Excerpted from

GPS and Geocaching in Education

Burt Lo

Geocaching is a fun hobby enjoyed by thousands, but it's also an activity that can be used to explore almost any subject, including math, science, and social studies, in an engaging way that requires creativity and problem solving. *GPS and Geocaching in Education* shows you how. Part One of this comprehensive guide provides an introduction to geocaching, geocaching resources, and GPS tools, while Part Two dives into using geocaching with your students.

In chapter 4, discover how you can use geocaching as a learning tool. Author Burt Lo explains what preparations are needed, how to bring geocaching to your classroom, how to design lessons, and how geocaching can be used across the curriculum. The chapter concludes with information on enhancing learning with geocaching through the use of Google Maps, Google Earth, and podcasting.

CHAPTER 4

Geocaching across the Curriculum

The creativity and real-world problem solving involved in creating and finding geocaches are a natural fit across grade levels and subject areas. Now that you have an understanding of what geocaching is all about, and what sort of treasures and pitfalls await, you're ready to incorporate GPS and geocaching into your curriculum.

In this chapter you will find:

- Real-world preparation basics
- Advice on lesson design
- A discussion of the role of online maps and podcasting in geocaching

Real-World Preparations

The sort of preparations you need to make before taking a class geocaching depends upon a multitude of variables: the sort of instructional unit you're teaching, how the activity of geocaching is integrated into your lessons, the size of your class or group, the type and number of GPS receivers you have, the availability of Internet-ready technologies at school, the volume and type of caches you plan to find or hide, the location(s) of those caches, the season, and weather. The same can be said about the equipment and items you and your students might need: rain gear, boots, hats, sunscreen, sunglasses, gloves, backpacks, spare batteries and chargers, first-aid kits, allergy meds, insect repellents, snacks, trade SWAG, and so on.

If you are new to geocaching, keep it simple until you figure out the types of caches you enjoy finding (or hiding) and you have a good grasp on using your GPSr. I recommend that you reflect on how you prepare for a geocaching expedition yourself: Do you typically prepare meticulously for a weekend adventure, or do you dash out for a quick find over the lunch hour? After you've had a chance to audit the world of geocaching, you'll have a good sense of the lessons you will want to create for your students, and how you'll go about bringing those lessons to life.

While I'm on the subject of the real world, what follows are essentials that apply to any geocaching expedition:

- Carefully audit every potential geocaching location prior to taking students there. Is it safe? How safe? What extra equipment and tools will students need? How much time is required for travel to the location and back? How much time

will students have to actually go geocaching? Are bathroom facilities available? Where? Can you monitor all of your students, or do you have enough adult volunteers to help out?

- Tell somebody where you are going. This seems obvious. (This point is no doubt more applicable for home-schooled students than for students who attend school in a more public setting.) Certainly, most day hikes don't turn into emergency situations, but one misstep and an otherwise well-planned day can take a nasty turn. Hikers (hence, geocachers) have come up with various self-preservation measures: contacting friends and family prior to the trip; checking in with park rangers before hitting the trail; and placing clearly visible placards in their parked cars that reveal who they are, what they are doing, when they started their journey, when they plan to return, and even where they are headed and how they plan to get there (these placards can include vehicle/owner contact information, cell phone numbers, GPS coordinates of the cache, and even a cache's unique ID number). Extreme? Maybe, but it is better to be safe than sorry.

- Be aware of your surroundings. Stress to students that they need to look up from their GPS receivers as they hunt for caches. Have students geocache in pairs—one to look out, the other to work the GPSr—or in small groups. Every experienced geocacher has a painful story that involves an immovable object (tree, rock, ravine, light post, car), a GPSr, a nearby cache, and a lapse in attention. Don't let your students take home their own version of this story!

The Kid in All of Us

For younger students geocaching is all about the SWAG. It's all about knowing that secret treasures exist and are just waiting to be found.

Older students and adults are, of course, more sophisticated. The SWAG probably won't capture their imaginations so much as will the prospect of stepping into a secret world that's hidden in plain view. In this regard, it's a real-world Harry Potter adventure. It is no accident that non-geocachers are known as "muggles" (nonmagic folk).

Geocaching lore is rife with stories about players who camouflage themselves to look official and otherwise beyond reproach. Geocachers have been known to carry clipboards and wear hardhats. Some even play dress-up—pressed green gabardine for parks; suits and ties (and hardhats!) for urban adventure. Part of the fun is hiding in plain sight, just like the caches themselves.

If you play dress-up, remember to play responsibly: No stashing caches in our National Parks or trespassing on private property. Do not play in public places with items like ammo boxes—not only can genuine trouble ensue for you and your school, but you'll be giving the game of geocaching a bad reputation that it doesn't deserve.

Of course, when a full class is unleashed on a geocaching expedition, the "secret world" aspect of the game is moot. But the other powers of geocaching will remain: the pleasure of the hunt, the dazzle of the technology, and the glimmer of hidden SWAG. Do it right, and your students will learn a lot more than what the lesson objectives prescribe.

- Plan for breaks. Students caught up in the excitement of the hunt may not take time out to hydrate or review information vital to the hunt. Break time gives you time to assess how well you and your students are holding up physically, the extent to which everyone is staying on task, and so on.

The more prepared you and your support staff are, and the better prepared your students are, the more enjoyable the experience will be for everyone.

Five Steps to Get Your Classroom Geocaching

Taking yourself, or a friend or two, out on a geocaching expedition is one thing, but a whole class is another matter entirely. While I can't possibly cover every issue that an educator and class might encounter, I can provide some field-tested advice for classroom-sized geocaching expeditions.

1. **Create a Standard Geocaching Kit**
   It is easiest to teach students about geocaching if everybody uses the same equipment. Try to set up each team of students with the same type of GPSr, some gloves, a flashlight, and a pencil.

2. **Create Classroom Experts**
   Every classroom has some students who are naturally gifted with gadgets. Gather these students and teach them how to use the classroom GPS receivers. As you teach the class how to geocache, these students can be the guides to help all of the students get accustomed to the equipment.

3. **Get a Bird's-Eye View**
   Before you set out to find your geocaches, show your class the area that you will be searching on Google Maps or Google Earth. This will help them identify landmarks and set parameters while they search.

4. **You Don't Need to Stay on the Published Path**
   By no means do you and your class need to limit yourselves to geocaches published at Geocaching.com. Set waypoints at interesting or important points on your school campus. Ask students to find these waypoints in addition to answering questions or using the waypoints in a story.

5. **Geocaching is a Team Activity**
   Geocaching is an ideal activity for cooperative learning. Not every student needs to hold the GPSr for every find. Form geocaching teams and ask one student to keep track of important details about the cache being hunted; ask another student to decipher the clue for the cache, should it be needed; ask another student to input the coordinates into the GPSr and keep the team headed in the right direction. Rotate the tasks for each geocache.

Lesson Design

While GPS technology itself is ever-changing, the sensibilities of great lessons that incorporate geocaching are constant.

Determine What Your Students Should Learn

What your students should learn will inform how you bring geocaching into your classroom. Simply, what do you want geocaching to do for your students? Do you want this activity primarily to:

- Guide student learning about the larger world? (geography, geology, ecology, history, etc.)
- Make abstract concepts real? (mathematics, physics, chemistry)
- Help students improve logic and problem-solving skills? (solving puzzles, finding caches)
- Practice community etiquette and promote small-group work? (online and the real world)
- Provide focus for writing and art assignments (posting online, creating signature items)
- Something else?

It goes without saying that you will align your geocaching lessons to your state and district standards and curricula. Likewise, you will no doubt provide students with clear expectations, guidance, practice, goals, and outcomes. Look to the lesson plans in Chapter 5 for inspiration as you create your own activities.

Make the Abstract Concrete

The underlying concepts that make GPS work—electricity, longitude/latitude, and satellite triangulation—are abstract concepts.

As educators, we know that many students have trouble with intangibles. Under the guise of geocaching, abstract concepts can be made concrete for students. Using a GPSr and a few simple handouts, for example, concepts like "true north" and "magnetic north" can be explained, demonstrated, and applied to the real world in one seamless sweep.

Concepts like satellite triangulation are more difficult to make "real" in the classroom, but it can be done. I heard about a very clever educator who hid a cache in his classroom, taped up pictures of satellites in the classroom, and used lengths of string to demonstrate relative distances from each satellite to the cache, and thereby "triangulated" the cache. This also doubled as a neat trigonometry lesson. The magic of GPS technology thus made real, the class then went outside to hunt for caches on school grounds. Websites like CyberBee (www.cyberbee.com/gps_sites.html) exist to help you bring abstract concepts like triangulation into your classroom.

Educate Your Fellow Educators

Geocaching is one of those rare activities that transcends the divisions among traditional subject areas. It also provides educators a way to focus their subject matter. If you catch the geocaching bug, spread it to your fellow educators without reservation.

> **Math teachers** can use geocaching and GPS to make abstract concepts real and relevant (e.g., what a degree is in relation to miles).
>
> **Science teachers** can use geocaching to give shape to inquiries into the natural world.

Language Arts teachers can use geocache logbooks and online posts to give focus to student writing (take a look at the Geocaching.com post Double Dog Dare–GC10H56).

Social Studies teachers can use trackable items to help students explore other cultures.

Physical Education teachers can use geocaching to promote outdoor adventure.

Art teachers can use geocaching to guide student projects via the creation and release of travel bugs and signature items.

From Muggle to Magical

The world comprises two types of people: those who know about the magic of geocaching and those who don't. A fun way to introduce younger students to geocaching is to designate them "muggles." Before conducting a classroom-based geocaching expedition, students can wear a small item that assigns them to muggle status—a pin, patch, sticker, and the like. Then, after a student finds his or her first cache, the muggle item can be swapped for an item that features a lightning bolt, indicating their graduation from muggle status.

Maps That Enhance Geocaching

Geocaching can add a great deal to learning activities; however, there are a few limitations that can be mitigated by using other technology, such as Google Maps and Google Earth. First, because GPS receivers cannot receive signals from GPS satellites while indoors, geocaching is primarily an outdoor activity. Because it is an outdoor activity, it is very susceptible to change due to weather. In the event that a geocaching activity is planned but cannot be completed, Google Earth or Google Maps can be used by students to identify significant landmarks. Unlike using printed maps, students are not limited to merely viewing content. Students can add content to Google Earth through placemarks or image overlays, or they can use Google Maps to view geocache locations.

Also, some locations have a more historically rich geocaching landscape than others. For example, downtown Boston is very different in this regard from the central valley of California. It is unlikely that all students can geocache along Freedom Trail in Boston, so this is a perfect opportunity to use Google Earth or Google Maps to bring Freedom Trail into the classroom. Beyond being able to point out parts of Freedom Trail to students, teachers can ask students to explain the historical significance of specific locations on Freedom Trail by adding placemarks, text, and embedded images and videos.

You may feel that previewing the location of geocaches with tools such as Google Maps or Google Earth is cheating. In terms of geocaching in education, it isn't. This software not only provides a bird's-eye view of cache locations, it also adds a great deal to lessons that involve maps, history, or geocaches. Instead of only

looking at locations on wall maps, teachers and students can interact with geography using Google Maps and Google Earth.

Google Maps

Creating interactive Google Maps requires either a Google account or a Gmail account. Logging into Google Maps with one of these accounts allows students to work collaboratively with you and their peers to create interactive maps. These maps can pinpoint points of interest added by the students—text, images, links to websites, and even embedded video clips. After creating a Google Map, students can make it available for the rest of the class to view. Students can also create a portable version of the map that anybody can open with Google Earth.

Google Earth

Google Earth is popular because of the numerous layers that add information to the satellite imagery of the globe. For example, teachers and students can turn on layers that show images from around the world, or even recent earthquake activity around the globe. Students do not need to have a Google or Gmail account in order to add their own layer of information to Google Earth. By adding placemarks and paths, students can retrace historical journeys or their geocaching journeys as a layer on Google Earth. Students can also add image layers in Google Earth that overlay the satellite images with pictures from their digital cameras or other image resources.

Podcasting Gives Geocaching a Voice

GPS satellite signals do not travel well through ceilings and walls, so one of the limitations to traditional geocaching is that it must be done outdoors. Technology such as Google Maps, Google Earth, and podcasting all provide ways for students to continue geocaching activities while indoors. Podcasts are audio recordings that are simple to create with a digital voice recorder. These voice recordings can either be created by the teacher to provide further information about a geocache, or created by students to provide their descriptions or responses to questions provided by a geocache.

A great extension to a geocaching activity is to set coordinates that will bring students to a specific location, then ask them to listen to a recording on an MP3 player that provides verbal directions to finish locating the geocache. Adding a podcast to a geocaching activity means that students can be directed to find an indoor geocache. To some geocachers, this type of activity has become known as a "podcache." For more information about geocaching and podcaches, visit the PodCacher website (www.podcacher.com).

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