

Technology in the Schools: It Does Make a Difference!

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Education World®

This year, the Clinton administration earmarked an additional \$25 million over last year's budget to help schools integrate technology into the curriculum and for technology training for teachers. Will spending all that money really help kids learn? This week, Education World examines both sides of the Is technology worth it? debate. This story focuses on some of the research that makes a strong case in favor of technology in the schools. Included: Resources to help make the case for technology.

Even though school roofs leak and textbooks are sadly out-of-date, school systems as well as the government are spending enormous sums of money wiring schools, purchasing and maintaining technology and software, and training teachers. Does this current emphasis on technology really make a difference in how much and how quickly students learn? A good deal of recent research suggests that it does! A study commissioned by the Milken Exchange on Education Technology and recently released by Columbia University discovered that West Virginia's use of educational technology led directly to significant gains in K-6 students' reading, math, and language skills. (See West Virginia Study Finds Direct Link Between Effective Use of Learning Technology and Higher Academic Achievement.) School officials in West Virginia selected software carefully and then integrated it into the curriculum. They provided students an adequate number of computers, and they thoroughly trained teachers in how to use the software to improve student learning. As a result, student scores on both state tests and the National Assessment of Educational Progress (NAEP) improved. Intriguingly, the study also found that West Virginia's program was more cost-effective than hiring more teachers or reducing class sizes!

A study of high-poverty, low-performing schools conducted by Fordham University showed similar positive results, as have studies in Westminster, Colorado, and Wichita, Kansas.

ADDITIONAL RESEARCH

"Children who don't do anything in class will work if it's on the computer," Darla Waldrop, a junior-high computer lab coordinator in Louisiana, told Education World. "It takes that 'I'm not working for an authority figure' element out of it. They're working at their own pace, and they love the multimedia effect."

Many studies published in recent years also document the benefits of technology. Without regard to potential biases, those studies include the following:

* A "Report on the Effectiveness of Technology in Education, 1990–1997," conducted by the Software Publishers Association, cites the results of a Vanderbilt University research group's study of at-risk, inner-city kindergartners. The researchers found that students studying language arts in a multimedia environment gained more auditory, language, decoding-in-context, and story-composition skills than did students in a control group who did not use computers. (See "Open your Eyes: The Evidence is There," *Technology and Learning*, September 1997.)

* Another group of Vanderbilt University researchers reported that students in the fifth grade and up who used a specific computer software product learned to solve multistep word problems more quickly than students in a control group did. (See a CNN report, *Computers Boost Kids' Test Scores*.)

* A study conducted at Stephens Institute of Technology found that high-school students retained math skills longer after using commercially available mathematics software than did students in a control group receiving traditional classroom instruction. (*Technology and Learning*, September 1997)

* A study of elementary-aged students learning math found that students who used multimedia computer software showed less math anxiety and more frequently perceived the subject as relevant to everyday life than students in a control group did. (*Technology and Learning*, September 1997)

* An Educational Testing Service study discovered that math teachers who used computers could significantly boost fourth and eighth graders' standardized math scores, and a study of 53 elementary, middle, and high schools found that providing cutting-edge technology improves teachers' morale. That ETS study also found that students' attitudes, motivation, and behaviors improved very quickly when they used computers in school. (See a USA Today story, *Do Classroom PCs Help Kids Learn?*)

* In a New York Times editorial, Ethan Bronner cited a study of college and high-school students that found that those who learned algebra with computers did better on a series of tests than those who learned it through more traditional methods. Bronner also quoted a study that found technology improves students' communication skills and the

quality of their presentations and makes it easier for them to complete writing and editing assignments. (See "Rethinking Computers: More Than A Toy?," 11//30/97.)

* Two Israeli researchers, analyzing how technology affects the study of science, discovered that adding computerized lab analysis tools and simulations to high-school biology curricula led to significantly better content knowledge and science process skills. (See *Technology and Learning*, September 1997.)

WHAT MAKES SOME PROGRAMS MORE SUCCESSFUL THAN OTHERS?

Most of the successful programs described in studies had three factors in common:

* The software used was carefully selected as an educational supplement integrated into a well thought-out program of classroom instruction. Technology was one important tool among many; teachers taught concepts and then used technology to reinforce, enhance, and elaborate on that instruction.

* Teachers received ample training and support in using the software.

* Students had ready access to up-dated software and well-functioning computers.

One can only speculate whether those programs would have been as successful if all those elements had not been present.

Recently, a White House advisory panel announced that the amount of money spent on researching educational techniques in the United States equals just 1/10 of 1 percent of the nation's total spending on education. "At this point, there are more claims about what technology can do than there are well-developed evaluations with conclusive findings," states a draft report produced for the U.S. Department of Education by the Washington-based American Institute for Research. (See an Education Week/Milken Exchange report, *A Tool for Learning*.) Schools not only need more technology, the report suggests; they also need more and better educational research to support their use of it -- to learn whether it's working and to document successes so they might be duplicated.

The cost of including technology in our school curriculum is high. There is no doubt there. Many people wonder, however, what the long-term cost of not including technology in the curriculum might be. Technology exposes students to experiences not available to them before. "Open Your Eyes: The Evidence is There," (*Technology and Learning*, September

1997), poses this question: How can anyone dismiss tools that allow students to manipulate 3-D mathematical objects, access primary sources at the Library of Congress on-line, gather and compare environmental data with students around the world, and publish their writing on the Internet, not just on the refrigerator?

To adequately prepare students for the future, educators say, they must be able to use 21st-century methods of teaching in the classrooms of the 21st century. If technology isn't available, students will have no chance of competing in the job market that they will enter -- a market in which a huge number of the jobs will require the use of technology.

Technology in our schools is still very new, and most educators will agree that it is not a magic bullet. More must be done to determine exactly what students of the 21st century will need to learn. Then different approaches to teaching those skills need to be tested, studied, refined, and improved.

TECHNOLOGY IN THE SCHOOLS: PRO RESOURCES

* West Virginia Study Finds Direct Link Between Effective Use of Learning Technology and Higher Academic Achievement This article discusses a study conducted by the Milken Exchange on Education Technology. Chock full of data, it describes West Virginia's very successful technology program, one that's been in effect for ten years.

* Computers Boost Kids' Test Scores This CNN Online article describes a Vanderbilt University study of the effects of Jasper computer software on students in the fifth grade and higher. It also discusses an Educational Testing Service study that discovered that math teachers who used computers could significantly boost fourth graders and eighth graders' scores on standardized math tests.

* Does it Compute? The Relationship Between Educational Technology and Student Achievement in Mathematics Describing an Educational Testing Service study, this article includes positive and negative effects of using technology to teach math. It states that much of the current research consists of small-scale studies with serious methodological problems. The study also concluded that using technology to teach math is more effective with junior-high school students than with elementary students.

* Do Classroom PCs Help Kids Learn? This USA Today article discusses a study of 53 elementary, middle, and high schools that found using technology can boost students' attitudes, motivation, and behaviors.

* Clinton's 2000 Budget Pours Millions into Civic Technology This February 9, 1999, CNN Online article describes how the fiscal 2000 budget increases spending on educational technology by \$1.2 billion over 1999 levels and for which areas of educational technology the money is earmarked.

* Educational Technology Improves Student Performance This Web page offers a compilation of studies in which technology use realized excellent results. The eight studies mentioned in this article were conducted between 1979 and 1995 (only one was conducted before 1990).

* New Research About the Impact of Technology on Math Scores Sparks Debate Eleven people involved in education discuss the results of the Technology Counts '98 study commissioned by the Milken Exchange and released through Education Week.

* A Tool For Learning A 1/13/99 Education Week story by Debra Viadero about the value of technology in education includes an evaluation of current research on the use of technology in schools. The writer discusses how well teachers are trained to use technology; whether administrators take advantage of technology's capabilities; how different the relationship between schools and the public is now; and how state and federal policies affect the use of technology in schools.

OTHER RESOURCES USED TO COMPILE THIS STORY

* "Open Your Eyes: The Evidence Is There!" Technology and Learning, 9/97

* "Rethinking Computers: More Than A Toy?" The New York Times, 11/30/97

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