alternate-route educators who through ESTCP earn a Certificate in STEM Education from ESTCP partner, Teachers College, Columbia University, and graduate credit from additional institutional partners. ESTCP utilizes a blended live-synchronous, and asynchronous model, for the delivery of research-based online courses featuring a wide range of fully-integrated STEM content products and data from each of NASA's Mission Directorates.

ESTCP course offerings include cutting-edge NASA content from each of NASA's mission directorates and the infusion of "STEM pedagogical strategies" and NASA and other proven educational materials. Educators also engage in a STEM Leadership Distinction project to promote systemic change within their school system, their region, and state. Alternatively they perform a STEM Action Research project in their classrooms. Teachers College, Columbia University is the affiliation of a number of the Endeavor course instructors, as well as the coordinators of educational research that was initiated during Year II.

Funding authorization for the ESTCP is provided through the NASA Endeavor Teacher Fellowship Trust Fund, as defined in 42 U.S.C. 2467a.

PROJECT GOALS

Two main project goals guide all of Endeavor's activities:

ESTCP GOAL 1: Contribute to the development of a highly qualified educator workforce knowledgeable in NASA-related STEM content, proficient in effective instructional delivery models that are based upon research-based best practices, and pro-active in STEM system change within their respective schools, regions and states.

ESTCP GOAL 2: Engage K-12 students in NASA-related STEM activities and experiences that positively influence their academic performance and interest in STEM careers through the Endeavor Fellows' classrooms or those of teachers they have trained.

PROJECT BENEFIT: OUTCOME 2

Endeavor's goals contribute to achievement of NASA Education's Outcome 2 – Elementary and Secondary Education. Cite the Outcome. Then provide the Endeavor's contributions. The paragraph below has already been stated. What's benefits has Endeavor contributed to Outcome 2 this year?

The Endeavor professional development model is designed to create a national cadre of 200+ Endeavor Fellows who demonstrate leadership in use of NASA-related STEM content within their classrooms and in educator workshops at the district, regional and state levels.

PROJECT ACCOMPLISHMENTS

ESTCP has successfully recruited, selected, and implemented work with four cohorts of educators, a total of 190 NASA-sponsored Endeavor Fellows and Teacher Educators from 45 states including Washington, DC; Puerto Rico; two U.S. international schools; and one DODEA school. In January 2012, 51 educators (Cohort 4) began ESTCP's Educator Professional Development. [See Press Release at http://www.us-satellite.net/endeavor/Cohort4-general.pdf].

100% of Cohort 4's eligible educators (48 of 48) successfully completed the Methods in STEM Education course in May 2012; the remaining three (pre-service educators) completed in August 2012.

A partnership agreement between Endeavor and Houghton-Mifflin Harcourt (HMH) remains active. HMH actively and regularly promotes NASA Endeavor as its solution for STEM professional development at national conferences including NSTA and NCTM. Through its marketing and sales channels it sells the Endeavor program to school districts. All educators earn the Certificate in STEM Education from Teachers College, Columbia University, and these non fellowship recipients sit alongside NASA Endeavor Fellows in live, online classes. All participate in an online community of practice. HMH partners with Endeavor with the goal of helping schools and school districts to create agents of change for integrated STEM education.

Early in 2012, for Houghton Mifflin Harcourt, ESTCP successfully presented national STEM webcasts to build awareness for STEM curriculum and educator professional development in STEM education. the audience was administrators, superintendents, and other educators. HMH invited Endeavor to repeat the national webcasts again for Fall 2012 and for U.S. News' STEM Conference in Austin Texas in June 2013. The national webcast initiative is called "ThinkForward". It promotes cutting-edge education practices and forward thinking in various education disciplines. In all of the webcasts, Endeavor educators participate in the national online presentations as panelists. These sessions are archived online at the ThinkForward website. The session: ThinkForward: STEM—What, Why, and How? may be played back here.

ESTCP GOAL 1: Contribute to the development of a highly qualified educator workforce knowledgeable in NASA-related STEM content, proficient in effective instructional delivery models that are based upon research-based best practices, and pro-active in STEM system change within their respective schools, regions and states.

GOAL 1 Project Objectives	Performance Measures	Progress as of 06/30/12
1. Receive over 2,000 applications and award ESTCP Fellowships to over 200 diverse teachers from all 50 states, Washington DC, Puerto Rico and U.S. Territories so that they may take courses, receive graduate credit and collaborate with the NASA network of Fellows as they work toward certification at the state level.	• 200 teachers will be recruited from 50 states and U.S. territories to become ESTCP Fellows.	• 1,602 educators have submitted partial or completed applications for Cohorts I –IV. • 181 educators plus 9 teacher educators from 45 states, including 22 pre-service teachers, have been awarded NASA Endeavor Fellowships or Teacher Educator appointments. • Fellows represent Urban, Suburban and Rural schools as well as Public, Private and Charter Schools; 62.3% of in-service Fellows' schools report they are Title I eligible.
2. Improve teacher pedagogical content knowledge (PCK) in related STEM disciplines as educators demonstrate changes in their practice, and *apply* science concepts with NASA content based on the latest research in science education.	• By the end of each year, 75% of the participating Fellows will demonstrate increased PCK in related STEM disciplines. • Action Research reports demonstrate changes in teaching practices in 75%	• Teachers College research demonstrates improved PCK and use of STEM pedagogical strategies (e.g., inquiry, engineering design) in the STEM disciplines and increased use of NASA content for instruction for all Endeavor educators; exit interviews illustrate that Fellows completing certificate report improved content knowledge. • 100% of Fellows completing Action Research projects demonstrate change in teaching practice.
3. Infuse NASA content from all Mission Directorates and materials into pre-service teacher education programs	• By the end of Year I, at least 3 partnering pre-service universities. • By the end of Year V, at least 20 partnering pre-service universities	• 9 Universities are partnering: o Columbia University o Alabama A&M o Kentucky State University o University of Pennsylvania o University of South Carolina o Southern Illinois University o Cleveland State University o Clemson University o University of Central Florida ▪ 9 University Teacher Education faculty (100%) have implemented NASA content into their pre-service methods courses.
4. Assist teachers in earning/maintaining STEM credentials in their respective states	• By the end of Year V, 50% of Fellows will meet state requirements for earning/maintaining credential.	• Endeavor Year I pilot initiative resulted in courses earning continuing education units or credit toward a credential or endorsement in three U.S. states. • Endeavor pursued an alternate strategy by which it formed a unique relationship with the National Board for Professional Teaching Standards. As of August 2012, a cohort of 16 Endeavor Educators (>30% of Cohort IV) is on a National Board Certification Option Track.

ESTCP GOAL 2: Engage K-12 students in NASA-related STEM activities and experiences that positively influence their academic performance and interest in STEM careers through the Endeavor Fellows' classrooms or those of teachers they have trained.

GOAL 2 Project Objectives	Performance Measures	Progress as of 06/30/12
1. Lead live, online, interactive workshops for science teacher educators at nationwide colleges and universities to learn to infuse NASA content and materials into methods and practicum courses and spark the interest of and attract pre-service teachers to become candidates for ESTCP Fellowships.	• Conduct successful workshops for college faculty. • 50% of workshop participants will infuse NASA content in materials	• Two, online, interactive workshop series were delivered to 9 Science Teacher Educators. • 89% Endeavor Teacher Educators have infused NASA content into their practice and presented findings to date.
2. Support teachers in the field to ensure success in engaging a community of NASA Fellows in implementing NASA content and materials featuring a special, new Stanford online collaboration tool.	• 50% of Fellows will use online collaboration tool for support in classroom implementation.	• 100% of Fellows are using online collaboration tool(s). • Fellows report that use of collaboration tool varies by course. • New, online peer-reviewed publication of Endeavor's Action Research planned for Fall 2012/early 2013.
3. Award, in association with Teachers College and NASA's AESP Program, a *Leadership Distinction* to teachers who scale up what they have learned as part of the final course to the district and/or regional level.	• At least 10% of ESTCP Fellows will earn *Leadership Distinction* to illustrate scaling up of ESTCP program to school, district, and/or regional level.	• A STEM Leadership Course is the capstone course for a new "non-credit" Endeavor educator option. • Approximately 66% of ESTCP Fellows, beginning with Cohort 3, and 100% of school district sponsored Endeavor educators through HMH are required to earn the STEM Leadership distinction. Leadership projects affect "entire staffs" in some schools and are "saving monies". Each semester produces additional educators earning the Leadership Award. Some "alumni" are opting to earn the award for no credit. Action Research. Since Fall 2011, 12 Endeavor Educators per section may elect to take Action Research. Teachers wishing to enroll in STEM Action Research must have a recommendation from two instructors to do this.
4. Increase interest of K-12 students in STEM and STEM careers.	• At least 50% of students of ESTCP Fellows will show increased interest in NASA content and STEM careers. • At least 75% of Fellows will demonstrate successful classroom implementation of NASA content	• Teachers College research reveals that coursework leads to improved understanding of infusion of NASA content and evolution of STEM pedagogical beliefs. Future studies will determine interest in STEM studies and careers.

Spotlight on Activities during FY12 that support the ESTCP Goals and Objectives

Objective 1: Science Teacher Educator Workshops. Cohort III teachers completed their STEM Certificate program during Year IV of Endeavor. Six Cohort III Faculty Teacher Educators from six distinct university partners participated in a webcast series this spring, after taking diverse Endeavor courses, including *Methods of STEM Education*, *Lessons from the Ocean*, *SPRINTT* and the *"E" in STEM*, and have subsequently, implemented NASA content and pedagogy for pre-service educators of their own, on their respective campuses, during the 2011-12 academic year.

Objective 2: Online Collaboration. 100% of Endeavor Fellows are using the online collaborative space. Fellows report that the importance of the online community varies among courses. For example, the Action Research course involves mostly independent work in one's own school, making Fellows less likely to seek support from others. In other courses, it played a more important role. The team also believes that the live interaction in courses contributes to the building of an online community of practice. The difference between professional development here, and within a school district, is that here, there are many ways in which to successfully infuse content and the single educator decides how that takes place. Strategies and camaraderie of others who are "in the same boat" create an important dynamic for the successful implementation of content with instructional technology tools.
Endeavor is on the lookout for the right, balanced "social/professional media tool" beyond the current, simple-to-use online management system.

Objective 3: Leadership Distinction. New for Cohort 2 and beyond is the requirement for NASA Endeavor Fellows to earn a leadership designation, the Leadership Distinction. Each educator from Cohort 2 onward will be responsible for carrying out a project that offers a sample of their Endeavor experience to other educators. Endeavor Fellows will: 1) Share projects with other educators so that new teachers can learn pedagogical techniques to successfully integrate NASA assets into standards-based curriculum; 2) Offer professional development sessions and produce pre-and post- results; and 3) Access projects from others in order to serve a variety of needs outside of the NASA Fellows' classroom walls.

The "Capstone Seminar Series" (non-credit) will help facilitate many more educators to adopt systemic practices throughout schools and districts.

Objective 4: Student Outcomes. Action Research is an important part of the Endeavor Fellowship. Fellows select some aspect of teaching and learning to study. Fellows are encouraged to share their work through presentations and publications. The Action Research process is worthy and valuable to STEM educators, as well as others, who may learn from the work of NASA Endeavor educators. Rubrics, support, and hard work are producing examples (randomly chosen) from Action Research instructors. Fellows' Action Research Reports and Electronic Portfolios have demonstrated the effects of the program on students, specifically in the areas of student engagement and inquiry skills. Additionally, for Year V, a study will be conducted, assessing student attitudes toward STEM and STEM careers.

A new procedure will launch Endeavor's Online Journal of STEM Action Research this year. A peer-reviewed journal, this new initiative will promote NASA Endeavor's formal classroom research projects. Many papers will become articles, other publications, and the launching point for more careful studies. Not all "STAR" projects focus on NASA assets, but most do. All infuse the NASA Endeavor experience, Endeavor's "STEM Pedagogical Strategies", and project goals into the STEM Education research project.

Some drafts, with links, include projects from:

- Gina Schilling, a middle school science teacher in California. Her work is entitled: Self-Efficacy of Middle School Girls in a STEM Class
- Lisa Waldman, a high school math educator in Pennsylvania. Her project is titled: Effects of National Board Certification on Teachers as Leaders: A Case Study of East Pennsboro Teachers
- Kim Abegglen, a middle school math and science educator in Washington State. Her project is called: Fostering Scientific Habits of Mind: Sharing the "Best" of NASA Endeavor in the Hockinson School District.
- Cris DeWolf, a high school science teacher in Michigan. His project is: The Impact of Online Professional Development Learning Communities on High School Climate Change Education.

A list and brief description of a number of **Action Research** titles reported in July 2012 may be found at the end of the report.

Additionally, PBS has produced two videos of current NASA Endeavor Fellows in their classrooms. The focus is on the integration of science and math and while highlighting engineering. The first below is a cutting edge application of technology in the classroom**.** Lawrence was inspired by his engineering course as well as the sea surface temperatures (SST) from *Signals of Spring –ACES*. The second takes a most relevant topic, "concussions," and makes meaning of it with students. Channa is most passionate in her STEM work.

https://www.teachingchannel.org/videos/stem-lesson-ideas-heat-loss-project
Lawrence Peretto, Cohort 4
Mamaroneck, NY
The Heat Loss Project: A STEM Exploration

https://www.teachingchannel.org/videos/applying-stem-middle-school?fd=1
Channa Comer, Cohort 3
Bronx, NY
Applying STEM: The Brain Safety Challenge

PROJECT CONTRIBUTIONS TO PART MEASURES

Numbers of Endeavor Fellows per Cohort:
I- 40 II- 45 III- 50 IV- 52

Survey Responses from 91 of 111 of ESTCP in-service teachers:
9,855 students used NASA instructional assets/content
100% of educators integrate NASA content into practice
3,235 additional teachers have been directly impacted by ESTCP teachers
10,000+ additional students using Endeavor content in their classrooms

Endeavor's Fellows are in-service, pre-service, and/or alternate-route educators. As Fellows they are required to be actively engaged in a 12-18 month professional development plan designed to improve their personal STEM proficiency, understanding of NASA-related STEM content plan, and use of evidence-based best pedagogical practices. Fellows incorporate 'lessons learned' into their classroom instructional delivery, in informal and formal methods of sharing with colleagues, and in participation on systemic committees at the local, regional, and state level.

Evaluation and data collection for Cohorts I,II, and III include independent Endeavor surveys, the number of self-reported recognition awards for teaching excellence, the number of self-reported professional promotion and/or appointment to systemic committees, individual Action Research Plans and reports and exit interviews.

PROJECT IMPROVEMENTS

Nationally Board Certified Teachers are "effective" or "accomplished". As Endeavor and NBPTS share similar philosophies regarding what teachers need to do to improve their craft of teaching, in 2011 the NBPTS and ESTCP pursued each other based on Endeavor's online model and success with STEM training. Since January 2012, Endeavor's "Board Certification Track" is allowing educators to meet all of the portfolio requirements for becoming nationally board certified.

Eighteen of the current Cohort IV fellows (35%) have committed to attaining their National Board Certification through Endeavor. Because of ESTCP partnership with NBPTS, Endeavor now has a powerful and unique relationship for math and science education in the U.S. going forward. NBPTS has invested in training Endeavor staff, as well as Endeavor graduates, who now mentor and guide teachers pursuing the board certification.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

By design, Endeavor's partnership with Teachers College, Columbia University has been significant in ensuring rigor of online courses and a high degree of credibility to the issued Certificates in STEM Education. Additionally, this partnership is key in exploring opportunities for publishable and presentable academic research to be conducted with this project.

Significant partners and their roles include:

☐ U.S. Satellite Laboratory, Inc.

- Administers and implements the ESTCP

☐ Teachers College, Columbia University

- 2011 Research results in use of STEM pedagogical strategies; mental models; use of NASA resources
- Teacher Educators from:
  - Kentucky State University
  - Alabama A&M University
  - University of Pennsylvania

Cleveland State University
Southern Illinois University-Edwardsville
University of South Carolina
Clemson University-Greenville
University of Central Florida

- Pre-service instructors infuse content into methods courses

☐ State Departments of Education (varied levels of application of Endeavor courses to state requirements for credit, certification)

- Maine – Endeavor courses meet state science content & pedagogy certification requirements
- Florida, Virginia – varied recognition but not full certification

☐ Higher Education Institutions

- Adams State College, Alamosa, Colorado (provides graduate credit)
- Kentucky State University (teacher educator involvement)
- Alabama A&M University (teacher educator involvement)
- University of West Florida (provides graduate credit towards Masters Degree)
- Purdue University (course instructor and research partnership)
- Illinois State University (course instructor and research partnership)

☐ School Districts

- School Districts may sponsor additional Endeavor Fellows

☐Education Resource Providers

- Houghton-Mifflin Harcourt, distributor of sponsored fellowships widely promote Endeavor as a solution for STEM professional development.

☐NASA Centers & Mission Directorates

- NASA Subject Matter Experts (SME's) – 20+ across agency

☐National Board for Professional Teaching Standards (NBPTS)

SELECT TITLES OF RESEARCH STUDIES PERFORMED TO DATE

- Increases in Self Efficacy and Leadership

  Self-Efficacy and Teacher Professional Development: Pedagogical Impacts of Teacher Participation in the NASA Endeavor Science Teaching Certificate Project

- More Use of STEM Pedagogical Strategies

  Improving STEM Education for the 21st Century through Professional Development: An Examination of NASA Endeavor Fellows Lesson Planning Practices and Implementation Techniques

- Changes in Mental Models

  Changing In-service Teachers' Mental Models on Teaching Science Through Online Learning

- More Use of Engineering

  Engineering Integration in K-12 Classrooms: A Qualitative Study about Teacher and Student Experiences with Engineering Activities in K-12 Classrooms

- Content Transfer to Students

  Assessing Student Knowledge in Physics from Teacher Participation in the NASA Endeavor Science Teaching Certificate Project

- Views of STEM Pedagogical Strategies of Pre-Service Educators Becoming In-Service Teachers (*in progress*)

SELECT NASA ENDEAVOR ACTION RESEARCH PROJECTS

Kimberly Abegglen Brush Prairie, WA Cohort 2
Fostering Scientific Habits of Mind: Sharing the "Best" of NASA Endeavor in the Hockinson School District

Integrating science, particularly at the elementary school level, is an on-going challenge for teachers and administrators. This NASA Endeavor Action Research project and study provided professional development workshops for teachers and administrators K-10; the focus of these workshops was to research and identify the need to develop scientific and engineering "ways of knowing" and practices with students and strategies to do so that required little preparation or "science teaching" know-how.

Joseph Ayala San Antonio, TX Cohort 1
Knowledge retention in 7th and 8th grade low performers: Comparing a Robotics STEM project with Inquiry Based Physical and Life Science labs

Is there a statistical difference on how well at-risk, middle school students retained selected physical science, and related life science concepts dealing with movement, forces and corresponding human anatomical limb movement and associated components? The concepts were presented to two student groups of equal numbers. One group was presented the concepts within the framework of a robotics / engineering STEM project and the other group was presented with same concepts but in a series of guided inquiry based science lab investigations.

Mark Barone Prattsburgh, NY Cohort 1

Social Dynamics of Effective Collaborations in Science Labs at Prattsburgh Central School.

This highly motivating Action Research used a combination of interviews and surveys to fine tune hands-on instruction in New York State required Earth Science Labs. The diverse, rural student population showed significant gains in their comprehension of Earth Science concepts and improved skill performance in lab applications. Earth Science students developed substantial results as an outcome of team coordinated instruction.

Mariano Buttitta North Brunswick, NJ Cohort 2
Implementing Inviting Classroom Practices

Action Research determined which behavior characteristics specifically motivate students to learn, and to utilize the four guiding principles of Invitational Education.

Shakira Castronovo New York, NY Cohort 1
Seeing Science: Can Independent Research Projects Increase a Positive Attitude and a Personal Connection to Science?
Students selected independent research projects. The students' attitudes towards science seemed to become more open after they started their projects. The students who did not work on independent research projects continued to view science in the same way. The students who chose to work on the independent research projects changed their perceptions of science, and seemed to accept that science could be part of their daily lives.

Lisa Chizek Traer, IA Cohort 2
Helping Students Become More Self-Directed Learners

Action Research focused on trying to help students take charge of their own learning and be less teacher dependent. Awareness and self-reflection helped both the educators and students change their behaviors to increase self-directed learning in our classroom.

Teresa Clower Memphis, TN Cohort 4
Music, Movement, and Science (MMS): Reaching Urban Learners through Music and Kinesthetic Learning.

Action Research questioned what influence music and kinesthetic learning play in engaging urban learners and their perception of science education.

Trevor Deighton Pre-Service Cohort 3
Comparing New, STEM and Old Science Strategies for Teaching and Learning

STEM Action Research was a pre/post survey of learning for an inquiry-based versus traditionally based physics curriculum. Research specifically focusing on learning outcomes for ELL students.

Gioya De Souza Fennelly New York, NY Cohort 1

Action Research Title: Using STEM Layered Curriculum Activities to Teach ELL's Science.

Students chose activities from Layers "C","B" & "A" to demonstrate their mastery of science concepts through the use of differentiated, multi-media presentations and oral defense.

Julio De Jesus Gurabo, PR Cohort 2
Effects of Classroom Lighting Type upon Students Concentration and Focus

During the implementation in a former school of an electricity economy policy requesting teachers to rely as much as possible of daylight in the classrooms, an improvement on student's attention and performance was noticed. Upon moving into a new school with the extreme scenario of a closed classroom with only fluorescent lighting available, research was to conduct a qualitative study to replicate and document previous findings. Researched showed that changing light quality by substituting fluorescent lights with full spectrum alternatives is followed by an improvement of student's academic performance.

Chris L. DeWolf Remus, MI Cohort 2
The Impact of Online Professional Learning Communities on High School Climate Change Education.

NASA Endeavor Action Research project leveraged involvement in both the Endeavor program and the Lifelines for High School Climate Change Education project with an interest in teacher professional development. Project was attempting to learn whether or not an online professional learning community (PLC) would be an effective vehicle for teacher professional development, or if the many demands on a teacher's time both inside and outside the classroom would lead to less engagement with the PLC.

Pamela Dresher Santa Monica, CA Cohort 1
The Use of Formative Assessment with 5th Graders in a Lab Based Setting

Action Research evaluated metacognitive skills and academic performance in 5th grade science students.

Dianne Dworzan Hollywood, FL Cohort 3
A Study of Implementation: Content and Pedagogy

NASA Action Research project studies effectiveness of a 2 - 3 week unit on Hot Air Balloons. The unit provides teachers with materials and activities related to understanding "lighter than air flight" through hands-on and interactive buoyancy and density labs, followed by design process activities that provide students with the opportunity to design, construct, and test Hot Air Balloons, applying the concepts of buoyancy and density learned during the labs.

Darcie Fregoe Massena, NY Cohort 2
Reflective Journaling in the Science Class

Endeavor Action Research project was designed to actively engage students by helping to guide them to a greater understanding of science content material, to reflect on what they read, and to effectively communicate what they learned. The students had the opportunity to extend their thoughts and understandings of the information, and

develop their critical thinking skills in an attempt to raise their grades on local assessments and to increase their level of engagement in the learning process.

Frances Fries South Daytona, FL Cohort 3
Tweaking Science Teaching Methodologies will Promote Student Understanding of Science Vocabulary Words

Teacher provided a science learning target resource and defined vocabulary word resource that my students and their parents could refer to everyday. Teacher created open ended questions with targeted science vocabulary word sets. Students were instructed to read informational text and explain a targeted science concept using the science vocabulary set provided. This type of formative work quickly reflected each student's understanding of the science vocabulary word and the science concept being explained.

Julie Gabrovic Long Wood, FL Cohort 1
Semi-departmentalizing in Elementary Schools: Impact on Teacher Attitudes Toward Teaching Science and Student Attitudes about Science.

Action Research chose to find out if Semi-departmentalizing has an impact on teacher attitudes toward teaching science and student attitudes about science? Project focused on two grade levels at a school, one that has been semi-departmentalizing for many years (fifth grade) and one that had just begun to semi-departmentalize (fourth grade). Project used student questionnaires, teacher interviews, and administrator interviews to collect information. At Wekiva Elementary, study showed that semi-departmentalizing in the 4^{th} & 5^{th} grades has had a positive impact on the teaching of science.

Elizabeth Gilmore Hoover, AL Cohort 2
How Do Struggling Students Perform during Engineering Design Challenges?

The NASA Action Research conducted in a 5^{th} grade classroom focused on identified struggling students in both reading and math. By using engineering design in classroom instruction, study wanted to see if it was providing success for ALL students in my classroom. By looking at results study was able to see gaps of misconceptions and to analyze value using design challenges in the classroom.

Steve Heck Milford, OH Cohort 2
How will 6th Grade Earth Science Students Respond to Studying Rocks and Minerals Using the Planet Mars as the Vehicle of Study?

It is a NASA Mars Missions inspired project that looks at an innovative way to inspire our next generation of scientists. Middle school students investigated the Earth Science concepts of Rocks and Minerals using Mars as a research center. This is accomplished using NASA Mars data and discoveries from Mars Odyssey to Mars Rovers (NASA videos, pictures, websites), culminating with Mars Curiosity's launch and landing.

Christina Hill St. Petersburg, FL Cohort 1
The Impact of Computerized Instruction on Students' Science Achievement

NASA Endeavor Action Research was based on how technology can be used to support and enhance learning for 153 sixth grade students enrolled in an Earth/Space Science course. Data was collected through the use of pre-test and post-test responses, observations - student engagement, student collaboration, and the intellectual challenges of the lesson. Data analysis yield a percentage growth in academic achievement for all 153 students enrolled in the course. The effectiveness of educational technology on student learning depends on how the technology is integrated into instruction.

Jeffrey Johnson Salem, WI Cohort 1
Using Technology to Increase Science Knowledge and Engagement

"I used to think that as a science teacher who uses the "technology to increase student learning and interest" issue was just something that I had a problem with. Upon doing Action Research, I found that the issue of trying to increase student science scores and interest levels through the implementation of technology within the science classroom is one that many educators and researchers have found to be intriguing. I moved away from textbook and worksheet teaching to teacher facilitated-student driven learning through the use of technology."

A couple of years after the Endeavor Fellowship, the middle school has gone to a one-to-one technology initiative. Each student has a Chromebook to work on and use for STEM learning.

David Kujawski East Walpole, MA Cohort 2
What are My Grade Six Students' Present Understandings of STEM Careers and the Academic Choices that They have after High School?

Endeavor Action Research asks students to describe their understanding of STEM as a career option. Students were asked to to describe their understanding of higher education and the difference between various degrees. Students had limited or misinformed knowledge of higher education and STEM careers.

Tamara McDonald Salida, CO Cohort 3
How do Computers and Websites Impact Student Learning?

Wanting to know more about how computers and websites might impact elementary students' learning and self-motivation, this Action Research study takes an in-depth look at student behaviors and achievement during a month-long space unit conducted solely in the computer lab. Students not only enjoyed the unique web-immersion format, but also outscored the other fourth grade classes.

Alicia Madeka Hammond, IN Cohort 3
Addressing STEMphobia - Easing Away Your Fears

NASA Endeavor Action Research allowed teachers to address the "fear factors" surrounding the integration of STEM into the everyday classroom. Colleagues participated in a 2-hour workshop that began with a comprehensive look at STEM and the urgent need for implementation at every grade level, and eventually were guided through the design process through two engineering activities. Several types of resources including websites, worksheets, project ideas and materials were provided to all grade levels to ensure a smooth start for each teacher. Survey results were gathered. Follow-up with support is an on-going process.

Marilyn Ortiz Jersey City, NJ Cohort 1
Implementation of the Engineering Design Process Inclusion Class in Webb Elementary School

The purpose of this NASA Action Research was to identify any changes in interest and understanding in science after implementing an engineering project. The engineering design process would be implemented into the science curriculum. This is a five step process: ask, imagine, plan, create, and improve. The goal is to improve the students' interest in science and related fields. The study consisted of two groups of participants: experimental group and comparison group. The fifth grade inclusion class was the experimental group. The classes consisted of a diverse group of students which are at different academic levels.

Angeline Pesky-Brown Gibbon, NE Cohort 1
Can Entomophobia be Reversed in Female Students in a Classroom Setting?

Action Research project centered around girls and their aversion to insects/arthropods. During the project, teacher slowly educated girls about insects and introduced them to live specimens first without touching (in Petri dishes) and then with contact. At the conclusion of the study 2/3 of the girls studied said that the classroom exposure cured their fear of these organisms.

Soi Powell Evansville, IN Cohort 2
Assessing Critical Thinking Skills with Performance-Based Assessments in the Elementary School Classroom

Summative assessments for science learning by elementary school students are primarily based on the students' development of reading/language skills. The development and use of rubrics gives validation to performance or formative assessments which are authentic measures of student learning.

Maggie Prevenas Makawao, HI Cohort 3
Ho'okele Wa'a: Creating a Community of Learners by Respecting Culture and Place

Action Research focused on how culture based education helped eighth grade male science students in Hawaii acquire skills in communicating and working together as well as science concepts. An interdisciplinary unit (IDU) integrated Hawaiian culture, science, and performing arts to teach students basic understanding of major source of energy on Earth; how energy is transferred; and energy movement through waves. Science concepts were transferred using native intelligence and performing arts into a metaphor that students used to describe navigating the ocean using personal 'mana' (energy).

Lesa Roe Leesburg, FL Cohort 1
Does having a Designated Science Teacher at the Elementary Level Help Close the Learning Gap in the Area of Science?

Science is a weak area of instruction at the elementary level. This is most often due to lack of time, lack of materials or lack of teacher training. Action Research studied how this was resolved.

David Rothauser New York, NY Cohort 1
The "T" in STEM: Integrating Technology into a 9th Grade Science Class

Most students were excited initially at the prospect of using computers in science class. A handful of students (under 10%) did not have access to the Internet at home. How would this subset of students feel about using computers for schoolwork? Would their desire to learn with computers change over the course of the year?

Margot Solberg Quito, Ecuador (U.S. School) Cohort 4
How Can Young Girls be Motivated to Engage in STEM

Through an accumulation of pre-, formative and post- data, as well as the implementation of research-based strategies, recommendations for the classroom are provided for educators, with the objective of increasing STEM engagement and success for young girls in elementary school. The ultimate objective is to encourage instructional strategies in the classroom which will, in the long run, increase the percentage of women pursuing degrees and careers in STEM.

Nicole Spain Sanford, FL Cohort 3
Eat Up Engineering! Students Learn About Engineering Through A Structured Lunch Club.

An engineering lunch club for fifth graders was the focus of this Action Research study that demonstrated the power of students working together using the NASA Engineering Design Process. Formerly withdrawn and struggling students in a low-income, crime-ridden community were able to build their confidence and find success in the club, the majority seeking out engineering courses in their future middle schools

Carolyn Stiles Hillsboro, NH Cohort 1
*Do Changes in the Details of a Written Explanation of Science Experiments or Investigations by Fourth Grade Students Occur when the Experiments or Investigations are Repeated as Homework**?***

Fourth grade students sometimes lack descriptions in their written explanations of experiments or investigations. This NASA Action Research project determined if, after repeating the classroom experiment or investigation, students' descriptions of the experiment or investigation changed in any way. By being more comfortable with the experiment, would students would increase the details of their descriptions.

Deborah Wasylik Orlando, FL Cohort 2
The Common Board Configuration

With the advent of new forms of teacher evaluations, instructors have been forced to adopt new techniques in their classroom, including posting the Common Board Configuration (Learning Goals, Essential Questions etc) for student reference. This Action Research looks at the efficacy of this practice in the science classroom when Florida required Common Board Configuration as part of the newly implemented Marzano Method to meet the requirements of Race to the Top."

Michele Wiehagen Tampa, Fl Cohort 3
STEM for all!

This Action Research project focused on the perceptions that teachers and special needs students (ESE students) have in relation to STEM lessons and design challenges.

Laura Wommack Potlatch, ID Cohort 3
The Benefit of Assigned Seating in Small Rural School Districts

Action Research project pertained to observing whether assigned seating and seating arrangement seems to be effective in classroom management in very small rural school districts (20 to 30 students per grade) where most students know each other. Assigned seating is commonly thought to be one method of aiding in classroom management but informal observation over the years had indicated it didn't seem to do much because all of my students knew each other well and were willing to talk with nearly anyone they were seated next to. Most information on classroom management comes from larger more typical school districts and not from small rural schools.

Roy Lander Atlanta, GA Cohort 3
Cooperative Learning in Contextual STEM Learning Situations

Action Research project examines the effect that cooperative learning groups have on student engagement in an inquiry driven unit on oceans in a 6th grade Earth science classroom of 18 minority students. A variety of qualitative and quantitative sources are used, including teacher observations, student surveys, pre and post assessments, student artifacts and student interviews.