The Impact of Broadband on Education in the USA

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INTRODUCTION

The rapid pace of international growth in Internet use is putting enormous pressure on nations to acquire Internet technology in order to compete in the global economy. In the USA, even as Internet access is being disseminated widely throughout society, Internet technology is rapidly changing to meet the growing demands for information. Cheaper and slower dial-up access is being replaced by high-speed broadband access (Horrigan, 2006, p. ii; NTIA, 2004, p. 1). Broadband access provides many advantages over slower dial-up service. In addition to faster and easier Web navigation, more information is becoming available and in greater variety. As a result, the typical Web search time has been greatly reduced and access to information and applications such as higher quality graphics are becoming more widespread.

Broadband access is growing at a faster rate than dial-up access (Horrigan, 2006, p. iv). Evidence suggests that **broadband** users are more likely to use the Internet in a wider variety of ways than traditional dial-up users. Since broadband is always connected, making access easier than ever, it has the potential to greatly affect the frequency and duration of user sessions, type of search, and location of access. As often stated, "While modem use is disruptive, broadband use is integrative" (The Digital Future Project, 2005, p. 4). According to one survey, 69% of broadband users go online on a typical day, compared to 51% using dial-up service. As applications of broadband activity widen, the typical delays encountered in accessing dial-up service are avoided.

As the global competitive environment intensifies, there is an economic imperative to prepare American K-12 students for this new reality (Honey et al., 2005). As broadband expansion throughout society increases, its potential impact on education is deepening. Its role has expanded beyond just enhancing the traditional classroom curriculum toward an integrated part of the educational curriculum. As schools increasingly assign work requiring online searches, students are encouraged to use broadband to complete assignments. Those without access will be at an increasing disadvantage.

In response, public schools have made substantial gains in acquiring Internet technology in recent years and nearly all currently have broadband Internet access as well. In 2003, 95% of all public schools with Internet access used broadband (Parsad & Jones, 2003, p. 3). This represents a 15% increase in broadband use since 2000. Furthermore, public schools are increasingly improving access for disadvantaged students by providing additional availability around normal school hours for those that do not have at home access.

The intent of this article is to examine current broadband use and its potential impact on overall educational experiences of school-age children. Does increased broadband use among children have a positive effect on the frequency, duration, manner, and type of Internet use as well as educational performance? Are children now using it more frequently for education and for research and information gathering purposes?

BACKGROUND

International statistics on broadband adoption indicate that although the USA has the largest number of broadband subscribers worldwide (58.1 M), accounting for over one fourth (29%) of the world's total, it ranks low in societal penetration relative to other nations. The USA **broadband penetration rate** (subscribers per 100 inhabitants) of 19.6% ranks 15th behind nations such as Denmark (31.9%), the Netherlands (31.8%), Iceland (29.7%), and South Korea (29.1%) (OECD, 2006).

Substantial growth has been reported over the past few years. Over the past year alone, broadband access grew by 52% (FCC, 2007, pp. 1-2). The number of households with broadband connections grew by over 12 million lines, a 126% increase from 2001-2003 (NTIA, 2004, pp. 3-5). From November of 2003 to May 2005, the share of home Internet users that have

broadband access climbed from 35% to 53%. Although rapid growth continues, the reported 6% increase from 2004 suggests its rate of growth may be slowing (Horrigan, 2005, p. 2). Growth has been particularly strong among those that have traditionally reported low rates of adoption. Among all age groups, those 65 and older reported the highest increase over the past year (63%), and Blacks and Hispanics reported much stronger growth than whites (121%, 46%, and 35%, respectively). Furthermore, broadband access in urban areas continues to exceed that in rural areas, by nearly a 2 to 1 margin (44% to 25%, respectively) (Horrigan, 2006, p. 3). At home access in rural areas also lags that in urban locations (24.7% and 40.4%, respectively) (NTIA, 2004, p. 12). The continued disparity in availability is due in large part to the lack of cable system availability to rural customers.

Many factors contribute to broadband use in society, including access location (including type of residential area), changing technology, and decreasing access cost. The location of broadband access is a major factor in the degree, frequency, duration, and type of Internet use. The majority of users currently access broadband at work, at home, or outside the home. Among users at work, access is generally high-speed service, through T-1 lines. The percent of at work Internet use continues to grow in response to industry's efforts to remain globally competitive and is deemed critical in daily work activities. As of October 2003, 77 million workers, representing over half (55.5%) of total employment nationwide, used a computer at work (BLS News, 2005, p. 1).

A rapidly growing percentage of adults are using broadband at home. Recent surveys estimate that the household penetration rate increased from 13% in February 2001 to 78% in December of 2006 (Nielsen/NetRatings, 2006, p. 2). Broadband users at home were more likely to go online daily (66.1%) than those with dial-up service (51.1%) and tend to engage in more types of activities such as entertainment and banking (NTIA, 2004, p. 5).

Finally, a growing percentage of adults are using broadband at locations outside of home. Internet use at libraries, schools, and other locations jumped from 17% in 2004 to 21% over the past year alone (Harris Poll #40, 2006, p. 1).

Current data indicate that broadband technology is rapidly changing from cable-based service, the most popular form, to telephone-based digital subscriber line (DSL) service, and to satellite, fiber-optic, or wireless technologies service. Although cable modem service is still the most popular, asymmetric digital subscriber line (ADSL) and other services are gaining ground rapidly. From 2005-2006, the number of ADSL lines increased by 6.3 million compared to 4.6 million for cable modem service (FCC News, 2007, pp. 1-3). From 2001-2003 alone, the share of cable modem households nationwide dropped by 10% to 56.4%, while the proportion of DSL households increased by nearly 8% to 41.6% (NTIA, 2004, p. 6).

Another key factor in broadband use is its declining cost. Demand is widening as its access price declines. Recent price declines have helped accelerate broadband use at home past that of dial-up service (Horrigan, 2006, p. ii; Jesdanum, 2004, p. 1). Although cable broadband typically costs more than DSL, cable operators argue that their prices are competitive since their connectivity speeds exceed DSL. Many perceive that with continued price declines, the availability of broadband to the disadvantaged will grow and reduce the digital divide (Aron & Burnstein, 2003, p. 1; Jesdanun, 2004).

MAIN FOCUS: BROADBAND USE AND EDUCATION

Critical factors that influence increasing broadband use in education include the level, frequency, type, and ease of use, access location, and collaboration with others. Children are using it for educational purposes more frequently and for longer duration. One study indicated that 94% of youth 12-17 years old use the Internet for school research and over three fourths (78%) indicated that it helps them with their homework and is their main source for completing school assignments (Lenhart, 2001, pp. 3-4).

Differences in broadband use among children depend on whether it is accessible at home or outside the home. The impact of broadband access on children's Internet use at home is substantial. Cleary, Pierce, and Trauth (2005) indicate that the largest impact on Internet use among children is at home use (p. 17). Households with Internet access, along with an adult who can provide expertise and guidance, increase the probability that children will become proficient. However, since over 98% of all public libraries in the USA now have Internet access, evidence suggests that more teens are accessing the Internet at the library. The PEW Internet

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