The Poor Get Poorer and the Rich Get Fiber: Why Free/Low-Cost Internet Might Not Bridge the Digital Divide

Emergent Research Forum

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Abstract

Public policy holds that bridging the digital divide is a critical requirement for improving the life chances of socio-economically disadvantaged groups. Free or subsidized internet access from government and non-profits is a common approach, however, with the advent of Google Fiber, a new venture providing free/low-cost fast internet, the access landscape is changing. We will study the effects of Google Fiber in Kansas City, Missouri, one of the first cities to receive the service. We propose several hypotheses on the relationship between free/low-cost, fast internet service and improved educational outcomes. We plan to compare academic performance results from Kansas City Public Schools inside and outside of Google Fiberhoods. We hope to determine if access to internet services such as Google Fiber have an impact on K-12 educational outcomes and what moderators may influence its effects.

Keywords

Digital divide, social inclusion, education, Google Fiber, internet usage in the home, internet access

Introduction

If economically disadvantaged communities had access to free and low-cost fast internet, would it bridge the digital divide? Although most policy makers and the press believe internet access is an important requirement for social equalization (Goolsbee and Guryan 2006), we investigate whether access to broadband internet makes a difference for lower income populations. The digital divide, a hot button for government and education since the mid-1990's, has recently returned to the spotlight thanks to free and low-cost high-speed internet service from Google (Velázquez 2015). The recent calls within the information systems discipline for the study of social issues, such as the Bright ICT Initiative, suggest that there is opportunity to revisit the digital divide to explore its manifestations, impact, and the effectiveness of communities' efforts to resolve this social problem.

The digital divide is generally defined as information access inequality (Hilbert 2013), and includes not only literal access to the internet, but also access to devices and the knowledge needed to access information (Dimaggio et al. 2004). Such inequality is presumed to prevent those without access from enjoying the benefits of a digital world (Hsieh et al. 2011). In this study, we limit our exploration of the digital divide to the differences among individuals in terms of "using the Internet at one's place of residence; and using the Internet at home through a high-speed connection" (Dimaggio et al. 2004).

In this study, we examine the digital divide in terms of high-speed internet as we examine the proliferation of Google Fiber in Kansas City neighborhoods and examine the impact of the adoption of Google Fiber in communities on local school performance. Our research seeks to answer the following question: *If communities have access to free/low-cost fast internet at home, does it improve educational outcomes in K-12 schools?*

While our research draws upon the fields of sociology, public policy, economics, and education, the study of the digital divide and education is relevant to IS researchers because of education's effect on the business environment. Looking at our entire economy, not only is positive educational performance critical for economic success, but even small improvements provide a big impact on the

economy as people increase human capital through education (Hanushek and Woessmann 2010). In their 2010 study, Hanushek and Woessmann suggest that the extant worldwide macroeconomic research "overwhelmingly" included education in economic measurements of developing countries. As governments and private entities push to bridge the digital divide with internet access, infrastructure, equipment, and training, millions of dollars are being spent in these interventions with mixed evidence of their success. This quantitative study is a step towards uncovering trends and suggests implications for further research with both qualitative and quantitative methods.

Background

To understand the impacts of the digital divide, Wei et al. (2011) suggest there are three different levels of the digital divide: 1) disparity of access to technology in homes and schools, 2) differences in leveraging IT due to the lack of access to technology at home and school, and 3) inequalities in outcomes as a result of the inability to leverage IT.

Prior research has examined interventions within various communities to bridge the digital divide in homes. One community that offered its citizens free Internet TV did not necessarily provide the benefits intended by the local government; while some citizens found value in the service and gained internet-related skills, the greater community did not widely adopt the service (Hsieh et al. 2008; Hsieh et al. 2012). Yet, there are arguments that even small improvements in reducing the gap within the digital divide are worthwhile endeavors (Dimaggio et al. 2004).

Other interventions to address the digital divide have focused on education, however, mixed results suggest that these efforts are not necessarily providing the benefits intended in the United States. One state's effort to provide access to technology in student homes found "very little evidence exists to support a positive relationship between student computer access at home and academic outcomes" (Vigdor and Ladd 2010, p. 3). In this case, the authors found that students who received a technology intervention in the home suffered from a "Homework Gap" in that technology created a distraction for students rather than assisting with learning. On the other hand, home internet access improved scholastic scores for low-income children in a multiyear study by Jackson et al (2006).

While many documented interventions related to the digital divide have had limited success, there are glimmers of hope for addressing this social problem. Having access to technology in school can address some barriers to technology use, such as computer self-efficacy; however, school access alone did not bridge the gap among students in Singapore (Wei et al. 2011). Internet in the home may be needed to reinforce success. Some community-level interventions have been successful at aiding individuals in lower-income communities by encouraging workforce development (Kvasny 2006). The challenge with addressing the digital divide is that there are many factors that contribute, such as race, age, and educational level, as well as economic factors (Dimaggio et al. 2014; Vigdor and Ladd 2010).

Prior interventions to address the digital divide have largely been community-based programs funded by government or grant agencies (Bidwell 2014, Goolsbee and Guryan 2006). An interesting shift in the digital divide issue is that for-profit organizations seem to be getting involved. Google has introduced Google Fiber, which "started with a goal to make the Web faster — for everyone. We also have a goal to make it more affordable, more relevant, and more useful. It takes a lot more than wires to bridge the digital divide, and we can't do it alone" (Swanson 2014). Google has specifically stated that one of their goals with Google Fiber is to improve communities through the use of high-speed internet. A recent Google Fiber blog post states:

> *At Google Fiber, we often talk about how superfast speeds and access to home broadband can move entire communities forward. For low income families, access to the Internet can mean the difference between thriving or falling behind. It can mean more children using computers in after-school programs and STEM classes, more students going online to finish their homework, more people taking advantage of resources like Khan Academy, and more families learning basic computer skills that help them be more connected (Kish 2016).*

The economic differences between technology haves and have-nots are spurring investment in technology infrastructure by companies like Google in an attempt to level the playing field and offer more opportunity to lower income communities. Therefore, this study seeks to explore how for-profit initiatives to build infrastructure to address the social issue of the digital divide impacts communities. Specifically,

we examine educational outcomes via standardized test scores from local schools. We propose the following hypotheses:

H1: Access to free and/or low-cost residential high-speed internet service will improve school standardized testing scores.

H2: Access to free and/or low-cost residential high-speed internet service will reduce dropout rates.

While it may appear that H1 and H2 are the same measurements, they are different. Dropouts may be caused by reasons other than low academic performance. Prior studies have shown that dropout rates vary a great deal between social groups (Rumberger 1987).

H3: Access to free and/or low-cost residential high-speed internet service will increase graduation rates.

Education strategies recommend that high-speed internet access be available to all students, particularly those at risk (Darling-Hammond, et al. 2014). Working from the premise that free/inexpensive fast internet should particularly improve educational prospects in lower income communities (Bidwell 2014), we also intend to examine if the economic status of the school, as indicated by the percent of free/reduced school lunch students in a school, moderates the relationship between access to high-speed home internet and scholastic performance.

H4: The relationship between access to high-speed internet at home and improved scholastic performance is moderated by the economic status of the school.

Research Method

To test these hypotheses, we examine data associated with the installation of Google Fiber in Kansas City, Missouri. Google Fiber, an internet broadband and cable TV service, offers free and low-cost service up to 1000 megabits per second, which is 100 times faster than speeds available to the majority of Americans (Medin 2011). Kansas City was the first city to receive Google Fiber in 2012. We will use secondary data from a variety of sources, including information obtained from the local school district, which provides individual school-level report cards on a range of measures as required by the No Child Left Behind Act. These report cards provide information at the state level, district level, and school level, and include data from elementary through high school, as well as special academies and magnet (specific academic focus) schools. Specific data will be collected from these reports, such as math and reading scores, demographics, dropout rates, graduation rates, and the percent of free/subsidized lunches (an indicator of the economic status of a school). To measure the proliferation of Google Fiber in neighborhoods or "Fiberhoods," to use Google's term (Canon 2014), we will utilize data from research firms (Pew, Bernstein Research), media and press releases, and Google blogs.

For this initial exploration, we are not including internet access outside the home or the use of smartphones for connecting to the internet because each additional source adds another layer that is beyond the scope of our initial research. Because the schools we are examining have had internet access for a number of years, we are considering access within schools as a constant.

To test H1 we will compare student Mathematics and English Language scores from the No Child Left Behind School Report Cards between 2009 and 2015 for students in Google Fiberhoods and outside Fiberhoods. The dates encompass three years prior to the 2012 installation of Google Fiber and three years post-installment. 2012 is considered a transition year.

To test H2 we will compare student dropout rates from the No Child Left Behind School Report Cards between 2009 and 2015 for students inside and outside of Fiberhoods.

To test H3 we will compare student graduation rates from the No Child Left Behind School Report Cards between 2008 and 2015 for students inside and outside of Fiberhoods.

To test H4 we will analyze the percent of students enrolled in Free/Reduced School Lunch programs as reported in the No Child Left Behind School Report Cards between 2008 and 2015. We compare this data to our findings in H1-H3 and to the penetration rates of Google Fiber in the Kansas City area.

Preliminary Results

In an initial review of the data, there is an indication that there has been little to no improvement in educational outcomes after Google Fiber was installed in Kansas City. Furthermore, there is an indication that the majority of households opting for Google Fiber are those that already had internet service, and tended to be in middle- to high-income neighborhoods. Although Google installed free devices and internet access through their Community Connections program, residential sign ups in lower economic neighborhoods remained low. The free installations included public housing, schools, libraries,

We're working with local partners across Fiber cities to get more families in public housing online with Gigabit Internet for $0/month. Residents at KC's West Bluff public housing community recently became the first in the country to activate this service. We can't wait to see what they'll do with Fiber. ("Fiber in the Community." n.d.)

Our initial analysis suggests that those in lower income neighborhoods may not benefit from Google Fiber. The full results, including the results of the hypothesis tests, will be presented at the 2016 Americas Conference on Information Systems in San Diego.

Conclusion

To date, many efforts to address the digital divide have been community, non-profit, or government-sponsored projects (e.g., Hsieh et al. 2008; Kvasny 2006; Goolsbee and Guryan 2006). Yet, Google's effort, as a for-profit organization, to take on this social issue suggests interesting implications. There are many for-profit companies that contribute to local communities; some for-profit communities recognize that doing social good can create positive benefits for them (Goldman 2016). There is an opportunity to examine how well existing theoretical and research models associated with the digital divide apply in a context when the community is supported by a for-profit organization. There is an opportunity to explore if there is a chance to overcome prior challenges with the digital divide when there is collaboration between business, governments, and local citizens.

While we are initially focusing this research on the implementation and impacts of Google Fiber in Kansas City Schools, we anticipate that it may lead to future research in the areas of the digital divide, inclusion, and government and policy implications for internet services and access. Upon completion of our research, we may well find that there is little correlation between the availability of free/low-cost at-home internet access and educational success, which could stimulate questions to answer that paradox. We anticipate that our contributions will shed light on internet and device usage in lower income communities. That, in turn, may give us insight into methods for improving our labor force through education and the role technology plays both as an end and a means, especially in the critical K-12 environment. We also expect to uncover other relationships. For example, the U.S. Census Bureau is currently contemplating online surveys in 2020 (Cohn 2016). Yet, if door-to-door census taking is reduced, this offers questions on whether or not citizens will be underrepresented because they do not have internet access at home. U.S. Census statistics are used for congressional districts, public services, new roads, and government funding (U.S. Census Bureau 2016). The implications are serious.

We understand that how a school implements internet usage will vary by teacher and this variance is a limitation of our work. We hope to develop our study further in the future using qualitative methods to tease out the implications from additional internet access locations and devices. We recognize that by looking at Fiberhoods and local schools, it may be challenging to observe the impacts of access to high-speed internet access on student achievement. We are still analyzing the limitations of our research. Yet, the results will help us to identify other outcome variables for digital divide interventions, such as improved vocational skills in computer application usage and computer maintenance (Vigdor and Ladd 2010) or increased cognitive and social skills from online games (Granic et al. 2014). If we identify Fiberhoods or schools with varying degrees of success in the outcomes of the introduction of Google Fiber, we can perform additional research using quantitative and qualitative methods to understand strategies that inhibited or contributed to the success of the intervention. This research is a first step in understanding how free/low-cost, high-speed internet may impact educational outcomes in communities differently based on their economic status. Politically, bridging the digital divide and improving the

economic outlook for poorer communities is a hot button. The successes and failures of Google Fiber may well influence public policy for decades.

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