Chapter 27
Internet Use and Cognitive Development

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ABSTRACT

There are surprisingly few studies of the effects of Internet use on children's cognitive development. Surveys by the Pew Internet and American Life Project (Pew, 2000, 2001, 2005, 2007) indicate that children and adolescents strongly believe that the Internet has improved their academic performance, primarily by making educational resources readily and conveniently available. The authors' research has found that Internet use is related to academic performance, specifically, to grade point averages (GPAs) and scores on standardized tests of reading skills, at least for underperforming children. No benefits were observed for mathematics skills, or for average or above average performing children. Though null findings must be interpreted with caution, one potential explanation is that Internet use is more likely to exercise reading skills than mathematics skills, and less likely to improve the reading skills or GPA of students who are already reading well and performing at or above average in school. Implications of the findings for future research and the importance of Internet access for underserved children are discussed.

INTRODUCTION

Decades of research have focused on the question of whether computer-based learning facilitates cognitive development, particularly development defined as performance in school. After reviewing dozens of studies of school learning with computer-based technology, including five meta-analytic reviews, Roschelle and colleagues came to the unsatisfying conclusion that the findings are inconclusive (Roschelle, Pea, Hoadley, Gordon, & Means, 2000). They offered three explanations for the equivocal findings. First, variability in hardware and software among schools participat-

ing in this research may explain the equivocal findings. Second, the failure of schools to accompany technology use with concurrent reforms in the other areas, such as curriculum and teacher professional development, may explain the failure to find effects of technology use on academic performance. Third, the lack of rigorous, structured longitudinal studies may explain the failure to find positive effects of computer-based instruction on learning, and other measures of academic performance. Rochelle and colleagues suggested that positive effects on learning are most likely to emerge when technology is used to support the four fundamentals of learning: active engagement; participation in groups; frequent interaction and feedback; and connections to real-world contexts.

Information technology (IT) has been heralded by many educators, policy-makers, and researchers as the long-awaited solution to the educational problems that have plagued our nation for decades. IT-based instruction, it is argued, will make learning "transformative," that is, focused on self-discovery, active engagement, interaction with others, and real world problems. At the same time, IT will presumably level the educational playing field because it will be available to everyone, everywhere, any time, regardless of gender, race/ethnicity, income or other socio-demographic characteristics. This viewpoint, typically referred to as the "utopian perspective," is partly responsible for the huge investment in IT in K-12 schools in the U.S. – more than $66 billion between 1994, when the Internet first entered the public consciousness, and 2004, when the Internet began to pervade the public consciousness (National Center for Educational Statistics, 2005).

There is ample evidence that efforts to increase the availability of computers and the Internet in America's schools have been remarkably successful. According to the *Secretary's Fourth Annual Report on Teacher Quality*, virtually every school in the U.S. with access to computers has Internet access (99%), compared to only 35% of schools in 1994 (National Center for Education Statistics, 2005). Public schools have also made progress in expanding Internet access beyond "media centers" and into instructional classrooms. In 1994, 3% of public school instructional classrooms had Internet access, compared to 93% in 2003. Between 1998 and 2003, the student-to-connected-computer ratio went from 12-to-1 to 4.4-to-1.

Technology, both inside the classroom and out, has an ever increasing presence in everyday life, especially among America's children. For young people today, technology, particularly the Internet and cell phones, is considered essential not only for educational purposes but also for social, psychological, consumptive and entertainment purposes. A recent survey conducted by the Pew Internet and American Life Project (2005) found that 21 million children between the ages of 12 and 17 - approximately 87% of this age group, use the Internet. Moreover, most children believe that using the Internet helps them to do better in school (88%), although their parents perceive no benefits of home Internet access to their children's school performance.

More evidence of the educational uses of the Internet comes from an earlier survey by Pew (2001). It found that 71% of online children, ages 12-17, said they relied mostly on Internet sources for school projects, and 34% said they downloaded study aides from the Internet. The U.S. Bureau of the Census (2003) found that 57% of all school children ages 7-17, said they used a home computer to complete school assignments. Children are also avid users of the Internet's communication tools. Almost 100% use e-mail to communicate with family and friends, and 75% use instant messaging, representing close to 16 million children. Of the 16 million, 78% say they sometimes use instant messaging to talk about homework, tests, or schoolwork (Pew, 2005, 2006, 2007).

Given the huge financial investment in Internet technology and the pervasive use of the Internet among children in the U.S., it is no surprise that educators, policy-makers and researchers are

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