# Award 1347640-Annual Project Report

## I. Accomplishments- What was done, What was learned?

### What are the major goals of the project?

The expected outcomes from the STEM Professional Academy to Reinvigorate the Culture of Teaching (SPARCT) program continue to be (as noted in Y1):

(1) Enhanced scholarship of teaching and learning (SoTL) by SPARCT faculty.

(2) Improvement of evidence-based practices targeting the introductory STEM classroom.

(3) Development of long-term FLCs in STEM instruction.

(4) Development of professional peer-observation strategies for the STEM classroom.

(5) Enhanced student learning in introductory STEM courses as a result of SPARCT faculty development.

### What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?

**Major Activities**

**Year 4 (9/2016-8/2017):**

**Sept. 2016 – Aug. 2017.**

Planning, Development, and Research. The third SPARCT Faculty Learning Community (FLC) series of monthly meetings and the fourth SPARCT STEM Summer Academy (May 2017) were developed and planned. Approximately monthly 90 min. meetings with the planning team occurred during the academic year 2016-2017. The planning committee consisted of Drs. Frost (PI, Whitaker Center, Arts and Sciences), Greene (Sr. Personnel, College of Ed.), Johnson (Dept. of Mathematics, Arts and Sciences), Kunberger (Civil Engineering, College of Engineering) and Ms. Tanya Huffman (Mathematics, Arts and Sciences). A minimum of 6 hours of planning meetings (does not include individual time outside meetings) has been documented. Because we are now on a no-cost extension, we did not have any further evaluations of the programming completed, however we do continue to communicate with our evaluator and she still visits campus to evaluate another program for the Whitaker Center and is kept up-to-date on SPARCT.

During the course of the third year of SPARCT, at intervals, we asked the participants in the third cohort to reflect on their SoTL projects, their observations, and their experiences in the classroom with evidence-based practices. In year 3, we collected a total of five video segments.  One of us (Dr. Greene) spent time transcribing the videos. Our goal this year was to prepare for a journal submission based primarily on the work of our first two years, but including the third year where applicable. Our work was divided into areas as: 1) statistical analysis of student surveys; 2) qualitative analysis of video statements by SPARCT participants (transcribed by Dr. Greene); and 3) statistical analysis of faculty feedback from the academy and FLC meetings, and 4) examination of trends in DFW rates in introductory STEM courses containing SPARCT faculty as instructors.

(1) Enhanced SoTL by SPARCT faculty.

The five members of the SPARCT 2016 group engaged in a SoTL project in an introductory course they were teaching during the 16-17 academic year.  One of the five members was unable to continue with the programming for personal reasons during the Spring of 2017. One of the five members presented the results of her project at a meeting in the summer of 2017.

(2) Improvement of evidence-based practices targeting the introductory STEM classroom. Faculty were asked to consider using an evidence-based practice in their targeted classroom. All 5 members of the 2016 SPARCT cohort described using an evidence-based practice in their targeted classroom. Even the faculty member who did not continue until the end of the programming had begun using practices prior to discontinuing.

(3) <u>Development of long-term FLCs in STEM instruction.</u> During 2016-2017 we offered a SPARCT FLC open to any STEM faculty member, but targeted to the STEM faculty who had participated in SPARCT. Members of the SPARCT planning committee still met separately with the SPARCT 2016 cohort to debrief about their projects and classroom observations in October and December of 2016. They also met individually with the PI to record a final video regarding their SPARCT experience in April 2017. The FLC programming during the 2016-2017 academic year included four guest speakers who gave seminars on STEM Education topics and workshops on IRB, academic writing, and Team-Based Learning (See attached schedule).

(4) <u>Development of professional peer-observation strategies for the STEM classroom.</u> The 2017 SPARCT cohort faculty were asked to perform observations during both the fall and spring semesters. Each faculty member was asked to perform two observations (one in their discipline and one outside of their discipline) and be observed twice during the academic year. Faculty were encouraged to consider selecting items from the RTOP protocol when having their classroom observed to focus the observer's attention on certain classroom items. Observers completed a one-page Strengths-Improvements-Insights form at the conclusion of their observation and provided a copy to the person they observed and to the SPARCT planning committee.

(5) <u>Enhanced student learning in introductory STEM courses as a result of SPARCT faculty development</u>. The SPARCT participant SoTL projects are directed toward understanding whether use of evidence-based practices enhances student learning in their introductory STEM courses. One of the 2017 participants has presented this evidence.

**May 2017.**

The fourth SPARCT STEM Summer academy was held over 4 days with 16 hours of instructional time for eight STEM faculty members. Because we are phasing out the NSF support, we were able to provide the third and fourth cohorts some summer salary for their participation which effectively closed out the participant support ($545 each). These faculty also received a commitment on the part of the Whitaker Center to support travel to present on any professional work (SoTL project) resulting from their participation in SPARCT. The Co-PIs each presented a session during this four-day academy. Other presenters included Dr. Greene and Dr. Susan Cooper, Asst. professor of Science Education. (See attached SPARCT schedule 2017 for a list of topics including evidence-based practices.) There were 8 participants, from the following disciplines: Chemistry (2), Environmental Sciences (1), Mathematics (5). Participation over the four academies is distributed as follows: Geology (1), Physics (3), Biology (4), Chemistry (7), Marine and Env. Sciences (8), Engineering, (7), Mathematics (15).

**June 2017-August 2017**

The planning group worked on summarizing the work from the first three cohorts for a presentation and a journal article.

**Specific Objectives**

**Y4-2017**

Specific objectives of Y4 as they fall under the goals were as follows:

(1) Enhanced scholarship of teaching and learning (SoTL) by SPARCT faculty.

Objective 1 – Track participant progress through their SoTL projects via analysis of video reflections during the academic year.

Objective 2 – Record the number of presentations delivered by SPARCT participants

(2) Improvement of evidence-based practices targeting the introductory STEM classroom.

Objective 1 – Track participant progress through analysis of video reflections during the academic year.

Objective 2 – Examine results of Postsecondary Instructional Practices Survey (PIPS) taken pre- and post SPARCT year by the Year 2 (2015) SPARCT cohort.

(3) Development of long-term FLCs in STEM instruction.

Objective 1 –Attend monthly meetings to develop an FLC culture among SPARCT participants.

Objective 2 – Continue the SPARCT meetings during Year 4 and open presentations to all STEM faculty focusing on SPARCT participants 2014-2017.

(4) Development of professional peer-observation strategies for the STEM classroom.

Objective 1 – Track number of observations done during Fall and Spring semesters.

Objective 2 – Determine the impact peer observations have on SPARCT faculty through examination of the three years of transcripts.

(5) Enhanced student learning in introductory STEM courses as a result of SPARCT faculty development.

Objective 1 – Examine the grades of SPARCT and non-SPARCT faculty teaching introductory STEM courses between 2012-2016 to look for any increases in student success.

**Significant Results:**

**Y4-2016-2017.**

(1) Enhanced SoTL by SPARCT faculty.

Objective 1. Based on the qualitative analysis from video transcripts, all five members of the SPARCT 2016 group engaged in a SoTL project in an introductory STEM course during the 16-17 academic year. Those who completed research projects resulting in a conference presentation, unequivocally articulated they would not have completed the project without being involved in SPARCT.

When examining SPARCT participants to date, close to 90% of participants listed "becoming familiar with SoTL" as a reason they would give for a colleague to attend SPARCT.  We have reached saturation and have internal validity and now participants are actually encouraging their colleagues to participate because of the opportunities and support for SoTL project. The more recent participants state in their first video that SoTL is a goal and verify in their last video that SoTL is a reason that others should participate.

SPARCT participants continue to appreciate the efforts by the SPARCT facilitators to help with the IRB process as most participants were not aware of the process or how to acquire IRB approval prior to SPARCT attendance.

Objective 2. Of the five faculty in the 2016 cohort, one presented the results of their SPARCT SoTL project in June 2017 at a professional conference. We also had 7 presentations by faculty in the 2015 cohort and 3 presentations by faculty in the 2014 cohort during Year 4. (see products)

To date, we know that 5/16 (25%) of the SPARCT 2015 faculty have presented or intend to present on their SoTL activities as a direct result of their participation in SPARCT. Six of these presentations are external (two faculty have now presented twice, adding information to the second presentation) and two more presented in 2016 at an internal teaching and learning conference. To date 12 of the 16 (75%) SPARCT 2014 faculty have presented on their SPARCT activities.

Additionally, the planning team (Frost, Greene, Huffman, Johnson, and Kunberger) authored a paper on the SPARCT findings which was submitted to the *Journal of STEM Education* and Dr. Frost presented preliminary findings at the Network for STEM Education Centers (NSEC) annual conference June 2017 in New Orleans, LA.

(2) Improvement of evidence-based practices targeting the introductory STEM classroom.

Objective 1. Faculty participants in Year 3 brought the total to 36 SPARCT participants. Based on transcripts of video recordings, all 36 reported introducing an evidence-based practice into their classroom strategies. The most common themes emerging indicated participant success in: (1) integrating more formative assessments into their classroom, (2) using research from the science of learning to support student learning, and (3) developing an awareness that lecture alone was not an optimal classroom practice.

Objective 2. During Years 2 (2015) and 3 (2016) we administered the PIPS survey (Walter et al., 2016) in a pre-post-format: immediately after a faculty member was selected for SPARCT and at the end the following April. Faculty were asked to consider their SPARCT course for the purposes of completing the survey. Nineteen (90%) of the 21 faculty completed the survey before and sixteen (76%) completed it after SPARCT. The survey consists of 24 statements that describe instructional practices for which participants give ratings on a scale of 1-5, with 5 being "very descriptive of my

teaching" and 1 "not at all descriptive of my teaching." Ratings for most statements did not have a consistent statistical change. However, the ratings in pre- vs. post-SPARCT for two statements (1 and 10) indicate major shifts. Namely, after SPARCT, *more* faculty rated lecture-style elements (Statement 1) as "not at all descriptive" and *fewer* rated constructivist-style elements (Statement 10) as "not at all descriptive"—faculty shifted their ratings from the extremes of a 4 or 5 for Statement 1 and a 1 or 2 for Statement 10. These results suggest movement away from strictly lecturing and toward more constructivist teaching strategies.

 (3) Development of long-term FLCs in STEM instruction.

Objective 1. During 2016-2017 most months we offered multiple opportunities per month for SPARCT FLC engagement to accommodate scheduling conflicts. (see attached schedule)

Objective 2. During 2016-2017 we opened the SPARCT FLC to all STEM faculty, targeting the SPARCT participants. Of the 31 faculty still at the university from the previous cohorts, 16 (52%) attended at least one FLC event during the 2016-2017 academic year. SPARCT 2016 faculty also attended the FLC as their schedules allowed.

(4) Development of professional peer-observation strategies for the STEM classroom.

Objective 1. Classroom observations also supported changes in instructional practices. During Year 1 we had 70% compliance for this task; however, for Years 2 and 3 we had over 90% compliance.

Objective 2. We saw five themes emerge from analysis of the video recorded reflections of the observations over the three years of SPARCT. The participants gained:
>    (1) new insights into student engagement and motivation,
>    (2) awareness of the impact of situational factors such as physical classroom space, number and seating choices of the students, and pedagogy choices instructors make,
>    (3) new ways to use evidence-based approaches,
>    (4) comfort being observed by peers, and
>    (5) value in the observation experience.

(5) Enhanced student learning in introductory STEM courses as a result of SPARCT faculty development.
We examined course grade data from Fall 2012-Spring 2016 from SPARCT faculty vs. non-SPARCT faculty in core STEM introductory courses. We examined 449 sections of the following introductory courses: Biology I (98 sections), Chemistry I (46 sections), Physics I (30 sections), Business Calculus (64 sections), and Statistics (211 sections). These courses enrolled 22,969 students. We looked at the numbers of D, F, and W grades (DFW) as one indicator of student success and learning. We examined this data set for trends in DFW rates for
- individual SPARCT faculty sections, pre- vs. post-SPARCT training, and
- non-SPARCT vs. the SPARCT faculty sections post-SPARCT.

We found no correlations between DFW rates and SPARCT training during the period under examination.

We also considered the student perspective in identifying the possible impact on learning. For this reason, SPARCT faculty administered a short pre- and post-survey to students enrolled in their targeted course during the semester(s) in which the faculty were implementing a change in instruction. The pre-survey asked students their major, interest in the course, and confidence with course content. The post-survey asked whether students were considering changing majors as a result of taking the course, their interest in the course, and their confidence levels before vs. after taking the course. All SPARCT faculty participated at least one semester in administering the surveys.

From Fall 2014 through Spring 2016, 36 sections of a variety of introductory STEM courses administered the surveys representing 1840 student surveys.

A paired-samples t-test was conducted to compare student interest levels before and after the course. There was a significant difference in the scores for before ($\bar{x} = 2.97$, $s = 1.266$) and after ($\bar{x} = 3.38$, $s = 1.205$) student interest levels; $t(1840) = -15.262$, $p < 0.0001$. These results suggest that student interest levels increased, *95 % CI [-0.471, -0.363]* when students took a course taught by an instructor in the SPARCT program.

A paired-samples t-test also was conducted to compare student confidence levels before and after the course. There was a significant difference in the scores for before ($\bar{x} = 2.83$, $s = 1.217$) and after ($\bar{x} = 3.579$, $s = 1.051$) student confidence levels; $t(1840) = -22.774$, $p < 0.0001$. These results suggest that student confidence levels increased, *95 % CI [-0.811, -0.683]* when students took a course taught by an instructor in the SPARCT program.

**Key Outcomes or Other Achievements:**

**Y4-2016-2017**

The submission of a journal article describing SPARCT and its accomplishments was a key outcome for the SPARCT planning team this past year. The paper is under review as of this writing.

## What opportunities for training and professional development has the project provided?

During the 2016-2017 year the SPARCT program provided training in academic writing and Team-Based Learning as part of the SPARCT FLC.

Some SPARCT participants requested travel funds to attend professional development opportunities. One member of the SPARCT 2015 cohort travelled to a Regional POGIL workshop. Another member of the SPARCT 2015 cohort participated in the Earth Educator's Rendezvous, a workshop for Geology faculty.

## How have the results been disseminated to communities of interest?

Dr. Frost presented our SPARCT findings at a session at the National STEM Education Centers Conference in New Orleans, LA. The SPARCT planning team along with our external evaluator submitted a journal article to the Journal of STEM Education for publication.  We have updated our website with several pieces of this information.

## What do you plan to do during the next reporting period to accomplish the goals?

(Goal 1)  We continue to encourage all SPARCT faculty in their SoTL projects. We are hoping to wind down the few travel dollars that we have left to support participant travel in the next couple months. SPARCT still continues and will continue to bring in speakers and host the May academy as part of Whitaker Center programming.

(Goal 2)  All SPARCT participants and non-SPARCT STEM faculty are invited to attend monthly Faculty Learning Community sessions during the upcoming academic year (2017-2018). Separate meetings with the SPARCT 2017 cohort will be scheduled to discuss participant progress toward the use of evidence-based practices in their classroom.

We continue to administer the Post-secondary Instructional Practices Survey (PIPS) and will continue to include more cohorts in the analysis.

(Goal 3) We have established the SPARCT FLC for 2017-2018 in conjunction with the FGCU Teaching and Learning Center for all STEM faculty. We also continue to facilitate a POGIL FLC and a SoTL FLC.

(Goal 4)  We continue to conduct observations among SPARCT cohorts and have offered this to the FLC this year as well.

(Goal 5)  We continue to offer the student interest and confidence surveys to the SPARCT cohort and have offered this to the FLC as well.

## II. Products - What has the project produced? (blue are new for Year 4)

Brooks, C.D.; Huffman, T. (2015). *Changing Teaching Practices to Influence Attitudes and Success in Mathematics*. SoTL Commons Conference. Savannah, GA.

Frost, L.; Greene, J.; McCulloch, E.; Serro, L. (2015). *Vertical and Horizontal Assessment of a STEM Professional Development Academy Using Videos*. SoTL Commons Conference. Savannah, GA.

Frost, L. (2015). *SPARCT: A Faculty Development Program Focusing on Introductory STEM Courses*. Science and Mathematics Teacher Imperative (SMTI) Conference. New Orleans.

Geiger, C.; Kunberger, T. (2015). *From Catch-all to Clarity: Revising a First-Year, Multidisciplinary Introductory Course*. ASEE 122nd National Conference. Seattle, WA.

Gonzalez, F.; Zalewski, J. (2015). *FAST Learning: Follow Accomplishments of Senior Teams*. ASEE 122nd National Conference. Seattle, WA.

Goodson, L.; Frost,L. (2015). *Developing and Evaluating a STEM Professional Academy and SoTL Culture*. SoTL Commons Conference. Savannah, GA

Lura, D.J.; Badir, A.; O'Neill, R. (2015). *Homework Methods in Engineering Mechanics*. ASEE 112nd Annual Conference. Seattle, WA.

Zalewski, J.; Gonzalez, F. (2015). *FAST Learning: A New Didactic Method in Software Engineering*. EDUCON 2015, IEEE Global Engineering Education Conference. Tallinn, Estonia.

New products loaded for 2016 report highlighted below:

Shadle, S.; Ortquist-Ahrens; L., Serro, L.; Sagmiller, K.; Ouellett, M.; Beach, A. (2015). Catalyzing Institutional Change: A Model for Effective Practice. POD Conference 2015 Interactive Session, San Francisco, CA.

Frost, L.; Greene, J.; Serro, L. (2015). SPARCT: A Faculty Development Program to Transform STEM Teaching Culture. AAC&U STEM Meeting, Seattle, WA.

Frost, L. (2016). STEM Professional Academy to Reinvigorate the Culture of Teaching (SPARCT). Plenary Rapid Talk, SMTI-National STEM Education Center Conference, San Antonio, TX.

Frost, L. (2016). STEM Professional Academy to Reinvigorate the Culture of Teaching. Poster Session. AAAS/NSF Conference on Envisioning the Future of Undergraduate STEM Education: Research and Practice, Washington, DC.

Girimurugan, S.B. (2016). Which is better in teaching probability and statistics? Conceptual change model or team-based learning? Engaging and Learning in Authentic Environments Conference, UBC, Okanagan.

Huffman, T. (2016). Brooks, C. (co-author). Project Based Learning as a Successful Approach to a One-Semester Calculus Course. Joint Mathematics Meeting. Seattle, WA.

Cassani, M.K.; Wilkinson, A. (2016). Role Play in Large Enrollment STEM. SoTL Commons Conference. Savannah, GA.

Kunberger, T., & Frost, L., & Greene, J. (2016, June), *Integrating a Faculty Summer Workshop with a Faculty Learning Community to Improve Introductory STEM Courses* Paper presented at 2016 ASEE Annual Conference & Exposition, New Orleans, Louisiana. 10.18260/p.25781.

Gonzalez, F., Guo, D., Nowicki, A., Zalewski, J. (2017). *Senior Lab Projects for Teaching the Internet of Things in a Software Engineering Program* presented at 4th Conference of e-Technologies in Engineering Education (eTEE 2017) Zeszyty Naukowe Wydzialu Elektrotechniki I Automatyki PG, Gdansk, Poland, April 2017.

Zalewski, J. and Gonzalez, F. (2017). *Online Course on Cyberphysical systems with Remote Access to Robotic Devices*, paper delivered at the 14th Int'l Conference on Remote Engineering and Virtual Instrumentation, Columbia University, NY, March 2017.

Zalewski, J., Guo, D., Kenny, R., Wang, X. (2017). From Embedded Systems to Cyberphysical Systems to the Internet of Things: Consequences for STEM Education, International Journal of Computers, 11, p. 48-53.

Frost, L., Greene, J., Huffman, T., Johnson, B., Kunberger, T. (2017). SPARCT: Results and Sustainability of an Interdisciplinary STEM Faculty Development Program. Concurrent Session at SMTI-NSEC Conference, New Orleans, LA. June 2017.

Demers, N. (2017). POGILizing Activities in General Biology I. North Central POGIL Regional Workshop. St. Paul, MN.

T. Kunberger and C. Geiger, "The Impact of Near-Peer Mentoring on Self-Efficacy in an Introductory Engineering Course," 2016 IEEE Frontiers in Education Conference, Erie, PA, October 2016.

C. Geiger, T. Kunberger, and J. Greene "Development of a Training Workshop for Undergraduate Mentor TAs in an Introductory Engineering Course," 2017 American Society for Engineering Education Annual Conference and Exposition, Columbus, Ohio, June 2017.

T. Kunberger, J. Dobbs-Oates, M. Marshall, and J. Greene, "The Mentor Experience: Undergraduate Near-Peer Mentor Outcomes Across Two Institutions," 2017 SoTL Commons Conference, Savannah, GA, March 2017.

Phillips, J., "Student's perceptions of choice versus prescribed service-learning projects", Lilly Conference – Evidence-Based Teaching and Learning, Bethesda, MD, June 2017.

Barbosa, A. "Utilizing Team Based Learning to improve student's engagement and critical thinking in physical geology lecture", Geological Society of America, Denver, CO, Sept. 2016.

Abercrombie, M. and Barbosa, A., "It is in the syllabus", Poster at the 3rd Earth Educators' Rendezvous, Albuquerque, NM, July 2017.

McManus, G., "Incorporating Team-Based Learning into the General Chemistry Curriculum," 100th Canadian Chemistry Conference, Toronto, Canada, May 2017.

Campbell, R. and Campbell, I. "Development of a LEGO based POGIL activity for improving student's conceptual understanding of limiting reactants", 253rd American Chemical Society Meeting, San Francisco, CA, April 2017.

Girimurugan, S. "Statistical Research on Active Learning in Teaching Statistics", SoTL Commons Conference, Savannah, GA March 2017.

Frost, L., Goodson, L., Greene, J., Huffman, T., Johnson, B., Kunberger, T. "SPARCT: A STEM Professional Academy to Reinvigorate the Culture of Teaching", Journal of STEM Education, *Submitted October 2017*.

The website has been updated to include archived information on the SPARCT program.

## III. Participants & Collaborating Organizations – Who has been involved?

*Here I listed all co-PIs, senior personnel as well as Jackie Greene, Elspeth McCulloch, and Rob Nichols.*

*This area asks for nearest person month worked. A person month is defined as 160 hours. So, if I thought someone put in more than 80 hours over the course of Y4, I gave them a 1. At present, Jackie has a 2 while Laura received a 1 and everyone else has a zero. If you feel you put in more than double that to raise your total over 80 hours, I will raise your person month to 1. This area also outlines the activities that you were involved with, so even if you have a zero listed, whomever reads this will know that you participated, just not more than 80 hours.*

### What other collaborators or contacts have been involved?

We had six visitors provide professional development sessions during the SPARCT 2016-2017 academic year

Ms. Ludwika Goodson, Instructional Design, IPFW - *Identifying Levels of Learning in Assessments*
Dr. Laura Regassa, Georgia Southern University, NSF rotating program officer – *Publishing your SoTL Research*
Dr. Kathleen King – University of Central Florida – *Advance your Academic Writing Skills and Publishing Record: Tips, Tricks and the Secret Sauce*
Dr. Amanda Diekman, Miami University (Ohio) – *Broadening Perspectives to Broaden Participation: Challenges and Opportunities of STEM Stereotypes*
Dr. Diane Ebert-May, Michigan State University – *Evidence-Based Teaching: Just the Facts or Thinking like Scientists?*
Dr. Wayne McCormack, University of Florida – Two Team-Based Learning workshops, beginning and advanced

## IV. Impact – What is the impact of the project? How has it contributed?

### What is the impact on the development of the principal discipline(s) of the project?

*Describe how findings, results, techniques that were developed or extended, or other products from the project made an impact or are likely to make an impact on the base of knowledge, theory, and research and/or pedagogical methods in the principal disciplinary field(s) of the project.*

### Impact on Principal Disciplines (STEM faculty development).

In introductory STEM instruction (as the principal discipline), all 5 SPARCT 2016 participants have introduced an evidence-based practice into their chosen introductory course as a result. All participants gained knowledge in pedagogical methods and indicated through our qualitative analysis that they were able to put this knowledge into practice. The observations were well received by the participants and also made an impact on the participant's own pedagogical practice. While the number of participants was only five in 2016, we are encouraged that the participation level for 2017 increased to eight.

As of this report, we have completed four sessions of the SPARCT summer academy with our grant funded two cohorts completed. There are ~130 STEM faculty at the university who are in departments where STEM introductory courses are taught. Forty-five of these faculty participated in SPARCT. This represents over one-third of this STEM faculty population at FGCU. We are starting to see some change in departments where we have had the most participation. For example, the math department who has had almost half of their full time faculty participate has submitted a grant seeking funding to further examine the teaching in their pre-calculus/calculus I/calculus II series.

**What is the impact on other disciplines?**

*Describe how the findings, results, or techniques that were developed or improved, or other products from the project made an impact or are likely to make an impact on other disciplines.*

FGCU currently has 540 faculty. The SPARCT model for faculty development has included co-PIs and senior personnel from FGCU's teaching and learning center. Some of the practices that have been developed for this programming have been transferable to faculty outside of the STEM disciplines. Because of the success of the SPARCT programming, we have been encouraged to accept faculty outside of STEM disciplines into the SPARCT program. We are willing to do this if the faculty member identifies as a STEM faculty member regardless of their department, but would encourage them to select an introductory course to examine for their SoTL project.

Additionally, we have brought speakers to campus for SPARCT that were able to interact with other faculty at the university during their time on campus. For example, we provided workshops on academic writing offered by the Textbook and Academic Author's Association and Team-Based Learning as a part of SPARCT. These workshops were offered to the general faculty and were well attended.

As SPARCT faculty model evidence-based practice in their classrooms, this has an effect on all disciplines, but especially on education majors who may be taking these courses as examples of effective classroom strategies.

**What is the impact on the development of human resources?**

*For example, how has the project:*
- *provided opportunities for research and teaching in the relevant fields;*
- *improved the performance, skills, or attitudes of members of underrepresented groups that will improve their access to or retention in research, teaching, or other related professions;*
- *developed and disseminated new educational materials or provided scholarships; or*
- *provided exposure to science and technology for practitioners, teachers, young people, or other members of the public?*

We see the impact on human resources as engaging even more STEM faculty through cohort three (SPARCT 2016) in evidence-based practices, observation, reflection, and SoTL research. The planning committee continues to develop as new people come onto the project and others leave FGCU through job opportunities or retirement.

**What is the impact on physical resources that form infrastructure?**

Nothing to report.

**What is the impact on institutional resources that form infrastructure?**

As a result of our Team-Based Learning workshop offering, the office of student affairs is now using Team-Based Learning in all its student leadership courses.

**What is the impact on information resources that form infrastructure?**

Nothing to report.

**What is the impact on technology transfer?**

Nothing to report.

**What is the impact on society beyond science and technology?**

The success of the SPARCT Academy impacts the full university faculty.

The SPARCT Academy presenter, Dr. Wayne McCormack, president of the Team-Based Learning (TBL) Collaborative, delivered two team-based learning workshop to the SPARCT participants and the general faculty in March 2017 based on his popularity in previous years. The Whitaker Center continues to offer book clubs each semester in the Science of Learning and disseminates this information regularly to K-12 teachers through a STEM Summer teacher workshop and other community efforts.

## V. Changes/Problems

**Changes in approach and reasons for change.**

Nothing to report.

**Actual or Anticipated problems or delays and actions or plans to resolve them**

**Y4-2016-2017**

We filed for a second no-cost extension until 12/31/17 allowing us to support travel for dissemination to SPARCT participants who may be seeking to travel to disseminate their SPARCT projects or for other STEM Education professional development.

**Changes that have significant impact on expenditures.**

Nothing to report.

**Significant changes in use or care of human subjects.**

Nothing to report.

**Significant changes in use or care of vertebrate animals.**

Nothing to report.

**Significant changes in use or care of biohazards.**

Nothing to report.