*Cultivating STEM Majors at Middle Georgia State University*

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* STEM Initiative Goals being addressed:
  + USG STEM INITIATIVE GOAL #2.
    - We seek to improve performance and retention in STEM core courses and majors.
  + USG STEM INITIATIVE GOAL #3
    - We also provided support for P-12 STEM teachers in Georgia’s classrooms.
* Brief description of activities
  + Activities included allowing faculty the opportunity to apply for mini-grants to fund undergraduate research projects and travel. Research activity creates an environment that allows faculty to closely mentor the student and to build relationships that will allow the faculty to shepherd the student towards completion of their program. These undergraduate research experiences culminated in student presentations and papers presented at our Undergraduate Research Symposium and other regional conferences. The research experience prepared students for post-graduate work and help to sustain their interest in STEM disciplines.
* Results
  + Current status/Accomplishments
    - Eleven faculty across scientific & math disciplines have submitted proposals for undergraduate research mini-grants and student or faculty travel.
    - The mini-grants supported 22 students participating in undergraduate research projects in chemistry and biology. Students also had an opportunity to attend/present at undergraduate conferences or scientific meetings this spring.
  + Specific milestones and outcomes met
    - We sought to encourage engagement in STEM activities and increasing undergraduate research opportunities among potential science, math and engineering majors. The department has seen an increase in the number of faculty offering undergraduate research opportunities to students. 72% of the undergraduates (n=25) participating in research in the department are receiving funds from the USG STEM grant. At this point it is too early to see a change in DWF rates.
    - This spring 2017, 25 students participated in the Undergraduate Research Symposium held on the Macon campus. Students from biology (n=5), chemistry (n=7) and physics (n=1) gave presentations. Students from biology (n=7) and chemistry (n=5) also gave posters.
    - Additionally, we had the opportunity to partner with Chesney Elementary School in Gwinnett county on a 9 week STEM Project Based Learning assignment. Kindergartners learned about the life cycle of birds and how to enhance backyard habitat to attract birds. Grant monies were used to provide lesson plans to the teachers.
* Challenges
  + - The grant office at MGA has never dealt with ordering equipment and supplies for a science department. This was a major institutional challenge, with purchases being held up, at times, by months. It is difficult to get research done if you cannot get the equipment and/or supplies in a timely manner. By working with the individual, we hope to have a smoother process in the upcoming year.
    - We had to invent all of the paperwork associated with the grant (e.g., travel forms, faculty proposal forms, etc.)
    - MGA does not have dedicated research space. Faculty/students have to work around laboratory schedules for teaching.
    - Vehicles are difficult to procure for faculty who travel to field sites.
    - Student expectations of how research is carried out does not match faculty expectations. Currently, we have a 1 credit course that can be used for undergraduate research. To the students, this translates to 1 hour a week, which is not enough time for any kind of research.
    - Our students do not seem to understand the importance of research to their future careers.
    - We noticed a variability in the way research projects were approached by faculty. Specifically, individual projects have goals and objectives, but the underlying teaching elements are variable (e.g., does the faculty emphasize techniques and manual skills? data collection? critical thinking? analysis of results? etc.)
    - Managing the separate for the grant was difficult because of communication (supplies) and differences in tracking expenses.
* Lessons Learned
  + - Spend money early. Snooze and lose.
    - Open mini-grant application process sooner.
    - Close communication with grant manager.
* Plans for the future
  + - Survey. We plan to survey both faculty, to determine underlying pedagogical objectives and goals for students; and students, to determine what they have gained from their research experience.
    - Nat Sci will recruit students in BIOL 2108 to participate in undergraduate research.
    - We will encourage more involvement by Mathematics faculty
    - Improvements to the Undergraduate Research Symposia including having judges across the disciplines, recruiting math students to participate, clarification of submission instructions (possible creation of web submission?).