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Internet use that reproduces educational inequalities: Evidence from big data



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ABSTRACT

Although the Internet has become ubiquitous in students' lives in school and at home, little is known about whether the Internet is used to close or reproduce educational inequalities. Drawing upon Bourdieu's notion of capital, there are two kinds of Internet use: capital-enhancing versus entertainment. This study used two big data analytic tools to examine interest in and usage of two highly popular websites that primarily target children and adolescents: KhanAcademy.org and CartoonNetwork.com. The former represents a capital-enhancing use of the Internet, while the latter represents an Internet use for entertainment. Data analysis revealed that high sociodemographic status was positively correlated with interest in Khan Academy, while low sociodemographic status was positively correlated with interest in Cartoon Network. This study provided some evidence that existing educational inequalities may be reproduced through unequal Internet use.

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The Internet has become ubiquitous in students' lives in school and at home ([Census Bureau, 2011](#); [National Center for Education Statistics, 2010](#)). As of 2008, nearly all (98%) public schools in the United States had Internet access, as opposed to only 8% in 1995 ([National Center for Education Statistics, 2010](#)). Remarkable progress has been achieved in closing the gap in Internet access among different socioeconomic groups. As of 2008, there was virtually no difference in Internet access rates (97%–99%) across elementary and secondary, large and small, rural, urban, and suburban schools ([National Center for Education Statistics, 2010](#)). A recent study by the Pew Research Center showed that 95% of teenagers aged 12 to 17 had Internet access at home, including 89% of those whose household income was less than \$30,000 ([Madden, 2013](#)). However, equal access does not ensure equal use. Not all types of Internet use are equally beneficial ([van Deursen & van Dijk, 2014](#)). Differences in Internet use among various socioeconomic groups may lead to a digital divide beyond Internet access.

1. Internet use and the digital divide

Drawing upon Bourdieu's capital theory ([Bourdieu, 1990](#)), some types of Internet use may offer more opportunities than others to help individuals gain economic (financial resources), social (relationships and networks), and cultural (knowledge and dispositions) capital and move forward in their education, career, and social status. In line with this view, there are two kinds of online activities based on their potential for enhancing one's economic, social, and cultural capital ([van Deursen & van Dijk, 2014](#)). The first kind is capital-enhancing use, which involves using resources on the Internet to improve education, find jobs, advance career, and enhance physical and mental health. Another kind of Internet use mainly involves using the

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Internet for entertainment, such as playing games, surfing for fun, and gambling online. Such use is generally believed to have little potential for increasing economic, social, and cultural capital (van Deursen & van Dijk, 2014).

Bourdieu's research on social inequalities suggests that individuals tend to develop practices and dispositions that accommodate their social positions and thereby reproduce existing advantages and disadvantages (Bourdieu, 1990). If Bourdieu's theory applies in Internet use, disadvantaged youth may be less likely to use the Internet to enhance their education, but more likely to use the Internet for entertainment. Prior research suggested three possible reasons that disadvantaged youth may be more prone to Internet use for entertainment. First, children in disadvantaged families may lack supervision and guidance in enriching use of the Internet because their parents have limited technological skills themselves (Hollingworth, Mansaray, Allen, & Rose, 2011). Second, children in disadvantaged families may lack opportunities to attend more intellectually stimulating extracurricular activities because of financial restrictions or time constraints due to parents' work schedules (Gershenson, 2013). Third, disadvantaged children may play games to escape from the drudgery of school-work, poor peer interaction, and other life stresses (Han et al., 2009; Jackson et al., 2005).

Prior research provided some evidence for the tendency to use the Internet for entertainment by disadvantaged youth. Rideout, Foeh, and Roberts (2010) found that Black and Hispanic youth aged 8 to 18 spent three more hours per day on media use, including playing computer games, than their White peers. Gershenson (2013) found that children in poor families whose parents had low educational levels spent more time watching television in summer and less time reading than peers in affluent families whose parents were highly educated. In a similar vein, disadvantaged children may be more likely to use the Internet for entertainment. Jackson et al. (2005) found that African American children in poor families used computers primarily to play games. Hollingworth et al. (2011) found that middle-class parents were better able to guide their children's Internet use for educational purposes, while some working-class parents showed discomfort with their own lack of technological skills. Chang and Kim (2009) discovered a positive association between home computer access and science performance for English-speaking students, but a negative association for English language learners. Han et al. (2009) found that about half (52%) of children in their study with attention-deficit hyperactivity disorder were also diagnosed with Internet gaming addiction.

In addition, disadvantaged students are also likely to attend high-need schools, as a substantial portion of public school funding in the United States is from property taxes. Such schools are more likely to be staffed with teachers who lack teaching experience and technical skills needed for effective technology use in classrooms (Chapman, Masters, & Pedulla, 2010). Prior research showed that technology use in schools serving disadvantaged students tends to be less sophisticated than in schools serving affluent students (Reinhart, Thomas, & Toriskie, 2011). Wood and Howley (2012) reported that teachers in affluent suburban schools had more technological training opportunities than did their peers in rural and urban schools. Similarly, Reinhart et al. (2011) found that teachers in schools with many students from poor families lacked instructional support of technological specialists. As a result, students with disadvantaged backgrounds may be less likely to use quality Internet resources for learning due to their teachers' lack of technological training and support.

In summary, prior research indicated a possibility that the Internet may be used to reproduce, rather than close, educational inequalities. However, few studies have examined to what extent this hypothesis may hold true. In particular, little research has examined this issue by analyzing the actual usage of youth-oriented educational and entertainment websites. The paucity of research in this area is largely due to the lack of an effective and efficient method for tracking Internet use by millions of users. Two big data analytic tools that have rarely been used by educational researchers offer great potential for understanding current Internet use by youth.

2. Tracking internet use with two big data analytic tools

In recent years, big data (data at a very large scale) has received significant attention in various fields, including education. Nevertheless, emerging discussions on big data in education are mainly focused on educational data mining and learning analytics (Bienkowski, Feng, & Means, 2012), which typically produces data controlled by local institutions. In the present study, two publicly available big data analytic tools are introduced: Google Trends and web analytics.

Search engine use is one of the most common online activities, thanks to its ease of use and convenience in access. Internet users rely on search engines to meet their information needs. The majority (67%) of Internet searches are conducted on Google, which receives over 12 billion search queries each month (comScore, 2014a). Students are heavy Google users to the extent that they are called "the Google Generation" (Rowlands et al., 2008). According to Purcell et al. (2012), 94% of teachers stated that their students were most likely to use Google or other search engines to look for information for school projects, while only 18% reported their students used books for that purpose. Accordingly, analyzing search volumes and trends for search terms related to youth-oriented websites may provide important insight into Internet use by students. Google provides public access to its search data via a free tool called Google Trends (www.google.com/trends).

2.1. Google Trends

Google Trends provides normalized search volumes for queries that Internet users have conducted on Google. The highest search volume is set at 100. Other volumes are divided by the highest volume and multiplied by 100. Zero represents either a lack of searches or insufficient search volumes. Google Trends provides monthly search volume data with the earliest date being January 2004. Google Trends also provides search volume data by country and region. To generate a

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