

# 7 things you should know about...

## Google Earth

### Scenario

As part of a course on U.S. history, Alexander is writing a paper about the Lewis and Clark expedition, focusing on a critical decision. When the party arrived at a fork in the river in June 1805, the crew believed the north fork was the proper route; Captains Lewis and Clark thought the south course would get them to the Pacific Ocean. Alexander looks at the area on Google Earth, which helps him understand the geography of this part of Montana.

Alexander decides to supplement his paper with a visualization from Google Earth. He has a complete set of Lewis and Clark's maps, in JPEG format, from their journey. He carefully overlays their maps onto the images in Google Earth, adding placemarks for important milestones. Once he has the journey superimposed on the satellite images, Alexander creates a screencast of himself navigating across the country toward the coast, following the route that the explorers took. His screencast narration touches on the events and circumstances that led to the decision at the fork near what is now the town of Great Falls. The images help explain the quandary the party found themselves in, as well as how they came to know they made the correct choice of the southern fork. Alexander also shows where the north fork would have taken the explorers and includes a hypothetical scenario about the difficulties the group would have encountered had they gone that way.

When he gives his presentation, Alexander uses Google Earth to show the class the areas he is talking about, zooming in and out to let students see the river and the expedition's course. The class is particularly interested in areas along the journey for which Google Earth represents the topography in 3D. The application also allows Alexander to click through to Internet resources that further explain many of the locations in his presentation.

### What is it?

Google Earth is an interactive mapping application that allows users to navigate (or "fly") the entire globe, scanning satellite imagery with overlays of roads, buildings, geographic features, and numerous other location-specific data points. Users can add their own points of interest and share them with others, chart routes, plot areas, calculate distances, and overlay separate images onto the application. Google Earth connects to the Internet, making online resources available in connection with particular places. For example, flying to Soldier Field in Chicago shows that location and also links to online maps of the area, comments about the field, and the results of a Web search for the name of the field. For some locations, the application creates 3D representations, both of topography, as for the Grand Canyon and many mountainous areas, and for buildings in some metropolitan areas. Users can show or hide available layers in any combination. Someone working out a road trip, for instance, might show roads, lodging, and restaurants but not shopping or airports. Using the scale and the measurement tools, this user could plot mileages, find places to eat and stay overnight along the way, and link to Web sites to contact those establishments.

### Who's doing it?

Google Earth has become a favorite for people needing to easily show locations, such as a mining company giving a presentation about current or potential sites. Many educators use Google Earth to help students understand subjects ranging from sciences to liberal arts. Geologists can take students—virtually—to an area being studied and show them the topography and surrounding areas, quickly zooming out and flying to other locations. Other scientists overlay images of subject material, such as layers of rock, relating the material to images of the real world. Liberal arts faculty show locations of current events and link to resources about those events, or give tours of historical locations. Some administrators have also found the application valuable for developing student recruitment materials, such as interactive maps and demonstrations of campus.

### How does it work?

Google Earth can be downloaded and installed for free. Users fly to locations around the world by entering addresses, names of landmarks or features, or latitude and longitude coordinates.

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Alternatively, users can search within a specified region for keywords. For example, you could search for “pizza” in “New Haven” and see on an interactive map all the locations that meet those criteria. Zooming in and out determines the number and kind of features or locations displayed as the resolution changes. As you zoom closer to a residential area, for instance, smaller streets and their names begin to appear. Locations on the map are clickable, opening a pop-up window with information about that place, links to related resources, photos, or other information. Users can change the orientation of the compass points of the map and adjust the aspect such that the map is shown at any angle—from directly above to horizontal. For areas rendered in 3D, adjusting the aspect gives the impression of moving through a real space. Users can add placemarks, which are clickable indicators of particular locations, and create structures using SketchUp, a 3D design application that integrates into Google Earth. Structures created with SketchUp can be exported to other users and tagged for organization.

## Why is it significant?

With Google Earth, colleges and universities can—without additional resources—leverage Google’s integration of vast amounts of data in an easy-to-use interface. Being able to fly students from the Great Pyramid of Khufu to the Eiffel Tower to the Sydney Opera House can bring a wide range of subject matter alive. The tool’s visual immediacy could prove enormously beneficial, for example, for a survey of various styles of architecture. Individually, students can use Google Earth to investigate places they are studying. Because it is interactive, the application encourages users to keep using it—to fly to new places, places they used to live or hope to live one day, scenes of events in the news, or parts of the world they may never visit in person.

More than just a map, however, Google Earth lets users create and share personal resources. Browsing and exploring distant locales augmented with contributions from other users presents a compelling opportunity for discovery and learning. Contributing anecdotes, stories, and histories will allow users to communicate in a context of geography.

## What are the downsides?

Because Google Earth displays images based on satellite data, users see a snapshot in time. If a building is added to the landscape—or torn down—those changes won’t immediately be reflected in the application. Moreover, satellite imagery is not available at the same resolution for all locations. For some cities, you can zoom in close enough to see people walking on sidewalks; for other places, the resolution might only show buildings or blurry cars. Higher-resolution imagery is often available in many parts of the United States, resulting in a perception among some that Google Earth exhibits a U.S. bias, an impression exacerbated by the fact

that currently most of the 3D buildings are in U.S. cities. Other concerns stem from its being an application owned by a commercial enterprise, which makes some academics uneasy about relying on it. Google Earth also uses a considerable amount of memory and bandwidth and requires substantial graphics capabilities. On older computers or those with slow connections, the experience of using the application can be frustrating and may cause slowdowns for other applications. In addition, some have expressed concern that Google Earth creates risks to personal safety, given that it offers anyone access to images—sometimes at a very high resolution—of their residences or offices and surrounding areas.

## Where is it going?

Google Earth will become more sophisticated, with additional tools and increasing coverage of high-resolution imagery. The number of places that offer 3D imagery is also likely to expand. The dramatic views and capabilities of the program have spawned communities of users who develop content—placemark collections on particular topics, 3D structures—that is available to others. Acting as the technical infrastructure, Google Earth allows users to share personal histories. Geographic notations can be found on many topics for many different places, and by integrating with other existing applications, Google Earth is positioned to become a spatially based collection of facts and knowledge.

Educators have started a number of blogs, user groups, and forums where they share ideas and experiences using Google Earth in the classroom, as well as post exercises they have created that use the application. As tools emerge to export content from Google Earth to other applications, such as video files, instructors will be able to give students assignments to create projects using the application and share those projects with others.

## What are the implications for teaching and learning?

Google Earth is another in a growing list of applications that can move ideas from the pages of a book into the imaginations of students. The experience of flying over Tripoli and then Brussels and comparing how the two cities are designed is immediate and compelling. Students today expect technology to be part of education, and Google Earth is a way for institutions to provide that component in a tool that students find familiar and comfortable. It provides educators a means to assess and bolster students’ visual literacy skills, and, to the extent that it gives students a peek into virtually any corner of the world, Google Earth can help them develop a context for spatial and cultural differences around the world.