

# Hoover Dam

## Instructor Guide

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Hoover Dam Instructor Guide Credits:

Kate Benjamin, Project Coordination & Layout

Dana Hawman, Copywriting

Lisa Krunwedie, Instructional Design

## Instructor Guidelines

The Hoover Dam learning node is designed for use at the secondary level to provide learners with a self-paced virtual reality experience. Learners are able to explore a geographic area they may have never experienced with the presentation of panoramic views that can be enhanced with a head mounted display and motion sensing tracker. Embedded fact files on various attributes of the Hoover Dam, enable the user to interact with the software.

The accompanying study questions and problem-based projects can be used to guide student learning with the software. These activities support the learning objectives and the Arkansas State Standards outlined in this Instructor Guide.

The problem-based learning scenarios provide the learner with opportunities to apply inductive and deductive reasoning, cause and effect and creative thinking strategies. The question format is based on Bloom's taxonomy of intellectual behaviors. The six levels allow the learner to begin with simple recall of facts, as the lowest level, and move towards more complex mental levels such as synthesis and evaluation.

The duration of the program varies depending on the extent of its use. After an initial exploration, the instructor will decide which activities to assign to the students. The flexibility in the program addresses those learners who complete only the required assignments, as well as those who wish to explore it in more depth.

### Hoover Dam Background Information

The Hoover Dam is considered by many to be one of the greatest accomplishments in civil engineering history. The dam straddles the border between Nevada and Arizona and reminds passing motorists of its marvel when they travel between the two states. The dam was named for Herbert Hoover, the Nation's 31<sup>st</sup> President, who was instrumental in its development. The dam is a source of hydropower, supplying energy for several areas in the Southwest. To understand the success of this project, an examination of the great care and planning that went into the construction of the dam, and the operational features provide a framework for educational research. The dam stands proudly in the desert as an engineering wonder, adorned with winged sculptures that represent the visionary spirit of mankind and the building genius of America.

## Instructional Materials

Hoover Dam interactive software

Educational Reality System (ERS) hardware system including head mounted display with motion sensing tracker, flying mouse input device, keyboard & standard mouse, flat panel monitor, surround sound speaker system

Hoover Dam Instructor Guide and project copying masters

## Guidelines for Use

The Hoover Dam learning node is designed for self-paced use within the classroom or computer lab setting. There are a number of different ways to organize use of the software. One or more students may use the software at a time. Although there is only one head mount display per workstation, the same image appears on the monitor. Therefore, students can take turns using the head mount and work in teams. Another option is to have students work independently with the software, and in groups for the accompanying projects. The instructor can develop a sign-up sheet for scheduling rotation of the students. Students should be allowed some exploration time to get used to the structure of the learning node and feel of the head mount, before they are required to complete assignments. The copying masters found in the back of this guide are designed to accompany learning at each level of Bloom staxonomy.

# Arkansas State Standards for Grades 9-12

The Hoover Dam learning node addresses the following Arkansas State Standards for grades 9-12.

## Social Studies

### Strand 1: Time, Continuity and Change

TCC.1.4. Link historical events region to region along timelines.

TCC.1.6. Analyze and evaluate the history, causes, consequences, and possible solutions to persisting issues, such as health, security, resource allocation, economic development, and environmental quality.

### Strand 2: People, Places and Environments

PPE.1.2. Evaluate the effects of science and technology on individuals, groups and organizations.

PPE.2.5. Investigate ways that natural or man-made environments interact with culture by using a variety of experiences such as field studies, interactive technologies, works of literature and the arts

### Strand 5: Social Science Processes and Skills

SSPS1.1. Integrate reading, writing, listening and speaking skills throughout the social sciences.

SSPS1.2. Develop and enhance observation, questioning and interpretive skills throughout the social sciences

SSPS1.3. Develop and enhance critical analysis skills, such as cause and effect and inductive and deductive reasoning throughout the social sciences.

SSPS1.4. Employ creative thinking skills throughout the social sciences.

SSPS.2.5. Draw inferences.

SSPS.2.6. Use appropriate tools, such as globes, maps, statistical data, primary historical sources, relevant media resources, interactive technologies, and field studies, etc.

## Science

### Strand 1: Physical Systems

PS.2.23. Distinguish between direct and alternating current.

PS.3.1. Analyze the role science plays in everyday life and compare different careers in the physical sciences.

PS.2.23. Apply technology as appropriate tools for solving problems.

### Strand 2: Life Science Systems

LS.2.12. Analyze the flow of energy through various cycles including the carbon, oxygen, nitrogen and water cycles.

### Strand 3: Earth / Space Systems

ES.2.3. Explain how Earth's energy sources and materials are conserved, interrelated and recycled; include ores, and the following cycles - water, oxygen, carbon and nitrogen.

Arkansas  
State  
Standards for  
Grades 9–12  
(continued)

Language Arts

Strand 1: Writing

- W .1.4. Synthesize information from a variety of sources, such as traditional print, word processors, spreadsheet, graphic software, Internet, etc.
- W .1.5. Write in response to new learning in a variety of forms.
- W .1.6. Write to persuade, to defend, to inform, and to explain from thoughts, experience and research.
- W .1.8. Write for real or potentially real situations such as job applications, business letters, college applications.
- W .1.10. Construct from text a statement of central purpose and theme.
- W .1.12. Gather research data from a variety of traditional and electronic sources to formulate, substantiate, or refute opinions or theories.
- W .1.17. Revise writing for clarity, coherence, economy, syntax, and style.
- W .1.18. Share writing through peer/teacher feedback sessions, exhibitions, classroom displays, multimedia publications, and contests
- W .2.2. Edit writing for appropriate mechanics and usage.
- W .2.5. Synthesize research data into an original work and present that work in a developmentally appropriate manner, such as reports, annotated bibliographies, research papers, multimedia presentations, etc.

Strand 2: Reading

- R.1.3. Read and analyze a variety of materials for academic and other purposes, e.g. science journals to illustrate current trends in science, biographies to provide understanding of historical events, etc.
- R.1.8. Articulate the central purpose or theme of a text.
- R.1.10. Gather research data from a variety of traditional and electronic sources to formulate, substantiate, or refute opinions or theories.
- R.1.16. Apply critical thinking skills in interpreting text, e.g. inferencing, comparing/contrasting, analyzing, evaluating.
- R.2.4. Use the library, the Internet, and other sources of information gathering tools to develop informed opinions and make decisions in order to achieve educational and employment goals.
- R.2.5. Use electronic media for language arts purposes.
- R.2.6. Use the Internet appropriately for information gathering and problem-solving.

Strand 3: Listening, Speaking and Viewing

- LSV.1.2. Express and logically defend one's ideas.
- LSV.1.6. Use graphics and supporting audio-visual media.
- LSV.1.13. Evaluate information from a variety of sources.

# Instructional Objectives

After exploring the Hoover Dam learning node and completing the related activities, students should be able to complete assignments associated with the following learning objectives. The objectives and their level within Bloom staxonomy are shown below:

## Knowledge Level:

The learner will list reasons why the Black Canyon site was chosen for construction of Hoover Dam.

The learner will name three cities that benefit from the power produced at Hoover Dam.

The learner will identify the type of architecture used for the construction of Hoover Dam.

The learner will list the primary reasons for building Hoover Dam.

The learner will name the dams built downstream from Hoover Dam.

The learner will list two benefits of Davis Dam.

## Comprehension Level:

The learner will explain how the Colorado River Compact resolved conflicts over water rights

The learner will describe how the cost of Hoover Dam was repaid.

The learner will describe the phases of Hoover Dam construction.

The learner will explain the operational features of Hoover Dam.

The learner will explain what happens to the money earned from the sale of hydroelectricity at Hoover Dam.

## Application Level:

The learner will create a tour presentation outlining the features of Hoover Dam.

The learner will design an animation storyboard to explain hydropower.

## Analysis Level:

The learner will compare alternating current (AC) to direct current (DC) power.

## Synthesis Level:

The learner will write a resume for a chosen science-related career.

## Evaluation Level:

The learner will evaluate the impact of dams on the environment.

The learner will evaluate their water use as it relates to water conservation.