



STEM Annual Report Form FY 2014

Report Narrative Form

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I. STEM Initiative Program Overview

A. Program Implementation and Operation – This section covers the operation of your institution's STEM Initiative Program:

1. Identify and explain the **key programs and projects** (i.e., mini-grant program, FOCUS-derived project, etc.) that comprise the STEM Initiative at your institution. (You will be asked more detailed questions about these later.)

The Georgia Perimeter College (GPC) STEM II Initiative focuses on two strategies:

- Strategy I – Structured Mini-grant program
- Strategy II – Institution-Specific Strategies that deepen STEM student engagement

1.1. Strategy I – Structure of Mini-grant program

The mini-grant program was implemented in two ways: 1) grants for the academic year and 2) for the spring 2014 semester. Although there were submissions for the academic year, it was decided that after review of the budget an additional request for proposals would be done to provide an opportunity to more faculty who wanted to develop and implement smaller projects. This section provides a description of each RFP.

1.1.1. Academic Year Requests for Proposals

The scope of 2013-2014 GPC Faculty Mini-grant Program was aligned with the Board of Regents direction, which was a focus on the objectives of Complete College Georgia and addressing the challenges of STEM gatekeeping courses. Proposals were especially encouraged in the area of improving STEM education in critical gatekeeping courses (MATH 1113, MATH 2431, CHEM 1211, CHEM 1212, etc.) as well as those courses considered gatekeeping in their respective programs of study. The maximum award amount was \$7500.00

The goal of the GPC STEM Faculty Mini-Grant Program is to support faculty who engage in innovative research-based projects that:

- Restructure current instruction delivery models
- Develop new models for building and sustaining effective teaching
- Impact student learning and performance through enhanced learning experiences

The overall objective is to increase by 10% the number of students who demonstrate satisfactory performance (A, B, C) in the overall course, on an educational unit, or course topical area.

Proposals were reviewed by volunteers comprised of STEM faculty from varying disciplines and different campuses. The faculty used the criteria found in Table 1 to review and award proposals.

Table 1. Mini-grant Review Criteria AY 2013-2014	
Faculty Mini-grant Proposal Review Criteria	Possible Points
Identified need is challenging and well documented	15
Clear goals and objectives are included and relate to the goals as outlined in the RFP	20
Proposed activities have potential for broad impact by reaching large numbers of students through collaboration	20
The research plan is well-designed, innovative, based on identified need, and will lead to successful implementation of proposal activities	20
The evaluation plan includes measures for effectively evaluating the project (i.e., measuring student learning, teaching impact)	10
The dissemination plan includes an effective strategy for sharing results (i.e., presentations, publications, etc.)	5
Budget expenditures are rational, justified, and directly linked to proposal activities	10
Total Possible Points	100
Bonus points for focus on innovative strategies designed to meet objective(s) of Complete College Georgia	10

1.1.2. Spring 2013 Request for Proposals

The spring 2014 Faculty Mini-Grant Program was a modified version of the FY 2014 request for proposals, but has a specific focus on pedagogy and learning outcomes critical STEM-related gatekeeping courses. The maximum award amount was \$4000.00.

The overall objective is to increase by 10% the number of students who demonstrate satisfactory performance (A, B, C) in the overall course, on an educational unit, or course topical area. Faculty choosing to submit proposals will select between the following two options:

- Improving performance through utilizing undergraduate teaching assistants
- Improving performance through mastery instruction

Proposals were reviewed by the STEM Executive Director. The criteria found in Table 2 was utilized to review and award proposals.

Table 2. Review Criteria for Spring 2014	
Faculty Mini-grant Proposal Review Criteria	Possible Points
The need is identified and documented	10
Clear goals and objectives are included and relate to the goals as outlined in the RFP	10
Proposed activities have potential for broad impact by reaching large numbers of students	10
The evaluation plan includes measures for effectively evaluating activities (i.e., measuring student learning, impact)	10
Budget expenditures are rational, justified, and directly linked to proposal activities	10
Total Possible Points	50

1.2. Strategy III – Institution Specific Strategies that deepen STEM student engagement

As part of this strategy, GPC's efforts are the following five main activities:

1. Supporting and expanding the MESA Program
2. Developing peer-led undergraduate study (PLUS) sessions to assist beginning STEM students
3. Implementing a STEM student recognition program
4. Implementing STEM career and TAG fairs
5. Increasing student chapters of STEM professional societies

1.2.1. The MESA Program

The GPC MESA program is housed on the Clarkston Campus and is based on the highly successful California MESA Program. GPC MESA students benefit from academic excellence workshops; academic advising/counseling; assistance with the transfer process to a 4-year institution; career advising; summer research/internship opportunities; and, linkages with student and professional organizations. The USG STEM Initiative II provides financial resources for the students in the form of tuition assistance, performance stipends, tutoring in the MESA Center, and expenses associated with technical field trips. During the fall semester, Mrs. Diana McGinnis, Instructor of Mathematics, served as the Coordinator. In the spring 2014 semester, Mr. Stephen Fitzpatrick, Instructor of Geology, joined the MESA staff as a Co-Coordinator. Previous experience has shown that due to the high level of engagement and increase in student participation, a team approach to managing MESA is more conducive.

1.2.2. Peer-led undergraduate study sessions

Since the start of the USG STEM II grant, the Peer-Led Undergraduate Study (PLUS) session program has focused on chemistry. The rationale was that because all STEM majors at GPC must take an eight-hour laboratory sequence of either chemistry or physics and the data showed that most students chose to take chemistry. However, after careful review of the passing rate of the chemistry courses it was found that many students had difficulty successfully completing the courses. Consequently, the PLUS sessions focus has been on assisting beginning STEM majors with successful completion of this course sequence. However, due to the success of the program in past years and its growth with faculty and students, it was decided for AY 2014 to add additional STEM-related courses, which included math, physics and computer science.

Tutors were hired on each campus and supervised by a faculty mentor. The faculty mentor was responsible for training the peer tutor and for providing instruction on specific topics to be covered during the tutoring sessions. The tutorials were held in the Teaching and Learning Center on each campus or in a designated classroom assigned by the instructor. The tutors were required to clock-in and out. Students receiving instruction were required to sign an attendance sheet. Coordination of the PLUS program is handled by Dr. Janna Blum, Assistant Professor of Science.

1.2.3. STEM Student Recognition Program

Each spring, GPC holds its Student of Excellence Awards. However, in order for a student to receive an award, he/she must be nominated by a faculty member and only one award per discipline is awarded. Consequently, the purpose of the STEM student recognition program

was to broaden the scope of students eligible to receive an award and to encourage/promote STEM student excellence.

1.2.4. Implement STEM Career and Transfer Admission Guarantee (TAG) Fairs

GPC understands the importance of STEM career and informational sessions for students, especially first generation students. Therefore, the implementation of career and TAG fairs is important to assist with graduation and transfer goals.

Career Day

It was decided that the STEM Career Fair would be held each spring semester and the Transfer Admission Guarantee (TAG) fair would be held each fall semester. The STEM Career fair was held as part of the College's Career Day in order to conserve resources. The Career Fair is unlike the typical college career fair which only includes recruiters from various companies. The GPC Career fair instead is a Career Day in which there are no "formal recruiters" but career panelists discuss career options and training/academic background needed for careers.

TAG Fairs

TAG is an agreement between GPC and four-year colleges or universities that allows GPC students who meet certain standards to be guaranteed acceptance as a transfer student. GPC has TAG agreements with approximately 35 institutions.

To assist students with the TAG process, college-wide TAG fairs are held during the fall semester. It was decided to partner with the Office of Enrollment and Registration Services to implement special sessions for STEM students during the college-wide TAG fairs. At the TAG fairs, students meet with TAG institution partners.

1.2.5. Increase student chapters of STEM professional societies.

Two student chapters of STEM professional societies were established. The first was Mu Alpha Theta Mathematics Honor Society. The Dean of Mathematics, Computer Science and Engineering serves as the primary advisor for the society and works with campus advisors to identify students and plan campus activities. To be inducted into Mu Alpha Theta, students must have successfully completed at least one mathematics course at or above the College Algebra/ Pre-calculus level. Additionally, students must have a 3.0 GPA overall in all two-year college mathematics courses at or above the College Algebra/Pre-calculus level.

The other professional society established was the National Society of Black Engineers (NSBE). NSBE is open to any student majoring in a STEM discipline at a collegiate institution or graduate level students who majored in STEM as undergraduates.

2. Identify **key personnel** associated with your institution's STEM Initiative program and briefly describe **each person's role**. Be certain to include all personnel whose salaries have been paid, either fully or partially, by STEM Initiative funds. Include any faculty or staff receiving course release time or some comparable form of compensation to participate.

2.1. Executive Director

The role of the Executive Director of the Office of STEM Initiatives is to provide vision and organization for STEM programs at the college and oversee all STEM-related activities. The Executive Director is expected to work closely with STEM deans and faculty, both internal and external project evaluators, and project directors/principal investigators from various externally funded STEM initiatives. The Executive Director has primary responsibility for achieving the outcomes of the USG STEM initiative II, which include increasing student success in STEM "gateway" courses, deepening STEM student engagement in college-wide STEM activities, and improving and increasing collaborations to advance STEM preparation for post-secondary students, current college faculty and K-12 teachers, while also acting in accordance with the financial and administrative policies and regulations associated with the STEM award.

2.2. Peer/MESA Tutors

The role of the tutors is to provide academic support to beginning STEM and MESA students.

2.3. MESA Coordinators

The role of the MESA Coordinator is to provide leadership and vision for the MESA program and its selected students, faculty and staff. The Coordinator will manage and supervise all aspects and day-to-day operations of the MESA Program. The Coordinator will work closely with the Office of STEM Initiatives and PSLSAMP personnel to implement the objectives of the MESA Program as it relates to improving student success and retention for GPC students who have declared a STEM major or who are enrolled in STEM-related courses.

2.4. Other Personnel (supported by GPC)

To help sustain STEM programming at GPC, the institution provides additional support personnel which include:

- *Project Evaluator* – works with Office of Grants and Sponsored Programs on the internal review of programs; documents strengths and weakness; and, makes recommendations for improving success.
- *Administrative Assistant* – assists the Executive Director in the daily operations of the STEM Office; provides general office support, office administration, coordination of special projects, and implementation of projects; and, assists with data collection and report preparation.

3. Identify **partnering departments, offices, or centers** participating in the STEM Initiative at your institution. Briefly discuss their relationship with the STEM Initiative and note any relevant contributions.

The STEM Initiative partners with the following:

- Division of Mathematics, Computer Science and Engineering (MCSE)
- Division of Science
- GPC Foundation
- Early College Program
- The Office of Grants and Sponsored Programs

The Divisions of MCSE and Science play an integral role in the implementation of the USG STEM II Initiative. These two divisions include approximately 200 full-time and 215 part-time faculty members who teach all STEM disciplines offered at GPC. The personnel in these two divisions work collaboratively to host STEM talks and workshops, to implement new teaching pedagogy especially in lower-level division courses to improve student success, to host science fairs (GPC Science Fair) and prepare students for mathematics competitions (AMATYC). Additionally, Division Deans have worked with Department Chairs to include extra incentives for faculty applying for and receiving STEM Faculty Mini-grant awards.

The GPC Foundation and Early College Program worked closely with the Office of STEM Initiatives to implement Career Day 2014. The relationship led to increased involvement with DeKalb Early College Academy.

The Office of Grants and Sponsored Programs plays an essential role in the programmatic maintenance of GPC's STEM initiatives. The two areas work closely together to ensure that the programs implemented are in accordance with the proposal and follow the spending guidelines.

B. Program Successes – This section covers the key accomplishments of your institution's STEM Initiative program during FY2014:

1. Explain how your program has made progress toward Goal 1, **improving the readiness of P-12 students** for STEM in college. (You may wish to draw upon service learning programs, among other efforts. You also may wish to describe bridge programs or similar efforts directed at incoming freshmen.)

To improve college readiness the STEM Initiative supported the following efforts that are discussed in this section: 1) developing partnerships with P-12 schools and 2) high school visitation day.

1.1. Partnerships with P-12

Two memoranda of agreements have been established between GPC and two elementary schools: Dunwoody Elementary and Vanderlyn Elementary. Both schools are seeking to become STEM state certified schools and GPC is serving as their post-secondary partner. While each partnership has independent aims and goals, similar activities in which GPC partners, includes working the schools to: 1) provide students a link between subject area content and industry careers; 2) strengthen STEM instruction within the classroom by establishing a partnership between faculty; and, 3) enhance technology education through helping each to establish a LEGO robotics team through the use of the GPC Computer Engineering and Computer Science club. In addition to the MOUs established, other outreach activities geared toward middle and high school students include partnering with civic clubs to host College Fairs for vulnerable students living in residential car and partnering with DeKalb Early College Academy (DECA) to create a STEM pipeline. GPC faculty partner with DECA faculty on STEM curricula; collaborated to host the first of its kind Early College Math Competition (2014), involving five early college math teams from around the state; serve as judges in the annual Science fair; and, serve as faculty mentors when students transition to GPC beginning their 11th grade year.

1.2. High School Visitation Day

STEM High School Visitation Day (HSVD) began in 2012 and each year since its inception it has grown to include more schools and more students. Communication was sent to local area schools. More schools wanted to participate but due to their budgetary constraints some asked if they could be considered for participation for next year. However, eight schools and more than 100 students participated over the course of FY 2014. The participating schools were:

- Coretta Scott King
- Charles Drew High School
- Jonesboro High School
- Love Joy High School
- Munday's Mill High School
- Stone Mountain High School
- Therrell High School
- Towers High School

The agenda is provided in Table 3 and some results are shown in Figures 1 and 2. Figure 3 provides the grade level of the students attending HSVD.

Table 3. Agenda for HS Visitation Day

Activity	Logistics
OPENING SESSION <i>Dr. Cynthia Lester, Executive Director, Office of STEM Initiatives, GPC</i>	Building SF, Room 2100 9:30 am
SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS TALENT EXPANSION PROGRAM (STEP) - Ms. Naranja Davis	Building SF, Room 2100
THE ADMISSIONS PROCESS MS. DENISE RIXTER, OFFICE OF ADMISSIONS	Building SF, Room 2100
STEM CLASS AND RESEARCH EXPERIENCE <i>Dr. Pamela Leggett-Robinson, Science Department Chair, GPC</i>	Building SB 10:00 am
CAMPUS TOUR <i>STEP Student or STAR Leader</i>	GPC Campus 11:15 a.m.
WRAP UP	GPC Campus 11:45 am
LUNCH	Building SB, Campus Café 12:15 p.m.
RETURN TO SCHOOL	1:00 p.m.



Figure 1. Satisfaction with class/lab research activity



Figure 2. Satisfaction with information sessions

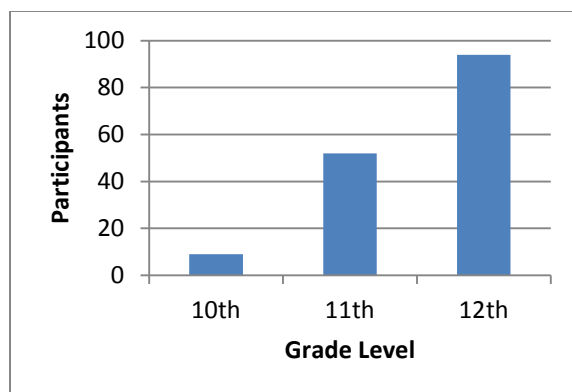


Figure 3. Grade Level of Participants

In conclusion, STEM HS Visitation Day proved to be highly successful. The goals of improving student readiness and increasing awareness of STEM at GPC among high school students were met. An additional goal was also met which included increasing the number of 11th and 12th grade students attending HSVD. The shift in focus to concentrate more on junior and senior level students is in line with college's plan to increase enrollment and strengthen recruitment efforts. Students and counselors agreed that it was a valuable experience, one worth repeating. We plan to continue this activity with more coordination with the Office of Admissions. It is anticipated that in the future the college will sustain this activity and make it part of the regular recruitment efforts.

These outreach activities had engaged 300+ students, faculty, volunteers and staff within the last year and demonstrate the successful impact that partnerships between colleges and P-12 can make on attracting and transitioning students into P-12 students into STEM.

2. Explain how your program has made progress toward Goal 2, **improving student success and completion rates**, by discussing how your program, a) **increased STEM majors**, b) **supported student retention and progression in STEM**, and c) **increased STEM degree completion**.

2.1. Increase STEM majors

Increasing the number of STEM majors at GPC is a priority and a goal that GPC takes very seriously. Consequently, the following activities were conducted to increase the number of STEM majors:

- Continuation of High School Visitation Day
- Active recruitment at GPC Student Orientations and Club Days

2.2. Support student retention and progression in STEM

To support student retention and progression in STEM, GPC did the following:

- Continued the PLUS session tutorials. Four tutors were hired and led tutoring sessions both fall and spring semesters. The tutors engaged approximately 300 students. The results of this effort are described in Section III-C.
- Funded five mini-grant proposals that focused specifically on supporting student retention and progression in STEM and STEM-related courses. The success of the proposal activities is discussed in Section III-A

2.3. Increase STEM degree completion

Table 4 presents activities which have been institutionalized to impact STEM degree completion.

Table 4. Activities to impact STEM degree completion

Activity	Description
Academic advising	Academic advising at GPC is not a formalized activity. However, students participating in STEM initiatives are required to meet with a faculty advisor at least once per semester to discuss performance and progress
Three-year academic plan	Students are required to complete a three-year academic plan and to meet with academic advisors each semester to discuss and update

3. Explain how your program has made progress toward Goal 3, **improving the pre-service P-12 STEM teacher preparation and production.**

Goal 3 is not applicable to GPC because the institution does not award a degree in teacher education. However, the College offers transferable education courses needed for the completion of a bachelor's degree in teacher education.

4. Discuss **other key successes** of your institution's STEM Initiative program.

Two key successes will be presented in this section while the institution-specific projects and their successes will be discussed in Section III-C.

4.1. STEM Study Center

The most notable success of FY 2014 was the partnership with the GPC Foundation to establish the STEM Study Center at Decatur. The STEM Study Center is funded in part by the Fitzgerald Foundation which gave a \$1M gift to the school. The Executive Director was part of the leadership team who worked to secure funds for various projects that fit within the mission of the Fitzgerald Foundation. The contribution to STEM will help to establish the STEM Center and hire additional PLUS tutors.

4.2. MOU with Elementary Schools

Another notable success for the Office of STEM Initiatives was the partnership and MOUs with Dunwoody Elementary and Vanderlyn Elementary schools. GPC had partnered with both schools in the past; however, there was no formal agreement. The establishment of the MOUs solidifies GPC as an educational partner who is committed to helping each become as state STEM certified school.

C. Program Challenges – This section covers challenges that continue to face your institution’s STEM Initiative program:

1. What challenges has your program encountered in **increasing the number of STEM majors?**

As an access institution, GPC serves as an entry point for a large number of students who also choose STEM majors. Many of these students are traditionally underrepresented in STEM fields. The students, based on self-reported data, are “first-generation” students who come also from low-income backgrounds. Researchers state that first-generation students often enter into college with weaker cognitive skills in reading, math and critical thinking. Consequently, the challenge in increasing the number of STEM majors is a complex issue which is intrinsically linked to the aforementioned demographics of the student population. Hence, the question at GPC is not how to increase the number of STEM majors, but how to retain students in STEM disciplines. Therefore, proper career guidance, mentorship and academic intervention, are some of the ways which allow many of these students a chance for success. Our challenge has been finding effective methods for implementation.

2. What challenges has your program encountered in **increasing STEM degree production?**

The two challenges originally reported in the FY 2012 report are still those that impact GPC’s ability to increase STEM degree productions: 1) students transfer prior to earning the associates degree and 2) determining the students who are enrolled in a pathway of coursework that will lead them to a STEM degree.

Students often see GPC as a “transfer” institution; meaning that they can take certain courses and transfer to a 4-year institution to complete their intended degree. Many do not see the benefit in completing all required course work necessary to earn the associates degree. Consequently, the STEM degree production at GPC is lower than at other institutions because these students may transfer without degree completion but complete STEM degrees at 4-year institutions. This issue is being addressed by the upper administration who is working with USG on a “backwards” transfer agreement which will allow GPC to award an AA degree once a Bachelor’s degree is earned from the 4-year institution.

Another challenge encountered in increasing STEM degree production is the definition of a STEM major at GPC. Students can declare a STEM major and enroll in courses, but not make progress toward a STEM degree. Not until a degree audit is done, typically towards graduation, is a student required to confirm a major. Therefore, it becomes quite difficult to determine students who are truly in a STEM trajectory which impacts STEM degree production. Dialogue between the Office of STEM Initiatives and STEM departments continues to address this challenge.

3. Are there any **program-specific** (i.e. mini-grants, service learning opportunities) challenges that your program has encountered?

The program-specific challenge that STEM Initiatives faced during FY 2014 was increasing the number of faculty members who applied for and were awarded funding. In years past, the teaching load was four courses each semester. However, in FY 2012, the teaching load was

increased due to the college's financial situation. This increased teaching load remained in place in FY 2013. Since the college instituted the increased teaching load, the Office of STEM Initiatives has seen a steady decrease in the number of faculty who are interested in the mini-grant program. To address the challenge, the Executive Director presented a workshop on the mini-grant program during faculty development day, lengthened the deadline to apply, and created an additional call for proposals which focused specifically on excellence in instruction. However, these changes only yielded eight proposals being submitted, with four ultimately being funded. As a result, the Executive Director is soliciting input from the STEM department chairs, past mini-grant recipients, and the Office of Grants and Sponsored Programs to address this challenge.

4. Are there any **other challenges** that your program has encountered that you have not described (i.e. departmental buy-in, personnel issues)

The program was still faced with the difficult financial situation of the College during FY 2014. Although the financial situation improved, the increased teaching load, increased service obligations, and working with few resources are still impacting the STEM program.

- D. **Did you implement the STEM Initiative program at your institution as described in your project proposal for FY2013? Please describe any notable changes from the proposal that you made (additional project components, project deletions).**

There are no notable changes from the project proposal for FY 2014.

II. Data Sheet Addendum

- A. **If you reported engineering majors in FY2013 (Row 12), please identify relevant subfields (mechanical engineering, electrical engineering, engineering technology, etc.) and specify the number of majors in each.**

At GPC there is only one major for engineering students which is depicted in the table.

- B. **If you reported majors in the field "Other" (Row 13), please identify those degree programs and specify the number of majors in each.**

N/A

- C. **If you reported engineering degrees awarded (Row 73), please identify the specific degrees (i.e. BS in mechanical engineering, BS in electrical engineering, etc.) and specify the number of awardees for each.**

N/A

- D. If you reported degrees in the category “Other” (Row 74), please identify the specific degrees and specify the number of awardees for each.**

N/A

- E. If you have any additional notes to offer relevant for the data sheet, please enter those here.**

It was decided again to use the definition for a GPC STEM major of one who had declared one of the STEM disciplines as a major, but who had also successfully completed Calculus I with a C or better. The rationale is that all STEM students must successfully complete Calculus I in order to proceed in the STEM trajectory and earn a STEM degree. The rationale for using these criteria was based on discussion with STEM faculty and the Office of Institutional Research and Planning. Originally, any student who declared STEM as a major would be counted in report of data. However, this student may not be taking courses leading to a STEM degree, which is unlike 4-year institutions. Typically at a 4-year institution in order to proceed in a STEM field certain prerequisites must be met along with declaration of the major. Therefore, to be more in-line with a reporting structure that would be consistent with 4-year institutions, the STEM office has revised definition of a GPC STEM major.

III. Programmatic Components

A. Faculty Mini-grants

1. Please provide a list of the mini-grants provided by your institution as part of its STEM Initiative for FY2013. You may use the following table or some alternate format, but please be sure to provide all of the information requested.

Project Title	Faculty Investigators	Award Amount	Brief Description (4-5 sentences)	Key Research/Pedagogical Outcomes

As previously stated, there were two requests for proposal, one for the 2013-2014 year which span the academic year and the other for smaller projects that could be completed in one semester. This section presents the results of all proposals funded during FY2013.

The mini-grant program stressed the importance of proposals that focused on the following:

- Restructure current instruction delivery models
- Develop new models for building and sustaining effective teaching
- Impact student learning and performance through enhanced learning experiences

Of particular interest were strategies focused on identified gatekeeping courses of Chemistry I & II, College Algebra, Pre-Calculus and Calculus I. Moreover, cross-campus collaboration was encouraged. There were a total of eight proposals submitted and four were accepted for funding and two were pending upon resubmission. The two PIs that were asked to resubmit for

further review chose not to complete the process; and, therefore four proposals were accepted for funding. Table 5 presents a high level overview of the four mini-grant proposals funded with the requested information following the table.

Table 5. 2013-2014 Mini-Grant Submission Synopsis

Type of proposal	Number of proposals funded	Number of faculty involved	Number of students impacted
Restructure current instruction delivery models	1	1	65
Develop new models for building and sustaining effective teaching	2	4	364
Impact student learning and performance through enhanced learning experiences	1	3	7
Total	4	8	436

Bennett, Valerie Projects in Engineering Advancing Knowledge and Performance PEAK Performance - \$6200.00

Brief Description

The purpose of the Projects in Engineering Advancing Knowledge and Performance (PEAK Performance) was to increase the retention of students in engineering – at the introductory level – by advancing knowledge and performance with the introduction of Project Based Learning (PBL) into an introductory level engineering course, specifically ENGR1603.

Key Research/Pedagogical Outcomes

The implementation of PEAK Performance entailed introducing Project Based Learning (PBL) into the proposed engineering course. The choice of PBL into the engineering course was hinged on creating an avenue for students to be exposed to many of the necessary skills required of engineering students. The skills practiced by students participating in PBL include fundamental and advanced research, collaboration, communication, and critical thinking skills. Learning objectives for the projects were developed so that they aligned with the Common Course Outline Learning objectives for the course.

Dutta, Antara – Developing New Learning Materials and Strategies for Improving CHEM 1151 - \$7500.00

Brief Description

The main purpose of this research study is to evaluate the performance of the Survey of Chemistry I, (CHEM 1151 students) by comparing different teaching methodologies in order to develop more effective learning materials for teaching this course. At GPC, this course has the highest enrollment of all the chemistry courses. The average passing rate was 62.4 % in the academic year 2013 (ABC grades), thus not reaching the lower quartile of the total student population. The failure rate is also not negligible with average at 14 %. These results indicate a need to improve the learning materials and strategies for CHEM 1151 course.

Key Research/Pedagogical Outcomes

Four sections of CHEM 1151, three face-to-face and one online, have been included for the research study during the fall'13 and spring'14 semesters. One section was taught (Instructor: Dr. Burkart) in traditional manner with oral delivery of the materials and use of white board in explaining the materials. Another section is taught as complete distance learning course (Instructor: Dr. Dutta) where all the content materials were delivered through web based technology with the exception to the final exam. In other two face-to-face sections, different technologies are used as part of instructions like iClickers (Instructor: Dr. Dutta) and teaching videos (Instructor: Dr. Blum).

From the overall performance data obtained so far, distance learning course has been performing best compared to any other face to face courses in this current semester (spring'14) although final exam data for this course is not available at this point. Traditional course has been maintaining steady performance both in fall'13 and spring'14 whereas technology oriented courses are showing fluctuations in overall performance leading to an impression that learning is enhanced by the use of different applications of technology used in classroom to some extent but the overall impact depends on many other factors besides technology involved in teaching.

Kim, Yoon Duk – Improvement of Student Learning and Participations using Online Learning Modules – \$1608.00

Brief Description

In Engineering Graphics courses, the understanding graphic software is one of the key aspects for students to acquire in order to succeed in the course. However, in general, instructions and guidance that a faculty can provide during the class meeting period are extremely limited. This is because the meeting time of two and half hours a week is simply not enough to teach the key concepts and to provide step-by-step instructions of how-to-use the software as well. At the current time, students can just do their best during the class to follow my examples and practice their drawing or modeling skills using the appropriate software outside the classroom. Sometimes students rely on a number of YouTube videos for additional references but the necessary resources are not available sometimes. The main objective of this project is to create online learning modules for the engineering graphics courses, ENGR 1211 and ENGR 1212 using software called "SoftChalk" so that students will have the right resources that they can use to improve their understanding of the course materials.

Key Research/Pedagogical Outcomes

Key research outcomes obtained from this research include followings:

- Students' overall grades for Engineering Graphics and Design I and II classes (ENGR 1211 and ENGR 1212) have been improved significantly.
- Qualities of homework assignments as well as group project submissions have been improved. Students' grades for homework assignments have been improved as well.
- Students' feedbacks indicated that the lecture modules were helpful to assess their understanding of the topics and the software packages used in class and to review in-class lectures in a short amount of time.

Lochamy, J. - Interest and Performance in Plants, Zoology, and Ecology - \$7500.00

Brief Description

Seven interns were provided stipends and cameras to photograph moths at home and wildflowers at Stone Mountain to provide data to an ongoing ecological research study founded by the UGA-based group DiscoverLife.org. The initial purpose of the grant was to study the effectiveness of giving students practical research experiences with Plants and Ecology, two areas in which Principles of Biology students have consistently scored poorly on standardized assessments. In the middle of the fall semester, changes were initiated to the Principles of Biology SACS Improvement Plan by the administration which removed the intended comparison test and refocused classroom improvements away from the implementation of this experience in multiple classes. An alternate research question was formulated to study the impact of practical research experience on student attitudes towards science and STEM careers.

Key Research/Pedagogical Outcomes

The experience was intended to increase student interest in research and STEM careers as well as improve student attitudes towards science. Secondary improvement in these areas would be gained in students attending presentations of intern data as they identified with research science conducted by their peers.

2. State the **funding rate** for mini-grants at your institution (i.e. number of grants funded vs. total number of proposals received)? Discuss how proposals were **judged and awarded**.

As previously stated eight proposals were received and reviewed; six were selected for funding; four were completed. Proposals were reviewed by four faculty members representing various STEM disciplines. Reviewers used the criteria as provided in Tables 1 and 2 to rate proposals and to determine if a proposal would be accepted for funding. Reviewers submitted their completed reviews to the Executive Director who then compiled the results on a Summary Review Sheet. The Summary Review Sheet also included areas to address proposal strengths, weaknesses and other comments. Proposals receiving at least a score of 80 and two recommendations for funding were funded. The Summary Review Sheets were distributed to the respective PIs.

In the budget, \$74,000.00 was allocated to fund 15 to 20 proposals between \$3750 and \$7500.00 per proposal. Since the total number of proposals funded was four and not all PIs requested the full amount the funding rate for FY 2013 was \$22,808.00 which represents approximately 30% of the budgeted amount.

3. For any of the mini-grants listed, do you **have evaluation data or other evidence suggesting the efficacy of the projects**? Also, please discuss the broader impacts for these projects (i.e. changes to instructional approaches, changes to departmental policies, etc.).

Results from the *Projects in Engineering Advancing Knowledge and Performance – PEAK Performance* revealed the following which are presented in figures 4 - 7:

- 1) Students have a better understanding of an engineer's roles and responsibilities in industry and academia

- 2) Highlights the impact of PBL giving an insight into the vital role of the design process in the engineering field, as there might exist multiple solutions to a single problem.

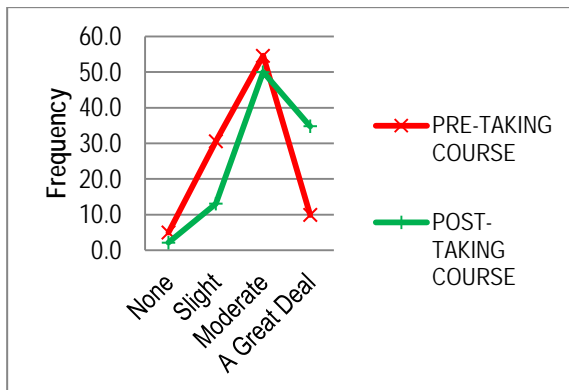


Figure 4. Understanding of engineering jobs

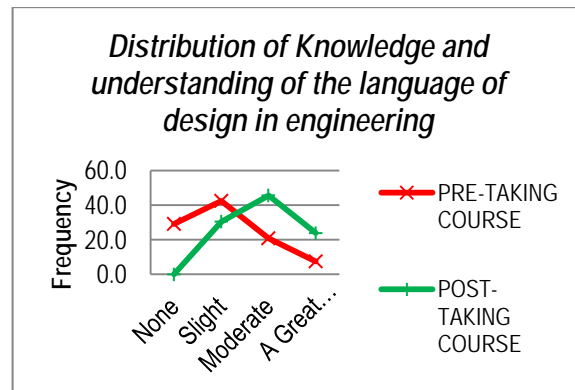


Figure 5. Understanding of Design Language

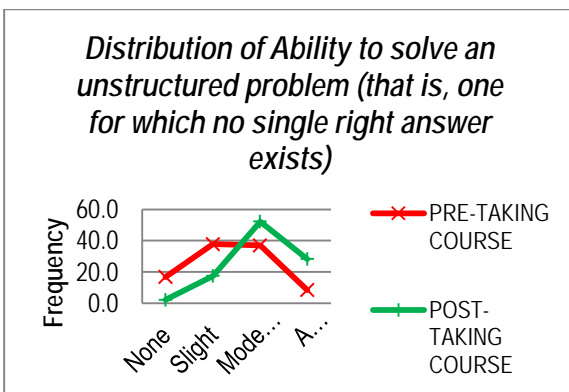


Figure 6. Ability to solve unstructured problems

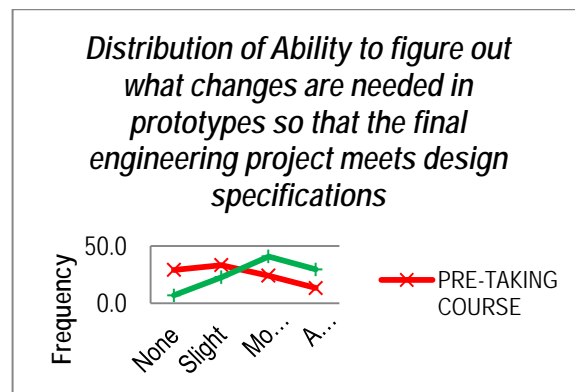


Figure 7. Ability to determine change

B. Service Learning Opportunities (i.e., FOCUS-derived projects)

While GPC STEM students participate in service-learning opportunities, this was not part of the College's focus for the STEM Initiative II proposal.

C. Institution-Specific Projects

1. **Identify your institution-specific project(s)** outlined in your proposal for FY2013 (i.e. 4-Year Undergraduate Research Experience, Academy for Future Teachers, MESA, summer bridge programs, peer learning communities, STEM tutoring/learning centers, etc.). Discuss any specific branding.
2. Provide data regarding the **level of participation** in each of these projects (i.e. number of faculty participants, number of student participants). Discuss their scope (i.e. oriented toward incoming freshmen, upperclassmen, STEM majors, education majors, all students, etc.)
3. Discuss the **activities and operation** of your institution-specific project(s), including any efforts to connect multiple projects for synergistic impacts.
4. Provide any available **outcomes data demonstrating the efficacy or effectiveness of the project(s)**.

In this section the following institution-specific projects will be outlined and the level of participation, activities and operation and outcomes/successes will also be presented:

GPC Strategy: Deepening GPC STEM Student Engagement

- Expand MESA Program
- Develop PLUS Session
- Increase Student Chapters of STEM Professional Societies
- Implement STEM Achievement Recognition Program
- Implement STEM Career and Tag Fair

GPC Strategy: Promote STEM Collaborations

- Host STEM workshops for K-12 schools and post-secondary teachers
- Provide research experiences for current GPC STEM students

4.1. Deepening GPC STEM Student Engagement

4.1.1. Expand MESA Program

One of the country's most innovative and successful programs, Mathematics, Engineering, Science Achievement (MESA) provides support for educationally disadvantaged students so they can excel in math and science and graduate with baccalaureate degrees in science, engineering, computer science, and other math-based fields. The GPC MESA program, initially launched and supported by MESA USA and Hewlett-Packard, is now supported by GPC and the USG STEM II Initiative. GPC MESA students benefit from Academic Excellence Workshops (AEW); academic advising/counseling; assistance with the transfer process to a 4-year institution; career advising; summer research/internship opportunities; and, linkages with student and professional organizations.

The specific goal identified in the FY 2012 proposal as it relates to MESA was to increase by 33% the number of students participating in MESA annually from 60 students to 80 students. This goal was met by engaging 98 students. MESA Scholars must maintain a minimum cumulative GPA of 2.0 and enroll in at least 12 collegiate-level course hours. In order to receive

a stipend, the Scholar must be maintain active participation which includes completing the required paper work, spending a minimum of 7 hours per month in the MESA Center, attending at least 7 AEWs during the semester, and maintaining a minimum cumulative GPA of 2.5.

General statistics about the MESA students are provided in Table 6.

Table 6. General MESA Statistics

	Total Scholars
Majors	
Biology	22
Chemistry	12
Computer Science	12
Engineering	47
Geology	1
Mathematics	4
Classification	
Freshman	33
Sophomore	65
Cumulative GPA	
GPA \geq 3.5	46
3.0 \leq GPA < 3.5	29
2.5 \leq GPA < 3.0	12
2.0 \leq GPA < 2.5	8
GPA < 2.0	3
Transfer/Graduation	18 (AY 2013-2014)

The data from Table 7 show that approximately 89% of the MESA students had cumulative GPAs of 2.5 or better which through grades and student surveys indicate that investment into MESA is value to the students and GPC.

Table 8 shows the transfer/graduation data. While the overall number of transfers/graduates is less than the 40 students presented in the FY2013 report, the 19 students who transferred/graduated represent a very accurate view. Each year, the STEM Office is working to improve its data collection and in FY2014 a new method was employed which included not only the MESA Coordinators providing data, but also student self-identification throughout the academic year.

Table 7. Transfer/Graduation Data

School name	Number of transfers
Dartmouth College	1
Georgia Institute of Technology	5
Philadelphia College of Osteopathic Medicine	1
Southern Polytechnic State University	2
Texas A&M University	1
University of Georgia	4
Unknown	4
Total Transfers/Graduates	18

4.1.2. Develop Peer-led Undergraduate Sessions

Four tutors were hired who led tutoring sessions in chemistry courses both fall and spring semesters. The tutors engaged approximately 300 students. Figure 8 shows the grade distribution for students who attended the tutorials during the fall 2013 semester and who were tutored in *Chemistry 1211 – Principles of Chemistry* and the required lab and *Chemistry 1212 – Principles of Chemistry II* and the required lab. Figure 9 shows the grade distribution for the same course for the spring 2014 peer-led tutorial sessions.

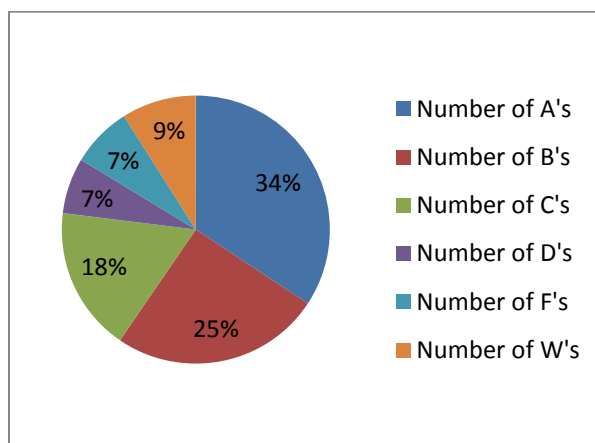


Figure 8. Grade distribution for FA13

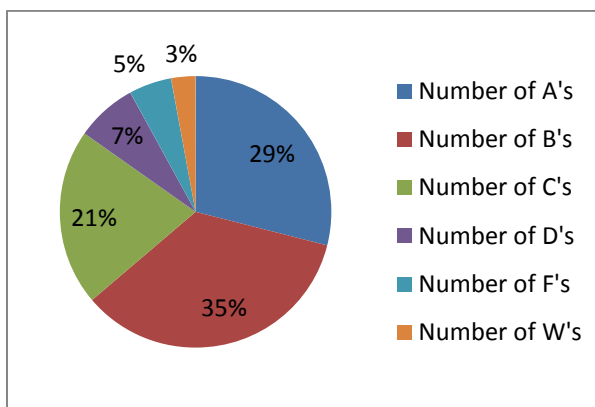


Figure 9. Grade distribution for SP14

The data show that approximately 77% of the students who attended the tutorial sessions in the fall semester successfully passed the classes with a C or better. In the spring 2014 semester approximately 85% of the students who attended the tutorial sessions passed with a C or better. The data reveal that the PLUS program is working to help students persist in STEM courses. Additionally, an informal survey of faculty and students revealed a need to expand the PLUS program to include more tutors and subject areas.

4.1.3. Increase Student Chapters of Professional Societies

Student chapters of professional societies allow students who are contemplating careers in various disciplines the opportunity to explore the discipline, to have access to resources and

discipline mentors and the opportunity to interact with students who have similar interests. Moreover, by having these opportunities as members in professional societies student engagement is increased. The following two societies were established in the initial GPC STEM Initiative and this section presents an update on their activities.

Mu Alpha Theta

Mu Alpha Theta is the National High School and Two-Year College Mathematics Honor Society. In April, at its induction ceremony, the GPC chapter inducted 45 students. The average grade point average of students inducted was 3.75. Twenty-three students had an overall grade point average of 4.00. Each campus, including online, has an advisor who supervises activities. General statistics about the newly inducted students is presented in Figures 10 and 11.

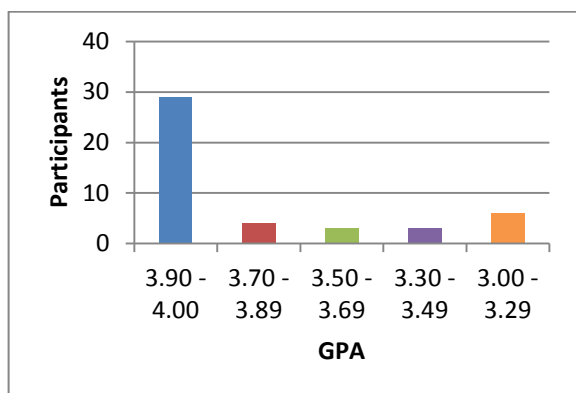


Figure 10. Mu Alpha Theta Scholars by GPA

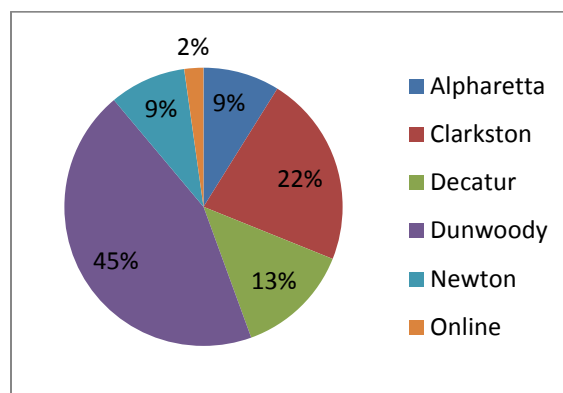


Figure 11. Mu Alpha Theta Scholars by Campus

National Society of Black Engineers

The National Society of Black Engineers (NSBE) is one of the largest student-governed organizations in the country. Its mission is to increase the number of culturally responsible black engineers who excel academically, succeed professionally and positively impact the community.

As stated in the FY 2013 report, it was the anticipation of the STEM Office to re-establish the NSBE chapter by securing new faculty advisors and increasing student interest in the chapter. Several faculty members were contacted who expressed interest. However, this is still an unmet goal for successful re-establishment of the chapter. In FY 2015, the Executive Director will partner with several of the programs and student clubs to invite NSBE members and officers to GPC to host workshops on the importance of professional societies.

4.1.4. Implement STEM Achievement Recognition Program

The third STEM Student Recognition Program was held on April 5th. Mr. Michael Robertson, Executive Director of the Technology Association of Georgia, served as the guest speaker. Overall the program recognized 131 students which is approximately the same number that was recognized during FY 2013. The program recognized 78 freshman students who were full-time students with a minimum GPA of 3.5 or better and who had successfully completed the gatekeeping course of College Algebra. This represents a slight increase from the 61 freshman students that were recognized last year. The program also recognized 53 sophomore students who were also full-time students with a minimum GPA of 3.5 or better and who had successfully completed the first required course in their respective STEM majors. Additionally, the PLUS

Session Tutors and their faculty mentors were honored. Figures 12-17 present basic statistics about the students recognized.

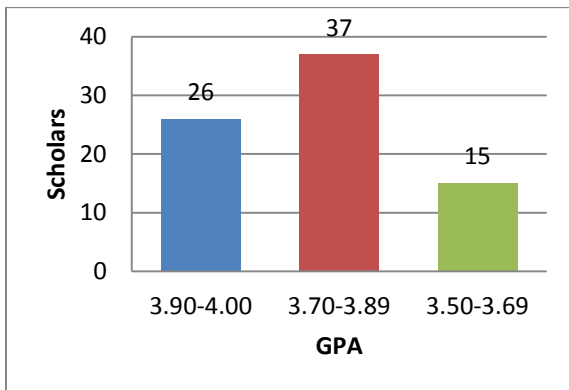


Figure 12. Freshman STEM Scholars by GPA

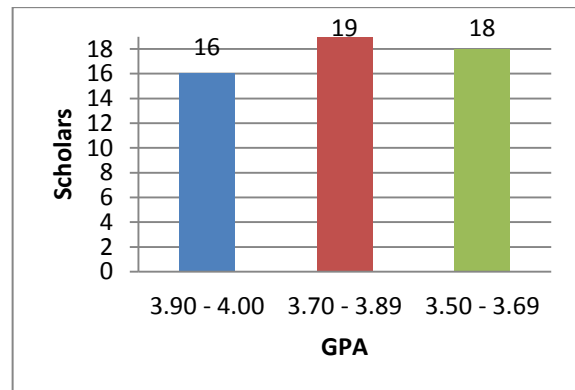


Figure 13. Sophomore STEM Scholars by GPA

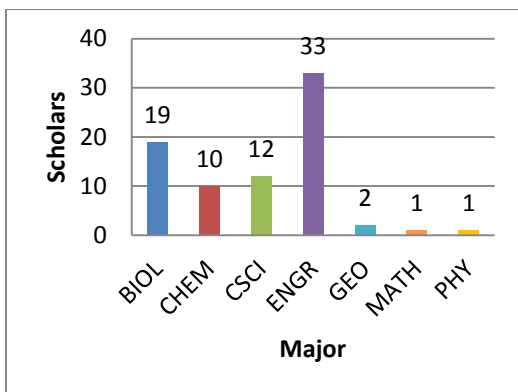


Figure 1. Freshman STEM Scholars by Major

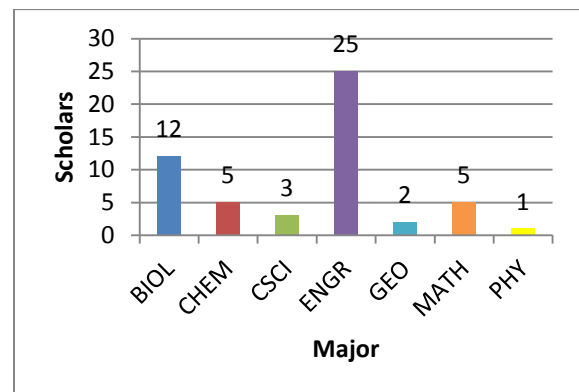


Figure 15. Sophomore STEM Scholars by Major

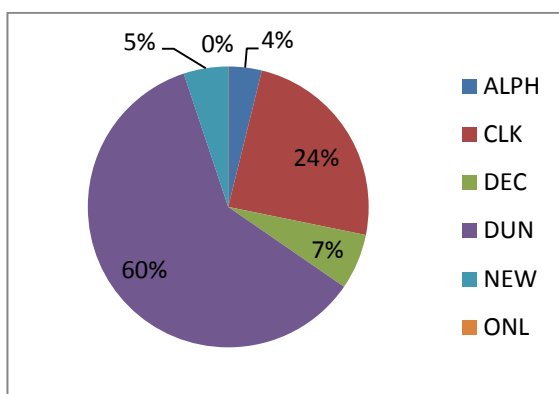


Figure 16. Freshman STEM Scholars by Campus

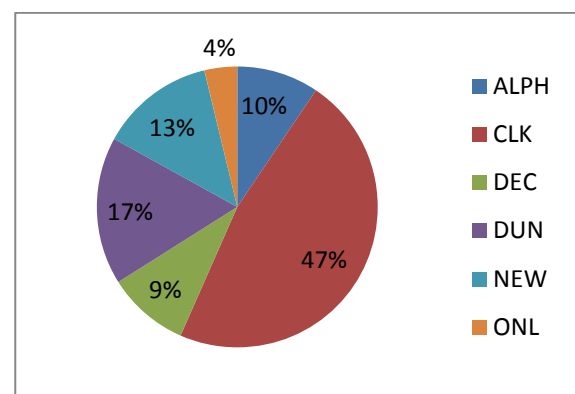


Figure 17. Sophomore STEM Scholars by Campus

4.1.5. Implement STEM Career and TAG Fair

The STEM Career fair was once again held as part of the College's Career Day in order to

conserve resources. The Career Fair was organized into approximately 20 panel sessions, with three panel sessions dedicated to STEM. The panel sessions consisted of panelists currently working in STEM areas who talked with students about their career choices and the pathway to a STEM career. Figure 18 shows the number of participants attending the STEM panels.

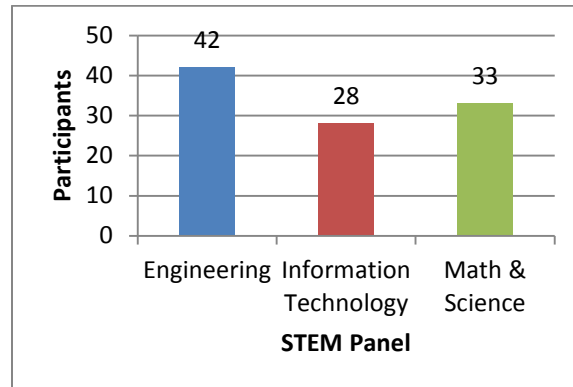


Figure 18. Career Day Attendance by STEM Panel

4.2. Promote STEM Collaborations

4.2.1. Host STEM Workshops

The objective of this strategy was to host STEM workshops for K-12 schools and College faculty. Below is a synopsis of the activities held and their impact. There were a total of 29 activities held during FY 2014 which shows a slight increase of 31% from the 22 activities held in FY 2013. Additionally, close to 700 K-12 faculty/students and College faculty/students were impacted. Figure 19 shows the attendance by activity.

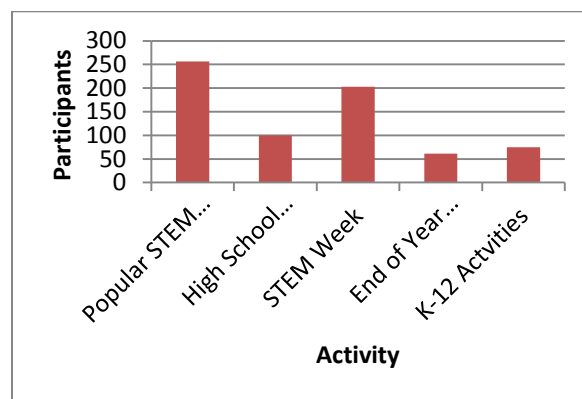


Figure 19. Attendance by Activity

4.2.2. Provide research experiences for current GPC STEM Students

Research experiences are important in the areas of STEM. Consequently, the goal of placing students in internships is important. However, this is often a difficult goal to achieve because: 1) cut-backs in laboratories due to funding constraints; and, 2) laboratory supervisors often

want more senior and graduate school students. However, there has been a concerted effort to find and place GPC students in research and internship positions for the summer. Table 8 presents a high level overview of students placed.

Table 8. Student Internships

Institution	Number of Students	STEM Area
Duke University	1	Science
Emory University	2	Science
Florida Institute of Technology	2	Engineering
Georgia State University	3	Science
Georgia Tech	2	Engineering and Science
Massachusetts Institute of Technology	1	Science
Texas Tech University	1	Engineering
University of Wisconsin-Madison	1	Science

IV. Future Efforts

A. Please discuss dissemination efforts for best practices or research findings identified through participation in the USG STEM Initiative.

Table 9 presents dissemination efforts by faculty and students who participated in the FY 2014 USG STEM Initiative.

Table 9. Dissemination Efforts

Presenter	Title/Topic	Dissemination
Dr. Y.D. Kim	<i>Improvement of Learning Experiences & Student Participation in Engineering Graphics and Design</i>	American Society of Engineering Education
Dr. C. Lester	<ul style="list-style-type: none"> <i>Cultivating Research: Georgia Perimeter College's STEM Faculty Mini-Grant Program</i> <i>Utilizing Internal Resources to Institutionalize STEM</i> 	STEMTech Conference USG STEM Teaching and Learning Conference
T. Quanch, Y. Duong, and V. Tran	<i>Documenting Changes in Moth Lifecycles and Abundance Caused by Urban Warming and Pollution</i>	Georgia Academy of Science
O. Omojaro	<i>Integrating ASP-Based Planning and Diagnosis with POMDP for Knowledge Representation and Reasoning for Robot</i>	Emerging Researchers National Conference in STEM

B. Please identify any external grants (e.g. NSF, Department of Education, private/foundation) for which you have applied based on support received for the STEM Initiative. Indicate whether any applications have been successful.

The following grants were described in the FY 2012 report and are ongoing.

- *BreakThru* – STEM Accessibility Alliance - Ms. Bonnie Martin
- *ENLISTEM- Educate and Nurture Leadership in Science, Technology, Engineering and Mathematics* - Dr. Marjorie Lewkowicz and Dr. Brooke Skelton (past mini-grant recipients)
- *Peach State LSAMP – Peach State Louis Stokes Alliance for Minority Participation* - Professor Margaret Major (past mini-grant recipient)
- *STEP – Science, Technology, Engineering, and Mathematics Talent Expansion Program* - Dr. Pamela Leggett-Robinson (past mini-grant recipient) and Professor Margaret Major

Additional funding applied for in FY 2014 includes:

- *BUILD* in partnership with consortium of Atlanta area institutions – National Institutes of Health – under review
- *Bridge to the Baccalaureate with Georgia State University* – not funded
- *Undergraduate Research Experience with Kennesaw State University* – not funded
- *Fitzgerald Foundation* - \$1M

C. Will your institution's STEM Initiative program for FY2015 involve any notable changes from your FY2014 program? If so, please explain any changes and the rationale for them.

The most notable change from FY 2014 to FY 2015 will be the reallocation of funds to implement and sustain the STEM Study Center. The STEM Study Center officially opened on the Decatur Campus on Wednesday, September 24, 2014. The Center is funded in part by funds donated to the college through the Fitzgerald Foundation and resources donated by the GPC administration. The Center is the first of its kind for GPC, in that the following activities will be held:

- Peer-assisted learning
- Faculty-led instruction
- STEM-related workshops
- State-of-the art software and printing
- Group study

The Center will be home to the PLUS Tutorial Program, STEM Supplemental Instruction and will host High School Visitation Days. As a result, more resources will be dedicated to ensure the viability and sustainability of the Center.

Another notable change from FY 2014 to FY 2015 will be the reallocation of funds to assist students with conference attendance and presentation who participated in REUs during the summer and who are a part of STEM programs. Many of these students have research projects in which they desire to present at national conferences, but due to a lack of personal funds they are unable to do so. Consequently, students who apply for a travel stipend through the Office of STEM Initiatives to attend and present at a national conference will be able to receive some funding to assist with their travel.