



Student EarthCache™ Site Development

Now that you have practiced EarthCaching yourself, you might want to design lessons that engage students in creating their own EarthCache™ sites. In this type of project, learners or teams of learners develop EarthCache™ sites either as stand-alone caches or as part of a larger class-themed project. The primary audience for these caches would be the students themselves or members of the local community. However, projects that meet the criteria for an official EarthCache™ site could still be submitted for publication at www.earthcache.org. The template provided in Appendix A may be used by students to guide development of their own EarthCache™ sites for the classroom, or to prepare them for possible submission to the EarthCache™ Web site. Students will need access to research materials about the location in order to write up their educational notes. This may involve visits to local libraries or Internet access. Local geology field trip guides from a nearby university, college, or geology museum may also be useful.

How to Use Student EarthCaching in Your Classroom


Creating EarthCache™ Site Themes

Student-developed EarthCache™ sites could take many forms and meet many instructional objectives. Listed below are three major types of student-developed EarthCache™ sites that you might be interested in having your students try.

Content EarthCache™ Sites

This type of EarthCache™ site relates directly to topics that learners may be exploring in formal class instruction. Students demonstrate understanding of the content by developing local EarthCache™ sites related to this material. This is the most immediate way that students can connect their classroom to their world. Concepts introduced in an Earth science or physical geography class can be explored in the students' immediate surroundings.

For example:

1. Learners investigating geologic time or stratigraphy may develop a project similar to Red Rocks EarthCache™ Site ( www.geocaching.com/seek/cache_details.aspx?wp=gcmqgg).
2. Students studying coastal features might develop EarthCache™ sites related local bays, estuaries, and Earth processes occurring there.
3. In many northern regions, students can easily find and cache evidence of glaciers.
4. In urban settings, students can search for geologic aspects of building stone.

Connected EarthCache™ Sites

In this type of EarthCache™ site, learners or teams of learners develop caches that are linked spatially and/or thematically. For example, learners might develop EarthCaches™ at various locations along a river course to observe seasonal changes of a shoreline.

Connected EarthCache™ sites consist of a series of locations that illustrate a particular Earth system concept or changes in a concept throughout a specified spatial area. If your community has nature trails, a stream, or even just a road running through it, a series of connected caches are a possibility.

To begin creating connected EarthCache™ sites you must identify what concept occurs in more than one location in your area. An example could be soils. If your area contains several different types of soil exposed in accessible areas, you could link them together into a series of caches, giving a broader understanding of soils in your area.

Your next step would be to write up the EarthCache™ sites so that each is significant on its own, but also becomes an integral part of the broader concept you are investigating. As in the soils example, learners could describe the chemical components of the soil at a particular site. By exploring other students' caches, learners could discover how soils differ and compare how they were created. This would provide a better understanding of the soils of your area. Similar strategies can be applied to investigations of water and water systems, historic areas, or economic conditions.

Community EarthCache™ Sites

In developing Community EarthCache™ sites, learners investigate an issue of concern to the local community, publicize some element of the issue through the EarthCache™ site, and propose a potential solution to the problem. These types of caches could be either stand-alone or connected caches.

For example:

1. Students might investigate the issue of combined vs. separated storm water/sewer systems. Teams of learners might create an EarthCache™ site at the location of a combined sewer overflow, those places where raw sewage occasionally enters the local water system, and describe the Earth system affected at the location.
2. Alternatively, students might create an EarthCache™ site at the location of a local or regional landfill. Such a cache might describe the geologic formations or soils at these locations and describe the processes that created or deposited them.

Publishing

Whether or not a student-developed EarthCache™ site meets all the publishing requirements of an “official” EarthCaches™, it remains critical that students present and publish their work in some way. The work the student completes constitutes a potentially valuable teaching tool for you as the instructor as well as a learning tool for other teachers and students. Individual instructors will define how the local EarthCache™ sites will be published. These may include strategies as simple as student posters and handouts or as interactive as PowerPoint presentations or local Web sites. Listed below is a broad range of alternative publication strategies.

Intranet

Many schools have a school- or district-wide intranet for use by teachers and students. An area can be set up on the intranet to display the student-generated EarthCache™ sites. Such a site could be as simple or elaborate as time, skill, and interest allows. If the school or district has a technician with interest or students with an aptitude in managing online sites, additional functionality can be offered such as keyword searches on the content of the local EarthCache™ sites developed by students. Teachers should consider, however, whether there are an abundant number of possible EarthCache™ sites within reach of the school. This may affect publishing if the teacher wants to use the sites for subsequent yearly classes.

Teacher Web Site

The same technique used in intranet posting can be used to post local EarthCache™ sites to your own teacher Web site that students and/or community members might access. Set up a page where students can scroll through the various local EarthCaches™ and learn about their community through the eyes of their peers.

PowerPoint

An interactive PowerPoint presentation is a powerful tool to present local EarthCache™ sites developed by students. Students can design a series of PowerPoint slides that include the different sections of the local EarthCaches™. There can be links on the slides that include video, jpg images, and even sound clips that enhance the description of the area of the EarthCache™ location. If other students will be able to view the PowerPoint independently, text can be added

to inform readers about it. If the PowerPoint is going to be presented, the text portions will need to be very short bullet points, and the local EarthCache™ student developer will need to “teach” their peers the parts that are not graphic or auditory. If students choose this method, do remind them that audiences do not like to read PowerPoint slides; they prefer the presenter tell them about the materials.

EarthCache.org Database

Students who meet the official EarthCache™ logging requirements can be encouraged to submit their projects for review and posting as part of the international EarthCache™ database. Such posting would unquestionably meet the criteria for authentic assessment. Be certain that students have read and understand the official submission requirements. Approximately 60% of first submissions are rejected due to failure to comply with one or more of the official requirements.

It should also be noted that only one EarthCache™ site is allowed at each particular location. Learners interested in posting on the international Web site should confirm before beginning work that no EarthCache™ currently exists for the proposed cache site. Likewise, if multiple teams of investigators intend to create EarthCaches™ for the same location, you might encourage them to work cooperatively to develop a single EarthCache™ site.

Finally, you should also be aware of the need to supervise the listings that are accepted for publication on the EarthCache™ site. Supervision consists of approving logging requests from individuals who have visited the cache and responding to inquiries from visitors. Students may be expected to supervise their own EarthCache™ listings or you may consider taking on this responsibility yourself. If a site is not properly supervised, the Web site management reserves the right to archive the listing until such supervision is in place. Please note that there is a “firewall” between the EarthCache™ supervisor and other individuals accessing the Web site. In other words, other users are not able to contact the EarthCache™ supervisor directly through personal email. Make it clear, however, that no personal information should ever be included in an EarthCache™ site since it is accessible by the outside world.

Authentic Assessment Strategies

Student involvement with EarthCaching projects may be evaluated in a number of ways. These may include traditional, knowledge-based assessments based on the content material addressed in the assignment. Projects are also candidates for constructed response and essay-based assessments. As collaborative, project-based learning experiences, EarthCache™ sites also lend themselves to rubric-based evaluation and authentic assessment.

The latter consists, in its essence, of asking learners to demonstrate the knowledge or skill defined as the expected learning outcome. Most often, this learning is assessed using a rubric that specifies what the learner is to be able to do or know by the end of the activity. Authentic assessment also frequently demands the development or creation of a product of some sort. Many elements within a student-developed EarthCache™ site project lend themselves to authentic assessment strategies.

General Assessment

The most elemental form of authentic assessment involves evaluating whether or not the project meets the standards of a publishable EarthCache™ site. After completing a project, learners

may simply analyze the project using the provided checklist to confirm that all the elements of a publishable project are present, and then submit the project for consideration. If the project is accepted, it is successful. If the project is rejected, it will need to be revised and improved until it meets all requirements for publication.

Content Specific Assessment

Student-developed EarthCache™ sites may also be evaluated based on attainment of local standards and content objectives. Such evaluations would require locally developed rubrics defining the desired outcomes and the tasks that would be considered evidence of their attainment.

Peer Assessment

Learners might also be encouraged to assess and evaluate each other's performance. This evaluation could take place both within and between groups.

Intra- and Intergroup Assessment

Intragroup assessment might consist of providing team members an opportunity to constructively evaluate the performance of other members of the team. This could be done formatively, during the project, as a means of improving cooperation and collaboration skills while producing a superior product. It might also be done summatively, at the conclusion of the project as a means of evaluating the effectiveness of each team member's level of contribution. An example of a peer assessment rubric is provided in Appendix C of this document.

Intergroup assessment might also consist of teams of learners attempting to carry out other teams' EarthCache™ sites. Evaluation could address both mechanical and content questions. Are the directions adequate? Is it possible to complete the investigation successfully? Is the learning outcome appropriate to the content under consideration? Is the learning meaningful and engaging? Again, this type of evaluation would benefit from the use of locally developed rubrics.

The following link will take the user to an online 'toolbox', The Authentic Assessment Toolbox, that offers assistance and support to teachers wishing to explore strategies and develop rubrics and other tools designed to assist with the evaluation of EarthCaching projects:

 www.jonathan.mueller.faculty.noctrl.edu/toolbox/.

EarthCache™ Masters Program

Students who really enjoy EarthCaching and continue to pursue the activity on their own can also be made aware of the EarthCache™ Masters Program. This GSA program gives them an opportunity to earn a physical reward for visiting EarthCache™ sites — an EarthCache™ pin. There are four EarthCache™ Master Levels and four pins to earn. Details of the program can be found in Appendix F.

Checklists for Student-Developed EarthCache™ Site Projects

Field Checklist

- GPS receiver (at least one)
- Extra batteries
- Topographic map
- Notepad or clipboard with paper
- Pencils
- What you need to be comfortable in the field
 - o Appropriate clothing
 - o Hat
 - o Water
 - o Sturdy shoes
 - o Sunscreen
 - o Bug repellent
 - o Watch (coordinate time to meet if necessary)
 - o Plastic bags to cache in, trash out

Assignment Checklist

- Copy of assignment criteria
- EarthCache™ site form
- Background information needed for understanding the site