

Computer-Assisted Instruction and Science

What Is Computer-Assisted Instruction?

“Computer-assisted instruction” (CAI) refers to instruction or remediation presented on a computer. Many educational computer programs are available online and from computer stores and textbook companies. They enhance teacher instruction in several ways.

Computer programs are interactive and can illustrate a concept through attractive animation, sound, and demonstration. They allow students to progress at their own pace and work individually or problem solve in a group. Computers provide immediate feedback, letting students know whether their answer is correct. If the answer is not correct, the program shows students how to correctly answer the question. Computers offer a different type of activity and a change of pace from teacher-led or group instruction.

Computer-assisted instruction improves instruction for students with disabilities because students receive immediate feedback and do not continue to practice the wrong skills. Many computer programs can move through instruction at the student’s pace and keep track of the student’s errors and progress. Computers capture the students’ attention because the programs are interactive and engage the students’ spirit of competitiveness to increase their scores. Also, computer-assisted instruction moves at the students’ pace and usually does not move ahead until they have mastered the skill. Programs provide differentiated lessons to challenge students who are at risk, average, or gifted.*

What Does CAI Look Like for Science?

Science computer programs demonstrate concepts, instruct, and remediate student errors and misunderstandings from preschool through college levels. Some programs help students learn key vocabulary words; others demonstrate concepts such as how machines work, the life cycle of a butterfly, and the positions of the stars and planets. Students can use Web sites to research information, find resources, or locate topics for science fair projects. Many science textbooks come with interactive CD-ROMs that can be used to reinforce ideas. Computer-created graphic organizers and concept maps can be used by students to organize ideas in science or as

A Web site developed by the University of Vermont, <http://www.uvm.edu/~jmorris/Sci.html> contains links to many science programs. There are virtual field trips and experiences, science museums, lesson and unit plans, science information and ideas, and videos and software. Not all of the sites are free, but there are a variety of programs described, and this site is a good place to start. One site, for example, <http://gldss7.cr.usgs.gov/neis/qed/qed.html>, developed by the USGS, shows the position and magnitude of the earthquakes that have occurred over the past 8 – 30 days. One word of caution, try the Web sites on the above university Web site before you plan to use it. Several of the links are no longer available.

* The programs cited in this discussion are based on research; however, it is not the purpose of this report to evaluate the rigor of the research supporting the programs themselves.

a guide for interpreting information found in a science textbook. Students can spend time in a virtual laboratory studying chemical reactions or observing a microscopic cell. They can answer questions about animals, see how clouds and mountains are formed, or watch the movement of the plates of our planet. There are games, quizzes, and information to support and enhance instruction. Problem-solving activities help students improve their higher order thinking skills and challenge all students. Below is an example of what students may see on the United States Geological Survey (USGS) Web site.

The USGS Web site, <http://quake.wr.usgs.gov>, has information that can enhance instruction about plate tectonics, waves, geography, history, and earthquake safety. Seismic charts from earthquake centers around the world show how the waves from the earthquake travel through the earth's crust. Students can choose cities in the United States and determine from the earthquake activity map how their cities were affected. They can also see the pattern of the earthquakes that helped scientists develop the plate tectonic theory. Finally, the USGS Web site has links to preparedness and safety organizations.

Real-time maps show how many earthquakes take place each day and where they were located.



Seismic charts from earthquake centers around the world show how the waves from the earthquake travel through the earth's crust.



How Is CAI Implemented?

Teachers should review the computer program or the online activity or game to understand the context of the lessons and determine which ones fit the needs of their students and how they may enhance instruction.

- Can this program supplement the lesson, give basic skills practice, or be used as an educational reward for students?
- Is the material presented so that students will remain interested yet not lose valuable instruction time trying to figure out how to operate the program? Does the program waste time with too much animation?
- Is the program at the correct level for the class or the individual student?

Computers may be used individually or in groups in a cooperative learning environment where students can discuss the concept as it is learned. Teachers should also review all

Web sites and links immediately before directing students to them. Web addresses and links frequently change and become inactive. Students might become frustrated when links are no longer available.

Students may be scheduled for instructional or remedial time with the computer. The computer program may also be a learning station in a classroom learning center or a reward for positive behavior or work completion.

References and Resources

<http://www.col-ed.org/smcnws/msres/curriculum.html> - These internet-based lesson plans for math and science are for both elementary and high school age. The Atoms Family from the Miami Museum teaches energy concepts to elementary aged children.

<http://dlcenter.larc.nasa.gov/> - NASA's Center for Distance Learning. This site helps educators present math, science, and technology programs with hands-on activities, web activities, and resources for grades K-12.

<http://education.jlab.org/> - Sixth, seventh, and eighth grade science facts, lessons, and games from Jefferson Lab, the laboratory that breaks apart atoms. This site has interesting science information to learn.

<http://insected.arizona.edu/home.htm> - An online curriculum with lesson plans uses live insects in the classroom to teach about arthropods. Developed by the Center for Insect Science at the University of Arizona, this program is hands on, for kindergarten through third grade, and available in both English and Spanish.

<http://www.netn.net/14113.htm> - This site has many links for elementary teachers and for parents of elementary children. There are interesting science, early education, activity, and organization links. Some of the sites are free and some charge a fee for the use of their materials.

<http://www.proteacher.com/110002.shtml> - This site offers science experiments and activities for students in elementary and middle school.

<http://www.reachoutmichigan.org/resources.html> - Fun Science Resources Especially for Students. This site is exactly that. Students can explore living things, creepy crawly things, extinct things, space things, and earth things. NASA projects are included, too.

<http://scithon.terc.edu/> - Science-athon offers elementary and middle school students ways to discover science in their every day lives. The world around them is investigated through challenges.

<http://www.sedl.org/scimast/steamer/project.html> - Join the Southwest Teachers' Education and Marine Expedition for Research on a month long expedition to study marine life. Although this project is for the high school level, the entire activity would entertain and enrich an upper elementary or middle school science class.

This strategy is identified as a Promising Practice.

View the [Access Center Research Continuum](#).



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The Access Center: Improving Outcomes for All Students K-8

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