February 29 & March 1, 2008 - UCET

GEOCACHING & GPS IN THE CLASSROOM

Geocaching Fact:
Worldwide, there are currently over 513,000 active caches & over 42,000 active geocachers.

HOW CAN I USE GPS/GEOCACHING IN S MY CLASSES???

data collection, discovery learning, self-guided tours, travel bugs, earth caches, area/perimeter calculation, historical tours, asynchronous story creation, calculate slope, team building, puzzle solving, map creation...

GPS technology can be an amazing tool for education. There are so many different applications and ways to implement this into your classroom instruction, no matter what you teach. I have been compiling a list of ways to use this tool in teaching, and so far I have 54 different ways to use GPS in instruction. The list is by no means complete. I will continue to add to it as ideas come along. For the most up-to-date list of ideas, please visit this website:

http://edublog.sedck12.org/?blog=50

Math:

• Calculate the perimeter or area of your school or other large area - you could even use the area calculation to estimate the volume of water that hits that area during a 1" rainstorm!

• Calculate the slope of a hill, using the trip information page. It will show you how far you have walked, and you can note the change in elevation. After that,

Creative Cache Containers
This is a photo of the most creative "container" I have ever seen. Container creation could be a great art or shop project!

GEOCACHING & GPS IN THE CLASSROOM

let the power of the Pythagorean Theorem guide you!

• Magic of Nine (GCGJPT) Geocache (http://www.geocaching.com/seek/cache_details.aspx?wp=GCGJPT). Through some mathematical trick, the procedure outlined in the cache description will give correct coordinates, even thgough the input numbers could be different. Can anyone explain to me *how this one works*?

• Create a path, and at each turn, tell your partner the angle to measure to make the next turn. Could each member of the team retrace the correct path?

• Create a multi-cache, and require students to do different math functions or problems to come up with the correct numbers for the next location.

• Have students walk and plot on the map the endpoints of a given shape (triangle, rhombus, parallelogram, circle, etc.) and see their results. (My addition - using Google Earth, plot the coordinates and enter them into the GPS units. Have students go from point to point and see how the shape that they walked compares to the shape that they plotted.)

• Calculate the distance between 2 points, then calculate the legs using Pythagoreans Theorem

• Calculate the height of an object

• Calculate or find the elevations of different points and graph those elevations.

• Area: Have students go outside and step off an area, graph it, and find the area. Use the GPS to walk the same area to see how close you were with the first estimate.

• (Elementary) Use the units to practice or learn cardinal directions of N, S, E, & W.

• Practice adding and subtracting 3 digit numbers to come up with GPS coordinates to travel from one cache or location to another.

• Use a Sudoku puzzle to give cache coordinates - replace the first needed digit in the puzzle with an A, second number with a B, and so on until the full coordinates are given.

See places you've never seen!

Social Studies/Geography:

•Get to know your Presidents. See President's Day (GC10QA0)! (http://www.geocaching.com/seek/cache_details.aspx?wp=GC10QA0) Use the presidential election order to give the coordinates of a geocache in a code.

• Develop an historical tour of your town that takes people to different monuments, statues, or markers of historical events, and develop a narrative for each location

• Come up with a "Travel Bug" on Geocaching.com that will go from place to place and end up in an historical location that pertains to the class, or give your travel bug a specific route to follow, such as the Old Spanish Trail or the route Lewis & Clark took - whatever you are studying!

• Send a travel bug along the route that the pioneers took, or to go to the locations of different Civil War battles.

• Hide flags for various countries and have a group/pair of students each find one and look on the Internet (CultureGrams) for more information of that country.

• Find elevation change & relief when learning to use topographic maps.

• Take a GPS on field trips and either use the Geocaching.com website or have each class leave a cache for the next class.

• Geocache Time Capsule: Create a cache and leave some news items or top issues of the class year and place them in a cache near your school. Leave similar items each year and over time it can give some perspective on past events.

• Use the GPS to show students that there is more than one way to find different locations or objects - compare it with a compass, stars, or other ways of navigating.

Science:

• EarthCaching. There are many caches that people have come up with

GEOCACHING & GPS IN THE CLASSROOM

to point out or direct you to locations that are geologically interesting. These are called earthcaches. Plug in the coordinates into a GPS and let your students direct the class to places where you could talk about rock types, faults, or any other topic in Geology. There are nearly 2,000 of these locations already, and you could add your own!

• Weather. "In our fifth grade caches, we will have a log book, thermometer/ hygrometer, cloud chart, and directions. We will ask people to log the date and time, as well as a general description of the weather conditions, a comment on clouds overhead (if any), and the temperature and humidity." The cache finders will log this information and collect the data for you!

• Earth Science. "In the sixth grade caches, which will be placed along creeks/rivers, we will have water testing strips. We will ask finders to log the date, time, and results of a quick water test at the site."

Travel Bugs can take your students places you can't!

• "Our students will help us collect and graph the data. They will also be involved in making and hiding the cache containers. We're going to request that people fill in the log book and also take away a note sheet with the same data to include in their online log of their find. That way, we can collect data from the cache pages in real time without having to visit the hide locations frequently."

• Make a botanical tour of your campus or a park marking the locations of different plants and include a tour guide that gives each plant its scientific name and characteristics.

• Types of Rock Scavenger Hunt. Give your students the locations of different types of rocks. Their job is to determine as a group what type or kind of rock it is, give 3 reasons why they think this, and bring back a sample of the rock.

• Create a map or tour of different rock formations with a description of each layer visited.

• Create a map of different micro-ecosystems around the campus.

• Locate & record coordinates of 3 major geologic features near your home (i.e. faults, landslides, highly eroded areas, geologic formations, etc.).

• Create a virtual outdoor classroom by marking the locations of different habitats to visit as examples.

• Use the units in the study of moon phases - the Calendar on the GPS units give the current phase of the moon.

Language Arts:

• Hide different parts of a sequential story in different caches around your campus. Students will find each part and as a group, decide the proper sequence.

• Send your students to a coordinate and have students write a description of the object they find there or a description of what they see there facing a certain direction.

• Hide topics for essays & have groups find a cache and do a group project on that topic.

• Cut apart a story and have student find the pieces and put them back together using retention skills.

• Have several student writings at each point, each with different numbers. The student chooses the story they like based on interest and goes to the group by interest, then continue on with like groups.

• Class reads story or book. Hide props for the characters, setting, problem/solution etc. and have the students locate these props with the GPS. Meet back together to do a retelling or make up a new ending.

Other Content Areas & Electives:

• **Art**: Send your students on a Photo Safari, where they mark the locations and take digital photos of different sculptures or monuments around your town. They can report back with a slide show and a map describing what they saw, who created it, and why it is significant.

• **Physical Education**: Have your students map out a mile long course

around your school to follow for walking or running.

• **Home Ec./Family & Consumer Science/Health**:

• Create an historical homes tour around your town.

• Give students a recipe and the coordinates of the ingredients (i.e. store, garden, restaurant, etc.) and have them retrieve the ingredients, come back to the school, and cook the dish.

• Place ingredients & pieces of a recipe in different locations. Each group must find their goal in order to complete the recipe accurately & with all ingredients.

• Go and find different foods from each food group.

Counseling/TLC:

• Create a problem or activity to promote a teamwork teaching moment.

• Have students come up with different careers that could use a GPS and describe how they would use it.

• (Elementary) Use the GPS to introduce students to the school by using it to find classes (or find the Gingerbread Man at Panguitch Elementary).

• **Computers**: Create a new geocache and list it on Geocaching.com. Create a travel bug to make it more interesting.

• **Music**: Go to different sites to find music clues or rhythms and try to duplicate them with rhythm sticks.

My favorite educational geocache:

The name is "What If..." and asks the question, what if the Sun were the size of a community water tank? The placer has scaled the Solar System based on the size of the tank as the size of the Sun. I have completed all of the stages, and the scale is amazing. Saturn, the last cache that you can see the tank from is 8.5 miles away! Pluto is the last cache in the series, and it would be less than an inch in diameter and 32 miles away. It is an amazing way to help students visualize the sheer dimensions and emptiness of the solar system.

If you are in Cedar City, the work has already been done for you, but there are a multitude of ways to incorporate this into your instruction in many different classes. You could...

•...use this in Science to teach the planets in the Solar System. At each planet location, you could tell how large the planet would be at this distance from your "Sun" and then talk about the orbit, diameter, mass, etc. of each planet as you went. The Nine Planets website has images and all of the information that you will need! If you need a little help with converting the sizes of the planets and the distances to scale, let me know and I will pass along a file called Planetary Conversions in Excel that will do the work for you.

•...use this in Math to teach conversions, ratios, fractions, etc. Find a suitable "Sun" and measure its dimensions. Then use this and the information at Nine Planets to convert each planet size and distance from the sun to your scale. Feel free to use the Excel file linked above for help.

•...use this in Geography to help teach mapping skills. Find a suitable "Sun" to figure out the relative sizes and distances and have your students locate and map spots where each planet could be and how big it would be at that distance.

•...extend this in Science by assigning moons from the planets to your students. Based on your scale, they would have to calculate how big the moon would be and how far away it should be from it's planet. Extra credit could be given for making a model of their moon.

Of course, the real power of these activities is not to just do the math or project, but to actually go out and let your students experience the scale and the distances involved for themselves. Be careful, the larger your Sun is, the further you will have to travel to Pluto!