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Real STEM: Scientific Research for Rural Georgia Students

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Real STEM

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Real STEM Grant

A. Emphasizes connections between traditionally discrete disciplines
B. Students create, test, and refine models of real-world situations

Through partnerships, develop and implement high school courses that focus on interdisciplinary STEM scientific research, leading to a three course sequence that constitutes an academic pathway and supports a STEM school designation.

This grant proposes that when teachers are trained in the tenets of the grant, they will use these strategies in designing course work for students that will result in increased STEM achievement, increased interest in STEM and STEM careers, and STEM literate citizens better prepared to make informed decisions about grand challenge issues which will impact their lives.

Tenets of the Grant

I. Place-based Education
   A. Learning takes students “out” of the classroom and into the community and natural environment
   B. Students learn how local systems relate to regional and/or global systems
   C. Students collaborate with research scientists, local citizens, organizations, agencies, and businesses, and/or government

II. Problem-based Learning
   A. Engages students as participants immersed in real-world, ill structured, problematic situations
   B. Organizes curriculum around a holistic problem, enabling student learning in relevant and connected ways
   C. Coaches student thinking and guides student inquiry, facilitating learning toward deeper levels of understanding

III. Teaching for Understanding (UbD)
   A. Identify Desired Results
   B. Determine Acceptable Evidence
   C. Planning Learning Experiences and Instruction

IV. Modes of Reasoning
   A. Engages student in multiple approaches of investigation (i.e. model-based reasoning, computational reasoning, Engineering Design, and Quantitative Reasoning)
   B. Students create, test, and refine models of real-world situations
   C. Recognize and accurately interpret data

V. Interdisciplinary STEM (interdisciplinary vs. multidisciplinary)
   A. Emphasizes connections between traditionally discrete disciplines
   B. Works with a range of sources of information and perspectives
   C. Integrates multiple disciplines to solve problems

Collaborative Partnerships

<table>
<thead>
<tr>
<th>Team 1 – Research Institutes</th>
<th>Team 2 – GSU Faculty</th>
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<tr>
<td>Georgia Southern University</td>
<td>Engineering – Dr. Mitra</td>
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<td>Gray’s Reefs – KNOA</td>
<td>Biology – Dr. Leige &amp; Dr. Skowsky &amp; Dr. Colon-Gaud</td>
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<tr>
<td>Southeast Natural Sciences Academy</td>
<td>Chemistry – Dr. Leidle</td>
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<td>Sapelo Island National Estuarine Research Reserve</td>
<td>Geology – Dr. Scott</td>
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<td>Georgia Adopt A Stream</td>
<td>Mathematics – Dr. Lester</td>
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<td>Stellwagen Institute of Oceanography</td>
<td>Physics – Dr. Galch &amp; Dr. Balarsman</td>
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<td>Camden County Cooperative Extension</td>
<td>Education – Dr. Mayes</td>
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Spring 2013 – PLC work and implement a 1-2 week research module
Summer 2013 – PLC members participate in field experiences and an education symposium
School Year 2013/14 – Cohort 1: PLC work and implement a high school scientific research course
Cohort 2: PLC work and implement a 1-2 week research module
School Year 2014/15 – Cohort 1: Continue PLC work and course implementation
Cohort 2: Continue PLC work, module and course implementation
Cohort 3: Begin PLC work, 1-2 week research module and/or course implementation

Grant Timeline

Participant Reflections

"In being exposed to all of the hands-on research and our experiences with the scientists, we gained a lot of knowledge that can be brought into the classroom."

--Teacher

"...we were able to have experiences that we don't take for granted in the classroom. The scientists would demonstrate these experiments, go through the sequence of the experiment, and have us ask questions and then explore the science of the experiment."

--Teacher

"We learn things that aren't normally taught at school. We've learned real world problems and tried to solve them through STEM. That is something that we aren’t taught to do in other classes."

--Student

"It was fun researching and building our very own project. I never thought I would take interest in that."--Student

GSU Real STEM Day

On Wednesday, November 20th, 2013 approximately 65 high school grant participants arrived on the campus of Georgia Southern University to share each other in a research roundtable discussion and to participate in informative sessions in each of the GSU STEM departments. Students were exposed to the many STEM career opportunities available to them through a college experience. The students were challenged to think about life after high school.

Institute for Interdisciplinary STEM

The Institute for Interdisciplinary STEM Education (i2STEM) is a collaborative interdisciplinary program committed to excellence in K-20 STEM teaching and learning, with a focus on rural, diverse, low SES, and under-represented populations. The Institute will address problems indigenous to the rural environments of the region, including issues of cultural diversity and cultural relevance within our diverse population, matters of equitable access to STEM for low SES students, and concerns about the relevance of STEM for rural students. Long-term goals of the Institute are to establish partnerships across Georgia, the southeastern region of the United States, nationally, and even internationally in address issues of STEM education in rural areas.