Team Members: Carol Burch

Team Name: Hannibal HS Entergy MST

Write the number of Teacher participants for each period.

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<th>Academic Year number(s)</th>
<th>Summer Institute number(s)</th>
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Team location and focus: Hannibal High School: 21st Century career and college readiness skills, Web 2.0 communication technologies and literacy, spatial thinking, and goal setting.

Data collected and analyzed on teacher learning:

- College physics student goal progress Sept 2010 – June 2011 and exam results
- College physics visual thinking survey
- RSP9 basic skills test
- RSP9 world and North American spatial knowledge
- RSP9 topographic thinking quiz

Data collected and analyzed on student learning:

PRE-Project College Physics:

- Students were asked to set SMART Goals and course goals the first day of class. They wrote down one or more long term goals that they could monitor and evaluate their progress on. They also were asked to set a goal for their achievement in the college physics course overall as well as set a goal for the first exam. They then needed to indicate two strategies that they could use to help them attain the goals they set. Goals were written down on a card stock chart that allowed them to monitor their progress over the 10 months of the course.
- Students were given a simple visual thinking task of ten ‘half full’ containers of water that they needed to draw the half full line on. The containers were tilted at various angles, but all liquids were relative the the bottom of the page. Student correct answers were tallied. This survey was given to see if they would show growth in their thinking in terms of the world and physics laws by the end of the course.

Regents Science Prep 9:

- A basic skills quiz was administered the first day of class that required students to plot a line graph from data presented and indicate a possible hypothesis that the data might be testing. The skills quiz also probed very basic knowledge of ecosystems and other environmental science knowledge that they would have had prior exposure to in middle school.
- A world map with latitude and longitude lines was administered to the students prior to any map work completed in the course. Students needed to plot points, label continents, and oceans. A blank North American map was used to collect data regarding student’s prior knowledge of where a select set of states are located, Canada & Mexico, Lake Michigan, and the Gulf of Mexico. Tallies were made of correct responses to be compared with post test results using the same map sheets.
- A simple quiz on overhead contour line-based views of land shapes were to be matched with profiles of the terrains was given prior to any topographic work to determine the level of spatial thinking using contour lines that the students possessed. A matching post test compared individual student by student would indicate growth in spatial thinking about landscape shapes.
POST–Project Data Analyzed:

**College Physics:**
- Student exam goals and actual results were graphed in terms of goal and result for each student on a record card. Each exam was also graphed as a whole class (no names!) and displayed in a prominent location. We regularly engaged in short class discussions about goals, studying, strategies, time management, etc. One result was an increase in student interest in holding review sessions for major tests outside of class time. Another significant result was a **9 point increase** in the class average on the college physics final exam! Over time the students’ goals and actual results had smaller gaps between them without a lowering of exam goal levels.
- The visual thinking quiz of half full bottles of water showed significant improvement, starting with an average score of 3.6 out of 10 correct on the pre test to 8.4/10 correct on the post test. NO DISCUSSION about how to think about the exercise had occurred following the pretest.

**Regents Science Prep 9:**
- The basic skills quiz showed the following:
  - **Graphing skills:**
    - **Growth:** 86%
    - **Flat (no change):** 9% (already competent)
    - **Decrease:** 5%
  - **Ecosystem Qs:**
    - 36%
    - 41%
    - 23%
- **World and North American Map skills:**
  - There was an increase in the accuracy and ability of locating points of interest based on coordinates and identification of continents in general, but not in any significant amount. The North American map showed some decrease in ability to locate states and some increase in states that include PA & CA, and an increase in locating the extents of Canada and Mexico.
- **Landscape topography post quiz results showed a small increase, 4.2/6 correct to 4.6/6 correct.**

**Entergy MST Project Reflection 2010-2011**

This past year's Entergy MST Project really began at the June Project SMART workshop presented by Carol Blunt White. Her approach to collecting student data and using it to help student achievement was the first approach that resonated for me. I left her workshop knowing that I would be using strategies she suggested to try to improve student learning in College Physics in the fall. With a few months to think about it and time to develop data tools, I was able to start the first day of class with a consistent goal setting conversation and strategy that carried through until mid June. I believe that the goal setting had a marked impact on student achievement and I fully intend to use the strategy again next year. I am also planning on adding better data analysis to several of the college physics labs next year, utilizing concepts from my statistics class I completed this past spring.

Web 2.0 tools for literacy and communication was a theme for this year's work. I planned purchases using Entergy funds to support this focus. Two used HP tablet laptops were purchased from EBay and two new Flip Video cameras were added thanks to Entergy. The laptops proved to be more than just tools to create videos and edit Audacity files with. They were also invaluable in enabling my physics students to utilize PhET Java-based physics lab simulations that definitely made learning about electric field, circuits, magnetism, diffraction, refraction, and wave interference concepts clearer and easier. The simulations allowed students to interact/experiment with variables and see the relationships. The simulations also enabled students to SEE invisible fields that one cannot show easily in a traditional lab experience.

I planned video projects for all of my students this year. Physics students planned and produced biophysics videos that made clear connections between physics and adaptations or strategies animals use for survival. The students were free to find a creature that interested them and then plan their video. Each finished video was peer reviewed and the project was a success overall. I will plan a few video based lab reports in earlier months next year to help students get their feet wet using the movie making software and sound editing software.
My Regents Science Prep 9 students had two different presentations to make to their classmates, both focused on the Entergy sponsored zoo field trip. RSP9 students first were given an assignment to create a presentation for a mock interview for a zoo exhibit specialist. Peers then chose who should be awarded the "job". Before, during, and after the zoo field trip, students researched, took videos, downloaded images, and information to create a short 2 minute movie featuring three animals and their ecoregion that they chose to focus in on during the zoo visit. They created and edited their videos and shared them with their peers.

To support all of the video and sound recording technology infusion, I completed a valuable 20 hour class through NASA's ePDN online education site taught through Georgia Tech. The Advanced Vodcasting course required that I create videos and record and edit narration for a final project. While the class awarded a 20 hour certificate, in fact it consumed over 30 hours of my time to learn new technology skills, complete assignments, and produce a final project. I cannot imagine not having had the challenging workshop experience given all of the trouble shooting required to support my students' projects.

During the school year I continued work with my RSP9 students using GIS technologies (ScribbleMaps, Google Earth, Geo PDFs, and My World GIS) to help students gain some perspective on the local, regional, and up to world-wide scale. We investigated physical features of the land, weather, climate, river systems, and watersheds, as well as looked at the human impact on the environment looking at landscape change over time viewing satellite imagery. We also looked at local and regional invasive species (Zebra & Quagga Mussels, Round Head Goby, & Purple Loosestrife), focusing in on our Great Lakes and learned about the balance of ecosystems and how disruptions have a domino effect.

In physics, I incorporated a connection between physics and the conservation of endangered species by looking at Cornell's "Listening Projects" and created an online exploratory lab and followed it with a computer-based lab to analyze students' voices, using the same tools as Cornell and linguistics professionals (PRAAT and RAVEN software).

RSP9 students also completed two hands-on engineering design challenges to build structures from limited resources. The first project challenge was to create a two story structure to withstand shaking on an earthquake shake table with live loads on the top of the first and second stories. The second challenge was to build a tall, but economical structure to support a mass a foot or more above a surface. Students calculated the 'cost per inch' of their structure and had to show their budget and calculations for the project. The final culminating engineering design project for a solar cooker was not completed this year due to lack of time. The movie project took several days longer than expected, not allowing sufficient time to design, prototype, construct, and test solar cookers.