

2004

# Online Digital Archives Technology That Supports Rich, Student-Centered Learning Experiences

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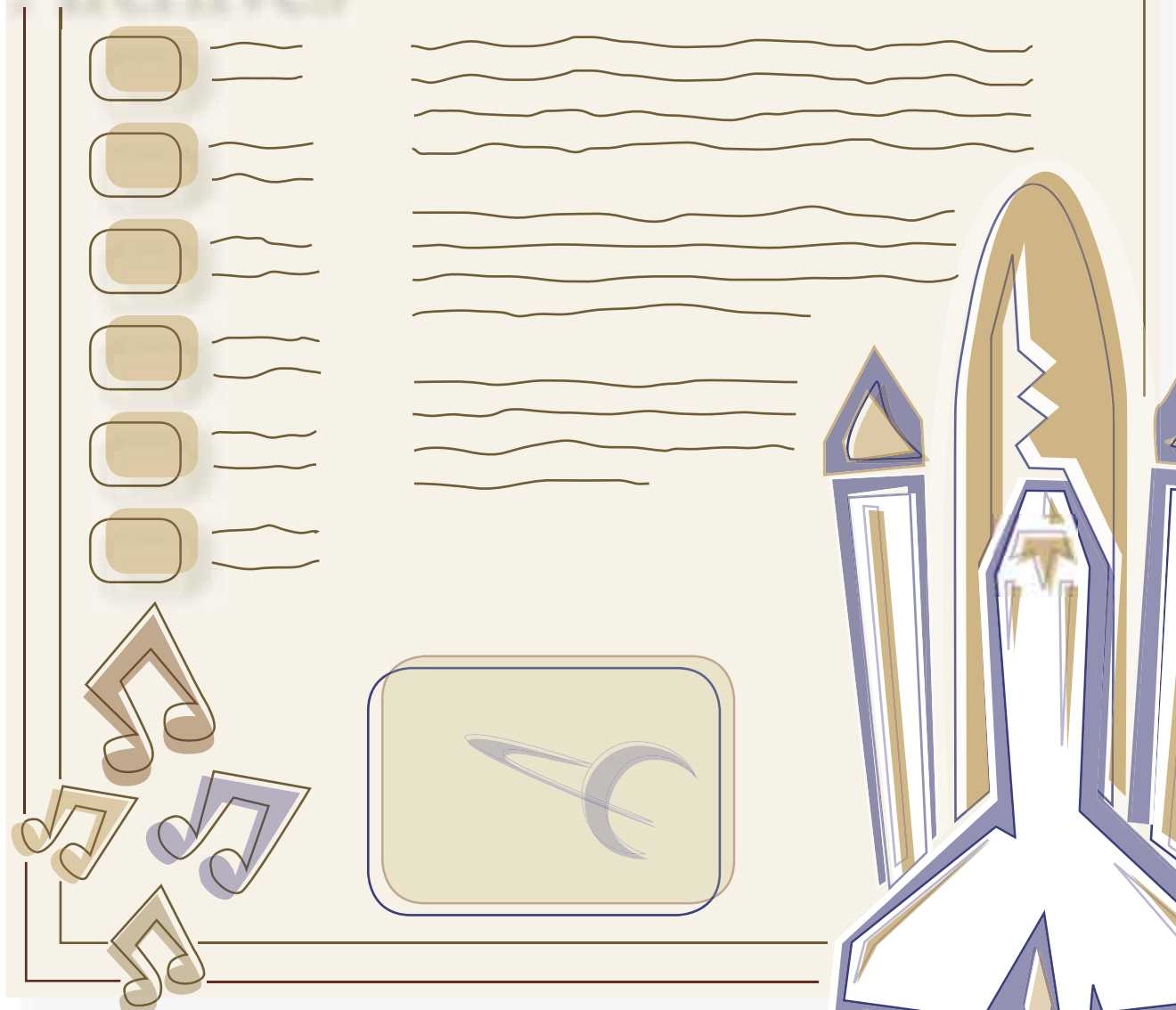
## Recommended Citation

Hofer, Mark J., "Online Digital Archives Technology That Supports Rich, Student-Centered Learning Experiences" (2004). *Articles*. 32.

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# Online Digital Archives



By Mark Hofer

**Subject:** Access, inquiry-based activities, student-centered learning

**Grades:** K–12 (Ages 5–18)

**Standards:** NETS•S 3, 5, 6; NETS•T II (<http://www.iste.org/standards/>)

Technology That Supports  
Rich, Student-Centered  
Learning Experiences

Today's students watch the newest movie trailers on the Web, share music files, play video games with other players over the Internet, and swap digital pictures of the latest teen idols. Donald Tapscott points out in his book *Growing Up Digital* that as this rich multimedia experience becomes more a part of students' lives outside of school, they will further expect this kind of experience in school as well.

A student's in-school experience with media is often quite different than in their personal lives. Despite increased technology access and student-centered and constructivist activities, the typical classroom often still emphasizes text and audio channels to transmit knowledge. Although it may be difficult for a fifth grade teacher to compete with MTV and *The Lord of the Rings* movies, teachers can leverage the rich multimedia resources accessible on the Web to support meaningful, content-based instructional activities by using online digital archives.

A digital archive is a Web-based collection of a wide variety of digital media focused around a common topic. The best digital archives do more than provide a collection of links to different resources on a topic; rather, a true archive houses all the materials on one Web server, helping ensure that materials referenced are well organized and available. Many digital archives are hosted by universities or government agencies, increasing both the likelihood that the site will be functional and the probability that materials have been screened by experts to increase their validity.

The topics can be either very specific (The Civil Rights Movement in Mississippi) or quite broad (animals). A common feature to many digital archives is their inclusion of a wide

variety of media types to provide multiple representation of the topic at hand. For example, a single archive might include text files, images, video, sound, animation, and other types of materials to provide a diverse, rich learning environment. Descriptions of the following archives provide a glimpse into the classroom potential of this rich resource. (*Editor's note:* Find URLs under Resources on p. 11.)

### Digital Archives in the Classroom

Although Web archives are undoubtedly great resources, merely having access to these rich collections of materials is only the beginning. For digital archives to effectively support teaching and learning, activities must be structured in a way to leverage the potential of these resources in ways that are meaningful for students while addressing worthwhile content standards at the same time. Although these resources could be used in instruction in numerous ways, the following examples focus on student-centered activities in which students explore the archives to create their own understanding of the topic at hand.

#### *Reactions to September 11, 2001.*

Perhaps one of the richest and most complete digital archives currently available on the Web is the September 11 Digital Archive. Created to "collect, preserve, and present the history of the September 11, 2001, attacks," the 9/11 archive provides a vast array of materials to explore the tragedy in New York, Pennsylvania, and Virginia. Upon visiting the site, the visitor has the option to explore the events

of and reactions to 9/11 in a variety of media formats including still and moving images, sound files (firsthand accounts and music), and a forum to read and contribute personal reflections on the events. Because of the sensitive and emotional nature of the subject, you should preview the materials included in the archive. In particular, some of the images are graphic and the satirical animations may be offensive to some viewers.



The September 11 Digital Archive allows students to see and hear the accounts of those involved in the 2001 attacks in New York, Pennsylvania, and Virginia.

A quick exploration of the site yields examples of children's artwork of how they depict the events, satirical animations of Osama bin Laden, countless images of the twin towers and the devastation that ensued, and a letter from a father to his six-month-old daughter describing the events he and his family experienced. You will find excellent images and poems to use as writing prompts in language arts classes. You could also challenge students to create a "found" or recycled poem using words and

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phrases found in the letters, poems, and essays found in the archive to convey their feelings about the 9/11 tragedy.

**Space Science.** The National Aeronautic and Space Administration (NASA) has compiled and posted a tremendous amount of resources related to the space program and outer space in general. A visit to the site brings billions of dollars worth of research and exploration to your fingertips. Under the multimedia heading are links to more than 300,000 carefully indexed, high-resolution images, video clips, an art gallery, and interactive multimedia, including a solar system simulator.



The NASA Web site contains rich materials to help you bring real-world science into the classroom.

A detailed history of the space program, including all the missions, provides mission background and objectives, astronaut biographies, results and findings from the missions, and many sound clips, including an extensive collection from the Apollo lunar missions. Items including an exploration of food and nutrition in space, an interactive tour of the space shuttle's crew compartment and

payload bay, and a behind-the-scenes look at the shuttle *Discovery's* recent overhaul bring the space program to life. You can lead students through the development and execution of the MESSENGER mission to Mercury. Students can follow, in real time, the progress of the mission, submit questions to the crew at mission control, and build a printable model to build a 3-D version of the spacecraft.

**Archimedes and Complex Mathematical Topics.** The wide variety of materials available in digital archives opens up many instructional opportunities for the classroom teacher. A difficult concept for many students to understand in mathematics is how mathematical principles and discoveries can be applied in the real world, and how some of these discoveries have literally changed the world. Teachers often attempt to address this problem by having their students research famous mathematicians and the impact of their work. The Archimedes digital archive housed at Drexel University provides students with a wide array of images, texts, animations, and even sounds to see how his many inventions and ideas changed the ancient world.



Web sites, such as this one about Archimedes, can help students see the relevance of ancient thinkers in the modern world.

In this site, students can explore animations that demonstrate the Law of the Lever and the displacement of water. Students can also explore

Archimedes' many war machines, including the Iron Claw and the Burning Mirror. Finally, detailed images and descriptions can be found on his development of "pi" and the Egyptian Screw, which is used to pump water from one place to another. The multiple ways complex topics are represented along with the hyperlinks between connected concepts and ideas help students understand Archimedes' achievements in a more holistic way than would be possible in static accounts or descriptions. One activity to use the Archimedes archive in the high school classroom is to challenge students to design a presentation on why Archimedes should be inducted into the newly created Mathematicians Hall of Fame. Students should focus on how his achievements have changed our world. By identifying specific ideas and contributions and creating a rationale for why they were so influential, students will have a better understanding of both Archimedes's accomplishments and how mathematical principles affect society.

**Inquiry and the Civil War.** Recently, local and national standards are placing an increasing emphasis on higher-order thinking skills. Student-centered inquiry projects, in particular, are emphasized in national standards, including the National Standards for History and the National Science Education Standards. In these activities, students are challenged to ask a question centered on a topic, design their own procedure to gather and analyze information, and reach a conclusion grounded in the evidence they found.

Although many classroom teachers see the value of this type of learning experience, a true inquiry activity can be difficult to implement in the classroom because of the limited resources of school libraries and the often-inefficient process of independent student Internet research. Digi-

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tal archives can provide a collection of resources in one place to support an authentic investigation activity.

The Valley of the Shadow: Two Communities in the American Civil War project, created and hosted by the University of Virginia's Center for Digital History, is a rich collection of primary source materials from the U.S. Civil War. The archive focuses on the experience of two communities in the war (Franklin County, Pennsylvania, and Augusta County, Virginia) and provides access to thousands of pages of diaries, letters, newspaper articles, government documents, pictures, maps, census and tax records, and a variety of other official records from 1859–1870. An interactive battle map allows users to visually track the progress of a variety of individual units throughout the war, while viewing or hiding several geographic details such as rivers or current roads and highways.



This interactive battle map at the Valley of the Shadow Web site shows the movement of specific troops and battle sites.

The collection can be browsed or searched in a variety of ways through either a graphical or text-based interface. The collection and organization of resources in the Valley of the Shadow project support students in conducting historical inquiry investigations in much the same manner as historians would. As the Web Inquiry Project activity *The Civil War and the*

*American Family* illustrates, this rich collection of documents can enable students to ask and answer sophisticated, student-generated questions about what life was like for a typical family in the Civil War. In this activity, students are guided through the process of asking specific questions about a letter from Thomas Garber to his sister Addie in 1862. This initial activity can lead into an activity in which students ask their own questions about life during the Civil War. Using the database of letters and diaries to help find answers to their questions, the activity could encourage students to explore a specific set of resources or topics within the database or be more open-ended. Students might be asked to create a set of diary entries from the perspective of a person whose experience is captured in the materials or create their own newspaper chronicling a topic found in the database, drawing from historical resources rather than just on information found in the textbook.

The diversity and depth of existing digital archives available on the Web provide opportunities for student investigations in all grade levels and content areas.

**Constructing Meaning through Digital Storytelling.** Another exciting possibility with digital archives is the potential for students to select archive elements and produce their own presentations to illustrate their understanding of a particular curricu-

lar topic. The digital format of these materials allows students to easily incorporate them into a variety of formats for presentation, including word processing documents, multimedia presentation, Web pages, and digital video creation/editing software. An increasingly popular application of digital materials for students to demonstrate their understanding of a topic is through digital storytelling. The Center for Digital Storytelling is an excellent resource for guiding students and others interested in developing digital stories. The *Digital Storytelling Cookbook* included on the site is a helpful guide in structuring the story creation process.

A visit to the Animals archive from the Sea World digital archive presents students with a wealth of information on animals, including text, images, video clips and sounds. Although a scavenger hunt of some kind will assist students in exploring the archive, by challenging students to use the resources included on the site to construct a story of an animal's life or adventures provides a more motivating and dynamic learning experience than merely a hunt for facts. For example,



The Sea World Web site is a source of information about many different animals, including the killer whales for which the theme park is famous.

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by copying and pasting relevant elements from the archive into a PowerPoint presentation, students can either add text captions or record a voice narration of the story to tie the artifacts together to tell a story. In the end, students have created a dynamic presentation that they can share with their classmates and parents, demonstrating a multifaceted understanding of their chosen animal.

### Considerations and Closing Thoughts

Although the potential of using online digital archives to support teaching and learning is considerable, there are concerns to consider. Chief among these are bandwidth limitations and copyright and fair use issues. A practical limitation in using digital archives can be the limitations of the school's Internet connection. To download some of the rich image, video, and audio files available in many digital archives requires a high bandwidth connection, particularly when students are exploring an archive on several computers simultaneously, such as in a computer lab. For the experience to be effective in a computer lab, students will need to be able to simultaneously access large resources. If the network connection cannot support this, perhaps using one computer as a station in the classroom might be a better approach.

Another significant concern regards copyright and fair use of materials posted on the Web. Contrary to what students and some teachers might believe, just because something is posted on the Web does not mean it is free for others to use. Fortunately, the U.S. Copyright Act considers the special needs and considerations of teachers and students. The Fair Use

Guidelines for Educational Multimedia provides certain guidelines under which teachers and students can legally use copyrighted materials in class projects. Before making student work using copyrighted materials (particularly posting projects on the Web), it would be wise to explore copyright issues in more depth.

Although the bandwidth limitations and concern over fair use of copyrighted materials are factors to consider, the potential of online digital archives to support and facilitate a wide variety of student-centered activities make this opportunity difficult to pass up. As more archives surface, the opportunities and potential to reach and engage the Digital Generation will also increase.

### Resources

- Archimedes: <http://www.mcs.drexel.edu/~crrorres/Archimedes/contents.html>
- Center for Digital Storytelling: <http://www.storycenter.org/>
- The Civil War and the American Family: <http://edWeb.sdsu.edu/wip/examples/garber/student.htm>
- NASA Web site: <http://www.nasa.gov/home/>
- Sea World: <http://www.seaworld.org/>
- September 11 Digital Archive: <http://911digitalarchive.org>
- U.S. Copyright Office: <http://www.copyright.gov>
- Valley of the Shadow—Two Communities in the American Civil War: [http://valley.vcdh.virginia.edu/govdoc/search\\_images.html](http://valley.vcdh.virginia.edu/govdoc/search_images.html)



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