Millennial Learners and Net-Savvy Teens? Examining Internet Use among Low-Income Students

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Abstract

This paper discusses access and use of information and communication technologies among urban high school students from low-income families, a topic of great interest to teacher educators, educational policymakers, and others concerned with digital literacy instruction. Recent reports from national digital learning initiatives have portrayed today's teens as digital natives—youth who are constantly online, perceive themselves as Internet-savvy, and prefer technology-enhanced learning experiences. However, this portrait may not be true for all learners. This study investigated trends in Internet use among students from low-income families compared to national trends. In the spring of 2007, students from low-income families responded to a survey assessing their access to the Internet, frequency and type of use, and capacity to use the Internet. The researchers also conducted focus groups with students. In this paper, we discuss findings and implications for teachers seeking to understand similar students' Internet access, use, and capacity and suggest implications for digital literacy instruction, technology policy, and teacher education. (Keywords: low-income students, Internet use, social network sites, literacy, survey research, digital equity)

Introduction

Increasingly pervasive, networked information and communication technologies (ICTs) via the Internet make possible new learning contexts, pedagogies, and learning outcomes. Technology infrastructure investments in U.S. schools have resulted in a 3.8:1 ratio of students per Internet-connected instructional computer (Wells & Lewis, 2006). Outside of schools, two thirds of people in the United States have Internet access at home (National Telecommunications and Information Administration, 2008). Researchers across disciplines concur that the Internet may be fundamentally reshaping our social and biological lives, offering new technologies to communicate, stimulating new mindsets, and affecting education in ways not yet imaginable (Barron, 2006; Greenhow, 2008; Greenhow, Robelia, & Hughes, 2009a, 2009b; Lankshear & Knobel, 2006; Warschauer & Ware, 2008). For instance, new research on emerging online writing practices and social computing tools (e.g., blogs, wikis, social networking) suggests learners may be developing supportive affiliations, creating and circulating their self-expressions, and collaboratively solving problems within such cyberspaces (Black, 2005; Greenhow & Robelia, 2009a; Greenhow & Robelia, 2009b).

Despite the potential of technology for learning and teaching, successful integration of ICTs has typically been slow to materialize in schools (Cuban, 2001; Means, Penuel, & Padilla, 2001). Where such technologies are integrated, differential uses among high- and low-socioeconomic status (SES) schools perpetuate inequities, with students who are black, Hispanic or low-income more likely assigned to using computers for drill-and-practice activities compared to their more affluent peers (Becker, 2000). Network connection speed; level of technology access and support; and teachers' attitudes, beliefs, and expertise with technology are just some of the factors believed to influence whether students meaningfully use technologies such as the Internet in course-related activities (Becker, 1999; Zhao, Pugh, Sheldon, Byers, 2002). For instance, Warschauer (2007) described the teachers' place in the digital divide, describing a "generation gap" (p. 149) between "digital immigrant" (Prensky, 2001) teachers who did not grow up using the Internet on a daily basis compared to their "digital native" or "insider" (Lankshear & Knobel, 2006) students. This gap (real or imagined) may be exacerbated by preservice and inservice teachers' reluctance to structure technology-enhanced learning projects with students they perceive as more technologically savvy than they are or with students they perceive as lacking out-of-school Internet access or technology skills. Indeed, orchestrating quality learning experiences requires that teachers understand the complex interactions between content, pedagogy, technology, and their learners (Mishra & Koehler, 2006). This requires understanding Internet use from a student's perspective, especially whether and where students access it, how often and for what purposes they use it, and how they perceive their capacity for using its varied capabilities.

In this study, we sought to understand low-income students' use of ICTs available via the Internet, believing such insights could contribute to teachers' understanding of what and how students learn with new technologies and how to design equitable learning opportunities and literacy instruction inside and outside of school. Building on efforts to accurately characterize Internet access, experience, and beliefs among different groups of users (Hargittai, 2007) (e.g., among preservice teachers [Lei, 2009] and among teachers and students in school settings [Li, 2007]) ,this research employs survey and focus group methods to explore Internet uses and perceptions among high school teenagers from low-income families. The current scholarly and popular discourse rarely feature this subgroup of adolescents. With more than one third (35%) of children ages 13–17 years—7.4 million teens—living in low-income families, the proportion of these children attending our nation's schools is significant (Douglas-Hall, Chau, & Koball, 2006). Understanding their experiences in out-of-school online social contexts is essential to teachers' building on them within schools.

Theoretical Framework

Concern is widespread about providing equitable learning opportunities for today's youth. Changing U.S. demographics over the next two decades, with a disproportionate increase in low-income and minority youth, are projected to lead to a decline in the educational level and per capita income of the U.S. workforce. Research has shown that students from low-income backgrounds do not currently graduate from high

school or earn admission to college as often as middle-and upper-income students (National Center for Education Statistics[NCES], 2001; St. John, 2000). Often these students are also first-generation college students who need more academic, social, and other types of supports to stay in college and obtain their degrees than do their more affluent peers (NCES, 2001; Tinto, 1998). Initiatives that enhance students' engagement and connections to others they perceive as like them can positively influence students' academic learning, persistence, and retention (Bransford, Brown, & Cocking, 2000; Tinto, 1998; Zhao & Kuh, 2004). Moreover, schools and colleges are increasingly concerned with developing digital literacy and 21st-century skills among all students (e.g., capacity for creativity, collaborative problem solving, research, digital information literacy, and citizenship) as innovation and "knowledge creation are fast becoming the most important sources of new material and intellectual wealth" (Hakkarainen et al., 2006, p. 1; National Research Council, 1999; ISTE, 2007).

Within this context, our study is informed by learning theories that emphasize young people as agents in their own development shaped by social context (Vygotsky, 1978) who learn in formal and informal learning environments (Wenger, 1998) and by theories that suggest teachers must understand the intersection of learner's experiences, content, pedagogy, and technology to implement promising practice (Mishra & Koehler, 2006). Of particular relevance to this study is research on Internet use (Lenhart et. al, 2008), multimedia learning (Mayer, 2001) and the Net Generation (Howe & Strauss, 2000; Oblinger, 2005).

For instance, a recent report from the Pew Internet and American Life project, *Teens and Technology: Youth Are Leading the Way to a Fully Wired and Mobile Nation* (Lenhart, Madden, & Hitlin, 2005) presented findings from a national callback telephone survey of a randomly generated sample of youth ages 12–17 (n = 1,100) indicating that:

- 94% of U.S. teens ages 12–17 use the Internet, the highest percentage among any age group studied
- 63% of teenage Internet users say they go online on a daily basis, with 35% of online teens reporting going online several times a day
- 78% of teens go online mostly from home, compared to 15% of teens who mostly access the Internet at school and 6% who say they go online most from someplace else, like a youth center, a library, or a friend's house
- 77% of teen Internet users get news online, which signifies growth of more than 38% in the number of teens getting news online since 2000

Pew reports that teens from the lowest-income families are the least likely to use the Internet. Teens from households earning less than $30,000 per year are less likely than any other income group to report Internet use. Approximately 86% of teens from these families use the Internet, and Internet use rises steadily with income: 93% of teens from families earning between $30,000 and $50,000 a year go online, and 96% of teens from the $50,000–$75,000 range do. At the highest income level reported by Pew, households earning more than $75,000 a year, 97% of teens go online.

The U.S. generation born after 1984 is increasingly referred to as the "Net Generation" or the "millennials" to indicate that today's young people have matured in a world that contains the Internet and many varieties of digital technology (Howe & Strauss, 2000). As members of this generation have entered and moved through the educational system, educators have expressed great interest in understanding these students, particularly the ways in which they differ from previous generations of students (Oblinger & Oblinger, 2005; Oblinger, 2003). Literature on Net Generation students portrays them as technological sophisticates who are constantly wired, who are broadly knowledgeable about digital technology, and who are capable of extraordinary feats of multitasking (Prensky, 2001).

However, this portrait may not be true of all students. Recent research at a large public university in the Midwest shows age- and gender-based differences in students' comfort levels, attitudes, and experiences with technology (Walker & Jorn, 2007). Kuiper, Volman and Terwel (2005), in reviewing the literature on Internet use in K–12 education between 1997 and 2003, found few empirical studies focused on young people's Internet use, their learning process with the Internet, or the contexts in which this occurs. Kuiper et al. (2005) and Windschitl (1998, 2000) called for more research focusing on students' use of the Internet in school and out-of-school contexts, their characteristics, and the variation between students. Our study contributes to the necessary accumulation of research in this area, complementing recent ethnographic work (Ito et al., 2008).

Methodology

Based on our select review of the literature dealing with teens' use of the Internet and Internet use in education, two central questions guided this study:

1. What are low-income students' access, use, activities, and capacity for using the Internet as compared to students generally?
2. What are the implications of this for teaching and learning?

Data Sources and Evidence

To attempt to answer these questions, we gathered both quantitative and qualitative data from the target population. The study participants were 852 students from 13 urban high schools in the upper Midwest (56% female). These students were from families whose incomes were at or below the county median income (at or below $25,000) and were participating in an after-school program, Admission Possible, which aims to improve college access for low-income youth.

The researchers administered paper surveys to students in the context of an after-school program. We adapted the survey questions from the Parents and Teens 2004 Survey (PTS). The Pew Internet and American Life Project and Princeton Survey Research Associates International developed the original PTS instrument and administered it to a nationally representative sample of 1,100 U.S. teens ages 12–17 years old. It consists of six questions designed to obtain demographic information, assess students' access to technology, and reported frequency and types of uses.[1]

The response rate was 99.5% (848 out of 852 possible). The third author entered responses into a database and vetted the data for student entry errors. She removed bad data (e.g., students checking more than one option in questions that did not permit this) on a question-by-question basis. We then used SPSS to generate frequencies and descriptive statistics from the data and to run standard parametric analyses. We used chi-square to compare male and female means on our dependent variables and ANOVA to compare means for different age categories. In all cases, the significance level was set at .05.

In addition, the first author conducted focus groups (Krueger, 1998) to deepen our understanding of students' responses to survey questions and to gather additional information about students' access, use, activities, and capacity for using the Internet. The two focus groups included 8 students each (16 students in total) and took place on two separate

1 Due to methodological differences, such as the fact that all of our students participated in Admission Possible, whereas the Pew sample was drawn from a broader pool, we do not compare our data directly to Pew data.

occasions at each of two urban high schools. These groups took place after school and were facilitated by the first author, who digitally recorded each 75-minute session and subsequently transcribed the audio recordings into text. Students began by introducing themselves and then answered a warm-up question designed to orient them to the topic for the session, focus their attention, and help them speak out and listen to their peers (Krueger, 1998). The group then progressed through more specific questions designed to probe about their Internet access; perceived competencies, activities, and comfort in using the Internet, including Web 2.0 technologies, such as social network sites (e.g., MySpace); and attitudes toward Internet use, such as its importance to their lives and learning. For instance, such questions included:

- Where do you use the Internet? Where do you do most of your use of the Internet?
- Do you own this [insert device] or do you share it with others?
- How many times per week do you use the Internet? For how long per time (on average)?
- What are the top three things you do with the Internet?
- How do you learn about new online technologies? How do you learn to use them? Who helps you?
- Is the Internet important to your life? If so, how?
- What social network sites do you use (e.g., MySpace), if any? For what purposes?

Results

In the following section, we present our findings, using data to support our claims. Our analysis produces insights into low-income students' Internet use along three dimensions: their technological environment and frequency of use, their Internet-using activities and perceived capacity, and differences in students' Internet use by gender and age.

Technological Environment and Frequency

Almost all of the students surveyed (94%) used the Internet. Our students appear to be more location-specific rather than location-independent users of the Internet; far more students in our sample have desktop computers (82.9%) and use these to go online than own laptops (35.5%), cell phones (63.9%), or personal digital devices (7.9%) they use to go online. Furthermore, our students go online from a number of different locations, including home, school, others' houses, and libraries. The vast majority of our Internet-using students go online most often either from home (59%) or from school (31%). Focus group data revealed that, of the students who go online from home, most use a family-owned Internet-connected desktop computer that they share with four to seven other family members, and a few students (4 out of 16 in the focus group) reported having a slow versus high-speed Internet connection.

In terms of frequency of use, more than half of the students said they go online at least once a day (52%), with only 16% reporting that they go online several times a day. About one third of students (35%) say they go online a few times per week. Eighteen percent report use of the Internet three to five days a week, and 17% report that they go online one to two days per week. Focus group data revealed that this use is primarily brief and task focused rather than leisurely. For instance, students reported often going online for 5–15 minutes to check e-mail or "update my MySpace" rather than for longer periods of time; however, they stayed online longer if they had a school project to complete that required seeking information online.

Internet Use and Perceived Capacity

Low-income students surveyed reported great facility with Internet-based technology, and the vast majority indicated they need no help printing pages from the Internet, using search engines, opening attachments, or uploading images to a Web site. The most-performed online operations were e-mailing and searching for college information; the least-performed were shopping online and writing in a blog (see Table 1). Focus group data confirmed this finding: The most common activities students reported engaging in online were communicating with others via e-mail (e.g., using Google, Hotmail, or Yahoo e-mail accounts) or performing online research for school-related projects, with Google as the search engine most cited. However, in focus groups, they also reported viewing or sharing YouTube videos and updating their social network site spaces (e.g., MySpace or Asian Town) as two other common Internet activities.

Table 1: Activities Performed Online

Activity	Valid Percent
Send or read e-mail	97.1
Send or receive instant messages	74.2
Send or receive text messages	63.6
Buying things online	34.4
Go online to get news	81.5
Look for information about a job online	73.5
Get information about a college or university	93.1
Write in or maintain your own blog	34.5
Play online games	67.0
Look for information online about a topic that's hard to talk about	61.6

Focus group data also revealed that students, for the most part, felt comfortable using the Internet. Students reported beginning to use a computer in elementary school and beginning to use the Internet around age 12. Only one student, who did not have a computer at home, expressed fear and anxiety with the technology, saying, "I don't like to touch computers and the Internet at all…. I'm scared I might break things or get in trouble by putting a virus in there [referring to the computer she is using, usually her cousin's computer]. So I go in, check e-mail, and that's it!" Another student expressed fear about using social network sites in particular, saying, "I am afraid that what I put on there [in a MySpace profile] will haunt me for the rest of my life," but these students were in the minority. Almost all students in the focus groups said their teachers introduced them to the Internet in school, but when asked how they learned about new online technologies or how to use them, they overwhelmingly reported that friends or younger siblings introduced them to new online tools or Web sites and helped them learn to use these. Finally, when asked in focus groups how important they felt the Internet was to their lives, all but one student said it was important. Reasons for this varied, but students generally agreed it was "very important," "convenient," "more important than a cell phone," "a serious disadvantage if taken away," and "essential" for school work and for communicating with peers and their coaches in the after-school program (e.g., "makes you feel connected" and "helps you keep up relationships"). One student's comment was particularly instructive: "It [the Internet] is important to my [school] project work. Sometimes I have to go to the Internet to get my ideas. If I read words I don't understand [she is a non-native English speaker] I can go on the Internet and get help translating, and it really impacts my ability to read and communicate in English."

Gender, Age, and Internet Use

We found several significant differences in Internet use between genders and between students of different ages, though these differences do not suggest any overall pattern (Table 2). [2]

2 This gender difference in active blogging is noted in a recent Pew report (Lenhart et. al, 2007, ii).

Table 2: Differences in Internet Use by Gender

Variable	Male	Female	*p*-value	Effect Size
Online from library	57.7%	67.7%	.022	Phi = .095
Ever blog	31.0%	40.7%	.029	Phi = .095
Ever play online games	79.9%	62.4%	<.001	Phi = .195

Turning to age, students who were at the upper end of the age range were more likely to own a cell phone, to have sent text messages, and to have used the Internet for purchases; students who were at the lower end of the age range were more likely to have played online games.

Discussion

With respect to hardware ownership and frequency of Internet use, low-income students in 2007 in our sample appear to have reached approximately the levels of higher-income students (as reported in Lenhart et. al, 2007). This may be some evidence of the narrowing of the digital divide, at least with respect to these variables.

Internet access appears to be a different story. Our data show that, whereas a large proportion of low-income students report once-a-day Internet access, a much greater proportion of higher-income students say they go online several times a day. Our research also shows a tendency for low-income students to go online from places other than home. We suggest two hypotheses to explain these findings.

First, although most low-income students have computers of one sort or another at home, our focus group data indicate that many share those machines with others and so are limited in their ability to use the computers for frequent or lengthy online activities. Second, low-income students may have more digital hardware at home in 2007 than they had in the past, but in-house Internet connectivity—an ongoing rather than a one-time expense—may be harder to come by for their families. As Pew notes, "wealthier people are more likely to have broadband connections that enable access to a richer array of online activities and content" (Lenhart et al. 2007, 29).

Moreover, our students frequently use the Internet for certain informational purposes; for instance, more than 90% turn to the Internet to find information about college. One explanation for this difference may be that our students were all participating in an after-school program designed to increase their college access, so they therefore may be more likely to engage in information seeking online, such as researching colleges, learning about scholarship opportunities, and using online financial aid calculators, than would students in general.

Of course, one limitation to our survey implementation is that we did not include questions about the kinds of Web 2.0 competencies that Pew recorded among teenagers on its Parents and Teens 2006 Survey, the results of which were published in January 2007, concomitant with our own survey implementation. We have since revised our instrument to address this issue and administered it to a second cohort of low-income students (Greenhow & Burton, in preparation). Therefore, the kinds of Web 2.0 competencies reported elsewhere recently among online teenagers, such as downloading music and remixing material found online (including music or images) into their own artistic creations,[3] were not captured here. In the final section below, we discuss the educational implications of these findings for digital literacy instruction, technology policy, and teacher education.

Educational Implications

As we consider the geography of opportunity and the implications of increased class- and race-based geospatial polarization for schools, neighborhoods, and individual learners, we ought to simultaneously examine alternative, intersecting virtual and physical spaces that might be developed across neighborhood, home, and school contexts to increase educational opportunities. Promoting increased awareness and understanding of different students' access, use, activities, and perceived capacity for using the Internet, especially that of students from low-income urban families, is a necessary precursor to digital literacy instruction and a step in this direction. In these final paragraphs, we offer practicing teachers and teacher educators some guidelines for instructional uses of the Internet with such students.

First, instructors can expect a large majority of their students—including those from low-income families—to have broad experience with Internet-based technology. However, students' sophistication in their understanding of technology or Internet-use strategies varies. Our focus group data confirm what others have found (Salaway et al., 2006; Salaway, Borreson & Nelson, 2008; Walker & Jorn, 2007): The majority of students' experiences may deal primarily with simpler communication and presentation technologies, and students frequently act as consumers of Internet-based materials. That said, and as acknowledged earlier, our surveys did not address the full range of content-creation and sharing activities that have recently been addressed (Lenhart, Madden, Macgill, Smith, 2007). Moreover, the digital productions that some low-income students may be practicing regularly (e.g., sharing content online that they created, working on others' Web pages, or remixing digital artifacts into their own creations) may be undervalued in schools and therefore underreported on school assessments. If online creation or sharing is not randomly distributed among young people (Hargittai & Walejko, 2008), it is imperative that teachers and educational policy makers gather information about and attend to the computer- and Internet-using conditions and habits of their students as part of their overall planning for digital literacy instruction. Although the Pew Internet and American Life reports and Technology Counts surveys strive to gather this information, their implementation is sporadic rather than continuous and often focuses on either home- or school-based settings rather than on students' experiences across the range of in- and out-of-school and online contexts for learning they inhabit.

Second, these facts about low-income students' experience with Internet-based technology suggest that such students will not be apprehensive about Internet technology that is introduced into their educational environments and, in fact, view this integration as essential to their schooling and social lives. Students we interviewed in focus groups frequently mentioned out-of-school activities that involved the Internet as taking priority over nonschool social or entertainment-related uses within their families. School policies that filter and block Internet content distort teachers' and students' experiences with ICTs within schools compared to the range of online activities available to them outside of schools. Therefore, teachers who assign Internet-based activities outside of schools, rather than confining Internet use only to classrooms, may be helping students from low-income families develop a portfolio of experiences that is similar to their more affluent peers.

Although our research with low-income urban high school students suggests that such students may have positive attitudes toward the Internet and favor its integration within educational environments, it also suggests that supports for using less familiar technologies should be considered. For instance, students in our study overwhelmingly reported using synchronous, one-to-one communication tools such as instant and text messaging. Teachers may need to provide specific instruction and

3 In the Pew Parents and Teens 2006 Internet Survey of a nationally representative sample of U.S. teenagers and their parents, 46% (n = 430) of households surveyed had parents with some high school (HS) or a HS degree (parental education is often used as a proxy for income). The activity performed by the majority of online teens in general was downloading music. About one third of online teens reported creating online content (e.g., taking material found online such as songs, text, or images and remixing it into their own artistic creation; sharing online artifacts that they created; or working on Web pages for others).

modeling about how to use asynchronous, group-oriented tools (e.g., online discussion boards or collaborative writing spaces) to construct knowledge together online. One possible strategy is to locate students' online writing activities within virtual spaces that enable them to get real-time feedback or help from teachers and peers who are simultaneously online (see DeGennaro, 2008). Such approaches honor and build on students' out-of-school experiences while introducing aforementioned 21st-century competencies.

Third, although the low-income students in our study appeared less different from high-income students than many teachers likely suppose them to be, such students may experience conditions that require further consideration. In particular, the Internet connections available to low-income students are often used by a larger group than those available to high-income students, and this may cause low-income students to be more dependent on public facilities, such as those in schools and libraries, for high-speed Internet access. The students' teachers should take all of this into account. For instance, although students express strong preferences for the integration of multimedia materials in their courses (Walker & Jorn, 2007), teachers should make arrangements for time extensions on assignments that require substantial periods of Internet-based work.

Finally, we suggest that teachers should consider explicitly designing activities that help minimize what still exists as a participation gap (Jenkins, 2006, p.13) in level of sophistication and duration of technology and Internet use between low-income and high-income students. According to Jenkins (2006), denying young learners the opportunity to use the Internet and engage in its participatory culture reinforces the participation gap between Internet users and nonusers: "the skills and self confidence gathered by moving across … online communities surely manifest themselves in other ways, offering yet another leg up to youth on one side and another disadvantage to youth on the opposite side of the participation gap" (p. 13). In fact, teachers and teacher educators in urban settings who do not instruct such students on the critical evaluation of online information or on the new literacies of online reading comprehension (Leu et al., 2009) or offer opportunities to engage in progressively sophisticated Internet-using activities and decision-making, such as the creation of digital content or consideration of copyright issues and digital citizenship, may be disadvantaging the very students they seek to prepare by helping to perpetuate this participation gap.

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