MADISON COUNTY STEM PROJECT

Madison County High School &
Madison County Middle School

Danielsville, GA

Focus and Goals

- Stimulate student interest and engagement in Math, Science and Agriculture, beginning with an Elementary Outreach Program and continuing through middle and high school

- Utilize instructional technology effectively to help our students master the 21st Century Skills they will need in the changing workplace

- Strengthen student achievement in academic content knowledge

- Help our students see how what they do in math, science, and career studies are relevant to real-world problems and needs

- Develop a high school biotechnology lab that will help prepare our students for entry-level jobs with local biotech employers or STEM-related college study

Professional Development

- Educational Technology Center
- Athens Technical College Life Science Department
- Conferences
- Some of our best professional development occurs when teachers have time to collaborate and work on lessons that incorporate what they have learned

Grant Governance Board

- School representatives, local farmers and business leaders, post-secondary professors in biotechnology, science education, poultry science, a retired USDA researcher and others
- Meets bimonthly to discuss progress towards the goals of the STEM program and guide future projects
- Works to facilitate the involvement of community, industry and post-secondary personnel
- Promote sustainability of the Madison County STEM Project
- Long term goal is to provide an educational experience for our students that gives them the knowledge, skills and desire to pursue STEM-related post-secondary studies and careers

STEM Project #1:
Agricultural Center Tree Selection
Madison County High School

An Interdisciplinary Project-Based Learning Experience for our students in

Basic Agriculture, Accelerated Math II and Botany

Purpose of Project:
For our students to form a landscaping plan for a section of our new Agricultural Education Center.

Driving Question:
What kind of trees would be the best choice create a
buffer zone of trees to shield the Agricultural Education Center
from a residential area?

Botany

Botany classes went on walking tours of the campus to see different varieties of trees. Groups of students conducted research on different tree species, and then guided Math II classes to certain trees they wanted to measure the height of. Botany students used tree borers to determine the age of trees and compared that to the height to determine a growth rate, so as to predict how long it would take newly planted trees to form an effective buffer zone.

Accelerated Math II

Accelerated Math II classes learned how to calculate the height of trees selected by the botany classes by using trigonometry. They used clinometers to determine the angle of the treetop when standing a certain distance from the tree, and used the tangent of that angle to determine tree height.

When the results of tree aging are done, they will use the age : height ratio to predict how long it will take for different species to reach a target height.

θ = 31.8°

Angle of elevation

y

x = 71 ft.

Basic Agriculture

Basic agriculture classes took measurements of the work area and collected soil samples. In addition to sending these samples to UGA for analysis, students will be using Vernier Probeware to determine the soil pH. This will enable the botany students to determine what kind of soil conditioning the trees they select will need when they are planted by the agriculture students in the spring.

Presenting the Plan

- Botany classes will use Google Sketchup to draw landscaping plans that include the locations and species of trees that they have selected. They will also use Prezi to create a presentation to deliver to the Agricultural Center Board on February 15th. The board will determine which student plan to use and fund with the purchase of

http://sketchup.google.com

http://prezi.com/

Future Project Ideas

Biotechnology in Animal
 Science/Genetics

- Artificial Insemination of cattle –
 genetic selection and semen
 evaluation

Future Project Ideas

Water Quality Testing with Adopt-a-Stream: including training our students in field collection and measurement techniques as well as being able to problem solve for solutions to water quality issues.

- Non point source pollution is a critical issue and agriculture is often identified as a source. Students will be given the opportunity to measure water quality in an watershed located in an actively farmed watershed and compare with a watershed where farming does not take place.

- Problem solve solutions for identified problems. Develop best management practices to improve water quality.

Future Project Ideas

- School lunch composting program: joining with our school's strategic plan initiative to "go green".

- Students get an up close look at the composting process at the Buford Trout Hatchery facility.

Future Project Ideas

Aquaculture :

- Start up process at middle school aquaculture tank
- Water quality management – identifying, establishing, measuring, evaluating and maintaining correct water quality criteria.
- Fisheries management
- Marketing of product
- Facility design, construction and maintenance at the high school

Other Future Project Ideas

- Tissue Culture
- Elementary Outreach – targeting soils, plants and local grown foods