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The **BALANCED VIEW:**

Research-based
information on
timely topics

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Research Update: *The Digital Divide*

The *Balanced View* first explored the topic of educational technology in 1998, with a review of two streams of research: 1) availability and use of technology and, 2) effectiveness of technology. Since that time, tremendous advancements have occurred on the availability/use front: more and more students have access to and are using computers in school and at home. The same is true for Internet access and use. But not all the news is good: many schools continue to grapple with disparities in technology access/use among certain groups of students. And several indicators suggest an even wider digital divide at home. This issue of the *Balanced View* focuses on the digital divide, profiling five groups of students who appear to be losing out when it comes to technology: poor children, minority students, girls, students with disabilities, and low achieving students. This research update does not revisit the topic of technology *effectiveness*, as no new large-scale studies have come forward to substantially change the conclusions from our earlier work (see box).

Is educational technology effective?

Research Recap from 1998 Balanced View

Meta-analyses of more than 700 research studies show that technology has been effective in helping students learn more, in less time, and with greater enthusiasm. At the same time, the research suggests that these positive findings pertain only when technology is properly implemented in the classroom. Technology is less effective—or even ineffective—when learning objectives are unclear or the focus of use is diffuse.

The Digital Divide

Income Gaps



Family income strongly influences the likelihood of a child having and using technology. Only one in three children of the poorest families (those with incomes under \$15,000) use computers at home compared with 92 percent of children from the wealthiest families (those with incomes of \$75,000 or more). The corresponding numbers for Internet use are 22 percent and 83 percent, respectively. Schools help to equalize the disparities of computer use: 81 percent of poor children use computers at school, little different from the 89 percent of children in the highest income category. However, schools do not compensate for the gap in Internet use: poor children have an overall Internet use rate half that of children in families earning \$75,000 or more—46 percent, compared with 88 percent.¹ Research also shows that even when technology is used, poor and well-to-do children use it very differently. Students from poor homes tend to use computers for simple tasks, such as repetitive drills or game playing, while those from higher socioeconomic backgrounds most often use technology for tasks that promote higher-order thinking skills.

¹Source: U.S. Department of Commerce using U.S. Census Bureau statistics, September 2001 (the most up-to-date statistics as of this writing).



Racial/Ethnic Disparities

Significant gaps in computer and online use also exist among children of different races and ethnicities, even when income is taken into account. Nearly twice as many white children as black or Hispanic children have access to and use computers at home—80 percent versus 45 percent. The same holds for Internet use: two out of three white children log on to the Internet at home compared with fewer than one out of three black or Hispanic children. The availability of school computers significantly closes the computer use gap among these children: 89 percent of black children and 84 percent of Hispanic children use computers when home and school use are combined, comparable to the 95 percent of white children. But access at school does little to narrow the disparities in Internet use: white children are still one and one-half times more likely to log on to the Internet in school than black or Hispanic children.²

Gender Differences



While gaps in math and science course taking and achievement have significantly narrowed for girls, a new gender gap has developed—this time in technology. Girls make up only a small percentage of students in technology-related classes in high school and comprise only 17 percent of those taking Advanced Placement computer science exams. At the postsecondary level, less than one-third of undergraduate computer science majors are female, and a smaller percentage actually receive computer science degrees. This under-representation is not only causing women to miss out on many (lucrative) technology-related job opportunities, it is also contributing to an already acute shortage of skilled technology workers.³

Special Needs Gaps



Computer-based technologies can play an important role in helping to equalize educational opportunities for students with disabilities. Basic applications such as drill and practice, multimedia tools, and the Internet can help mildly disabled children keep up with their nondisabled peers within the regular classroom. Likewise, sophisticated assistive devices can assist those with severe disabilities in overcoming limitations that hinder classroom participation. However, many special education teachers are not adequately trained in how to use technology effectively. Recent data from the Department of Education,⁴ for example, showed that lack of adequate teacher training was the number one reason cited by administrators for why disabled students lagged behind their peers in computer/Internet use. Costs are also a serious consideration. The computer systems needed for the severely disabled can run tens of thousands of dollars. And even mildly disabled students may require devices that are considerably more costly than the hardware needed for the nondisabled. Thus, although computer technology has the potential to level the playing ground for students with disabilities, the barriers of teacher training and costs must be overcome before more widespread use becomes a reality.

Achievement Inequities



Research shows that well-designed educational software combined with good instruction can help raise the achievement of students who have struggled in the traditional classroom. But these students, too, are often left on the wrong side of the digital divide because of ineffective technology usage. Research also indicates that teachers often use computers, and especially the Internet, as a reward for good performance in the classroom. As a result, poorer performing students have far less computer access. Teachers also tend to use substantially more drill and practice software with low achievers, while advanced students get to use an array of sophisticated software. Under these circumstances, struggling students rarely become involved in tasks that allow them to delve deeply into a topic or examine a problem in complex ways. The net effect is a widening of the digital divide between low and high achievers.

²Source: U.S. Department of Commerce, September 2001

³Source: Pew Research, May 2001; Carnegie Mellon Project on Gender and Computer Science, 2002

⁴Source: National Center on Education Statistics, 2001