Advancing Digital Social Equity Through the Application of Innovative Digital Literacy Programs

A Review on Bridging the Digital Divide in Two Selected Urban Environments

Daniel Theodore Ling Kent

Founder, Net Literacy

Haverford College

The Growth and Structure of Cities Program

Advisor: Professor Gary Wray McDonogh

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Abstract

As more services and business migrates to the Internet, individuals who lack the ability to effectively and efficiently use computers and the Internet are at an increasingly greater risk for missing out on new opportunities that are available only to those who are online. Historical models for remediating those who are digitally excluded have made progress towards digital inclusion but much work remains. This paper surveys the state of digital literacy programs and identifies and analyzes specific population groups that are less digitally empowered. It then examines three digital literacy organizations including the Hong Kong Internet Service Providers Association, the Hong Kong Internet Professional Association, and Net Literacy that seek to engage these traditionally digitally excluded populations. From these findings, this paper makes recommendations on how best to advance digital literacy and digital inclusion going forward.
Keywords

Digital Literacy, Digital Inclusion, Digital Social Equity, Best Practices, Hong Kong, Indianapolis, Hong Kong Internet Service Providers Association, Hong Kong Internet Professional Association, Net Literacy, Daniel Kent
Dedication

This work is for the men, women, and youth who are dedicated to the advancement of digital literacy and digital inclusion. Only together, through a collaborative, concerted effort will the digital divide be bridged and the goal of digital social equity be achievable. This is also dedicated to the students of digital literacy who embody the idea that no one – no matter how young or old – is incapable learning how to effectively and safely use computers and the Internet.

--Daniel T. L. Kent, December 14, 2010
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There are so many people and organizations that deserve recognition that have had a hand in guiding me along the journey that is represented in part through this paper. It has been an illuminating and humbling experience and one that I would not trade for all the riches in the world.

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Second, I owe a deep debt of gratitude to the corporations and organizations that have provided Net Literacy millions of dollars in donations and donations-in-kind and innumerable hours of dedicated support and attention. Without your support, this dream would not have become the reality that it is today. The over 300 of you provide us guidance and a vision and the means to make our dreams a reality.

Three organizations and groups of people deserve special recognition for their help in taking a chance in the then-several middle-school students who had the dream of Net Literacy. First, thanks goes to the Carmel Clay Public Library for serving as the environment where Net Literacy was conceived and providing us hundreds upon hundreds of computers, the lesson manuals we were able to use and modify and incorporate into our program, and the never-ending support you give us. Second, I want to thank the Forum at the Crossing and director Julie Boone for going that extra mile and agreeing to serve
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# Table of Contents

Abstract .................................................................................................................................................. ii

Keywords ............................................................................................................................................. iii

Dedication ................................................................................................................................................ iv

Acknowledgements .......................................................................................................................... v

Table of Contents .............................................................................................................................. viii

Table of Figures ................................................................................................................................... xiii

Introduction .......................................................................................................................................... 2

Chapter 1: Background and Terminology ......................................................................................... 8

  What is Digital Inclusion? .................................................................................................................. 8

  What is Digital Literacy? ................................................................................................................... 9

  What is Broadband and how does it impact Digital Literacy and Digital Inclusion? .................. 11

Chapter 2: The Service-Providing Stakeholders .............................................................................. 13

  The Public Sector ............................................................................................................................. 13

  The Education System .................................................................................................................. 14

  Libraries ........................................................................................................................................ 14

  The Private Sector .......................................................................................................................... 15

  Non-Government Organizations (NGOs), Nonprofits, Industry Associations and Social Partners .... 16

Chapter 3: The Current State of Digital Literacy and Inclusion in America .................................. 18

  Overview ........................................................................................................................................ 18
The Impact of Digital Exclusion ........................................................................................................... 21

Adoption concerns .................................................................................................................................. 25

Target Groups ............................................................................................................................................. 30

Low-Income Households ....................................................................................................................... 30

The Disabled ........................................................................................................................................... 38

The Elderly ............................................................................................................................................. 42

Young People At-Risk ............................................................................................................................ 43

Ethnic and Cultural Minorities .............................................................................................................. 46

Language Minorities ............................................................................................................................... 49

Compounded Disadvantages: Individuals in overlapping target groups .............................................. 53

Approaches for Remediation of Urban Social Divisions ........................................................................ 55

Other Examples of Technology Adoption ............................................................................................. 57

Chapter 4: Digital Literacy Programs Abroad and At Home: .................................................................. 65

Hong Kong .............................................................................................................................................. 65

The Hong Kong Digital Environment ................................................................................................... 65

The Digital 21 Strategy ........................................................................................................................... 65

Factors to consider when comparing Internet penetration, broadband adoption, digital inclusion, digital literacy, and other information for Hong Kong and the United States ........................................... 68

The Hong Kong Digital Literacy Programs ............................................................................................ 74

The Hong Kong Internet Service Providers Association ........................................................................ 74
How to Get People Online: the Six Most Important Next Steps to Increase Digital Literacy and Digital Inclusion in the United States

1. Create a Special Advisor to the President (Effectively, a National Broadband Czar)

2. A Digital Inclusion Cost/Benefit Analysis Should be Conducted to Maximize Taxpayer ROI

Broadband adoption is naturally increasing, but the Government Accountability Office or a similar nonpartisan government entity should conduct a cost/benefit projection to estimate a taxpayer return on investment for all components of the proposal.

3. The FCC should continue its public outreach strategy

4. Review of International Digital Literacy and Digital Inclusion Programs and International Broadband Plans

5. The Recommendations should be prioritized, have an ROI, and a completion timetable

6. Funding Broadband Adoption and Use as a component of the National Broadband Plan

   (a) National Funding With National Implementation

   (b) National Funding With State Implementation

   (c) National Funding With Local Implementation

Estimating Costs
(I) Assumptions Used to Estimate the Financial Order of Magnitude Using Two Digital Inclusion Scenarios ................................................................. 122

(II) Assumptions Used to Estimate the Purchasing of Computer Hardware ................................................. 123

(III) Assumptions Used to Estimate the Reoccurring Broadband Connectivity Service Fees.............. 124

(IV) Assumptions Used to Estimate the Costs of Providing Digital Inclusion and Digital Literacy Training ........................................................................................................ 126

Digital Inclusion Program Scenarios: .................................................................................................. 127

Scenario One ........................................................................................................................................ 127

Scenario Two ...................................................................................................................................... 128

Digital Inclusion and Digital Literacy Costs for Training 8 Million Americans: .......................... 128

Conclusion .......................................................................................................................................... 131

Post-Conclusion Findings .................................................................................................................... 133

Epilogue ............................................................................................................................................ 134

DigitalLiteracy.org ............................................................................................................................. 134

Works Cited ........................................................................................................................................ 138
Table of Figures

Figure 1: How various broadband speeds can support e-health (Broadband Commission, 2010, pp. 12-13) ................................................................. 11

Figure 2: Year-to-year percentage change in home broadband adoption, 2004-2010 (Smith, Home Broadband 2010, 2010, p. 6) ............................. 19

Figure 3: Historical Broadband Adoption at Home (Rainie, 2010, p. 5) .......................................................................................... 20

Figure 4: Broadband Adoption by American Adults by Socio-Economic and Demographic Factors (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 13) ....................................................... 21

Figure 5: Ranking of Costs Associated with Digital Exclusion (Econsult Corporation and Digital Impact Group, 2010, pp. A-9) ........................................................................................................ 25

Figure 6: Main reasons for not using the Internet (Smith, Home Broadband 2010, 2010, p. 11) ....................... 27

Figure 7: Six in ten non-Internet users would need assistance getting online (Smith, Home Broadband 2010, 2010, p. 12) ................................................................. 28

Figure 8: Main Reasons Nonusers Do Not Use the Internet (by Percentage) (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 27) ................................................................. 29

Figure 9: Broadband adoption trends within demographic groups, 2009-2010, % of all adults with broadband at home, 2009-2010 (Smith, Home Broadband 2010, 2010, p. 8) ........................................ 32

Figure 10: “Exhibit 10:” Broadband Survey Users on Where They Access the Internet (Horrigan J. B., Broadband Adoption and Use in America, 2010) .......................................................................................... 34

Figure 11: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total Population in Poverty Data (US Census Bureau, 2010) (Net Literacy, 2010) .... 36
Figure 12: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis)

Figure 13: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis)

Figure 14: Broadband Adoption by Race and Ethnicity, 2005-2009 (Shapiro & Hassett, 2010, p. 7)........ 47

Figure 15: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis)
Overlaid on Census Total Minority Populations Data (US Census Bureau, 2010) (Net Literacy, 2010)...... 48

Figure 16: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis)
Overlaid on Census Total ENL/ESL Household Data (US Census Bureau, 2010) (Net Literacy, 2010) ....... 52

Figure 17: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis)

Figure 18: Cable TV Subscribers as a Percentage of Households with TVs (National Cable Telecommunications Association, 2009) ................................................................................................................................. 63

Figure 19: Broadband Penetration versus Dialup (Website Optimization, 2010) (Pew Research Center, 2010) ................................................................................................................................. 63

Figure 20: Blue Tone’s Tips for Broadband Service Users (Office of the Telecommunications Authority, 2009) ................................................................................................................................. 67

Figure 21: Percent of Households with PCs at home connected to the Internet in Hong Kong (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. 10)................................. 71

Figure 22: Persons aged 10 and over who have used PCs in Hong Kong by age (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. 12)................................. 73
Figure 23: Persons aged 10 and over who have used PCs in Hong Kong by educational attainment  
(Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. 13) ...............73

Figure 24: Persons aged 10 and over who have used PCs in Hong Kong by economic activity status  
(Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. 14) ...............73

Figure 25: Cyber Centres in Hong Kong (Internet Professional Association, 2010).................................78

Figure 26: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) (US  
Census Bureau, 2010) (Net Literacy, 2010)..............................................................................................88

Figure 27: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) with  
a five block radius highlighted (US Census Bureau, 2010) (Net Literacy, 2010).................................91

Figure 28: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) with  
a five block radius highlighted with Indianapolis Public Schools Service Region (US Census Bureau, 2010)  
(Net Literacy, 2010).................................................................................................................................93

Figure 29: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) with  
a five block radius highlighted overlaid on Census Median Household Income data (US Census Bureau,  

Figure 30: Net Literacy’s 2010 Revenue by Source (Net Literacy, 2010)...........................................104

Figure 31: Broadband Survey Users on Their Reasons for Getting Online (% among Internet users who  
have been online for 2 years or less) (Horrigan J. B., Broadband Adoption and Use in America, 2010, p.  
19)..........................................................................................................................................................110

Figure 32: DigitalLiteracy.org Screenshot (Net Literacy, 2010)............................................................136

Figure 33: DigitalLiteracy.org Translation Feature Screenshot (Net Literacy, 2010)..............................137
“More than one out of three Americans will not receive all of the benefits that broadband has to deliver – and I’m talking about benefits in lifestyle, in telemedicine, in education, in jobs. They’re simply going to miss out on an important part of the American Dream.” - Dave McClure, President of the USIIA, June 22, 2010 (Kent, Broadband for America: A Roadmap to Broadband Adoption, 22 June, 2010)

Introduction

With the growth of Internet, broadband has redefined the historical paradigm of communications and commerce. While precisely quantifying the cumulative impact of the Internet on the economic, political, and social spheres is virtually impossible, it is evident that not all individuals have equal access -- or access at all -- to such an important tool. As contemporary life becomes increasingly digitized, individuals without access are challenged to fully participate in modern society and enjoy the benefits of this global network. Indeed, over time these individuals may soon constitute a population who are in essence, partially disabled – lacking the ability to completely function in our new digital world. However through the application of innovative digital literacy programs, the Internet can help facilitate increased digital social equity.

Digital social equity is a society's responsibility that all of its citizens are digital literate in the context that digital literacy is a required 21st Century skill and society is responsible for the fair, just, and equitable treatments of its citizens. Digital social equity is an extension of H. George Fredrickson’s theory of social equity (that those in public administration are making the mistake that citizen A is the same as citizen B; ignoring social and economic conditions) but applied to digital literacy. Digital social equity ensures that a sufficient commitment of digital literacy resources be distributed to groups that experience discrimination and social inequity so that all members of society are digitally literate and
able to use and access the Internet as an integral component of their lives. (Frederickson, 1990) (Urban Dictionary, 2010)

To work towards greater digital literacy and digital inclusion, this paper seeks to define patterns and experiences of digital exclusion and to address strategies of digital literacy, digital inclusion, and digital empowerment. It begins with the discussion of key terms involved in the analysis of connectivity and presents them in the context in which they will be used in this paper. The paper touches on “digital inclusion” and “digital literacy” and after this discussion; it examines the role of broadband and its necessity in the digital literacy and digital inclusion conversation.

The following chapter provides an overview of primary service providing stakeholders that not only have a vested interest in getting the population connected, but also play a crucial role in the connecting process. These organizations represent the vast majority of the efforts that are focused on bridging the digital divide.

The next chapter, “Chapter 3: The Current State of Digital Literacy and Inclusion in America” provides a survey of the contemporary environment in terms of connectivity and access, adding data on historical formations of digital inclusion and digital literacy, including a concomitant definition of exclusion. This section then devotes itself to identifying the service-providing stakeholders’ constituents ranging from disabled individuals to ethnic and cultural minorities within our communities. The chapter concludes with a synopsis of historical digital inclusion models and an analogue case to the adoption of computers and the Internet.

Using general discussions in the United States to frame this discussion, the paper then turns to two specific case studies, are based in Hong Kong and Indianapolis in the next chapter. This comparison seeks to evaluate answers to some of the fundamental questions surrounding efforts to promote
connectivity by presenting several best practices that have made a significant impact in their
communities. Hong Kong and Indianapolis were selected for two primary reasons: their established
digital literacy programs and their representation of the future of cities. In both cities, digital literacy
and digital inclusion have been recognized as a growing concern for policymakers as well as society at
large. These two cases further provide deeper insight as I believe that the growth of global metropolises
will likely parallel the historical growth of Hong Kong, where major regional cities will mirror
development in Indianapolis. This case-study chapter begins with an analysis of digital literacy in Hong
Kong that is provided to illustrate some commonalities and differences between Hong Kong and the
previously discussed environment in the United States. Then turning to two different examples of digital
literacy programs, the Hong Kong Internet Service Providers Association and the Hong Kong Internet
Professional Association, connectivity practices are highlighted and overall progress chronicled. The
paper then turns back to the United States and focuses on the efforts of Net Literacy in Indianapolis,
Indiana.

The chapter “Chapter 5: Lessons Learned and What Remains to be Done” identifies common obstacles
for the Hong Kong Internet Service Providers Association, the Hong Kong Internet Professional
Association, and Net Literacy. From this, it illustrates best practices and suggestions for future work. In
“Post Conclusion Findings,” the paper cites an example of how Intel, an international company, is
impacting digital inclusion across national border. Finally, research conducted to write this thesis
resulted in the development of the DigitalLiteracy.org best practices website, a tangible outcome of the
project. The Epilogue outlines the project and the international acceptance it has received.

There are many variables and factors that influence and affect digital literacy and computer and Internet
adoption but this work focuses on addressing the most significant factors in Hong Kong and Indianapolis.
For example, rural populations constitute a significant group of the digitally excluded and must be a
priority for policymakers and organizations to address. However, this paper will be limited to urban areas, even though many of the best practices that are examined in this discussion are applicable in the rural context. Additionally, issues revolving around a phenomenon known as “net neutrality” have arisen during debate on how to increase global connectivity. While some politicized debates could center on issues of “net neutrality,” this paper will not focus on this subject but will deal instead with concrete, measurable outcomes that transcend the policy debates regarding “net neutrality.”

This paper is the culmination of over seven years of my research and work. In 2003, I founded Net Literacy, one of the case studies presented. In the interim, I have authored and co-authored several whitepapers and information, statistics, and recommendations from these have been integrated into this work. These works include Digital Inclusion: Brining the Rest of America Online with Broadband, Reply Comments of Net Literacy Corporation, and Reply Comments of the United States Internet Industry Association (“USIIA”) and Net Literacy, both of which were submitted to the Federal Communications Commission (FCC) and incorporated into the National Broadband Plan.

Collected research and materials gained through my work with Net Literacy also have been incorporated into this paper. Many of these publications have been written by subject matter experts who have been commissioned by companies and organizations that have a vested interest in the digital literacy field such as Intel, Microsoft, and Cisco. Policy organizations and think tanks’ reports on digital inclusion and digital literacy have also been included, including the Pew Research Center, the International Telecommunications Union, the Knight Center for Digital Excellence, the Techpoint Foundation, and the United States Internet Industry Association.

Dr. John B. Horrigan’s innovative work during his career at the Pew Internet & American Life has served as a critical framework and provided integral statistics for this paper. During his work at the FCC, Dr.
Horrigan has published *Broadband Adoption and Use in America*, another report on the state of broadband and connectivity in America which has illuminated many issues. One of the largest service-providing stakeholders in this issue is the government, and reports and statistics from the United States government and its agencies and the Hong Kong Special Administrative Region’s government and its agencies have been included. The European Commission on Digital Inclusion’s report, *Supporting Digital Literacy: Public Policies and Stakeholders’ Initiatives* also provided a solid framework for analysis of the digital literacy issue.

Finally, in the summer of 2010, I traveled to Hong Kong and met with founders of the other two primary case studies, the Hong Kong Internet Service Providers Association and the Hong Kong Internet Professional Association. Additional information on each case study was gained through several interviews with subject matter experts and conferences that I attended. Research on the programs was gathered from websites as well as annual reports and sample presentations. Background information on Hong Kong was found in the books *Global Hong Kong* and *Shenzen and Hong Kong: Competitiveness and Co-operation in Technology* (McDonogh & Wong, 2005). Partner organizations of the case studies such as Computers For Youth, the Afterschool Alliance, One Community, and Save the Youth were researched and cited. Leading up to the writing of this paper, I also co-hosted the Broadband for America: A Roadmap to Broadband Adoption Summit in Washington DC on June 22, 2010 and presented “Net Literacy: Empowering Youths to Help Make America Digital & Net Literate!” Net Literacy and the United States Internet Industry Association presented at iWeek 2010 during September 13 – 17, 2010 in South Africa to the International Internet Industry Alliance – a gathering of Internet associations representing 200,000 Internet companies in five continents. These experiences allowed my colleagues at Net Literacy and me to speak with other digital literacy programs that are making a difference in communities across the United States and across the world. Lastly, because of the dynamic and rapidly
changing nature of the Internet, news reports from sources such as the *New York Times, The British Broadcasting Corporation, BusinessWeek, and The Associated Press* have been cited where appropriate.
Chapter 1: Background and Terminology

What is Digital Inclusion?

Digital inclusion means the long-term availability of access to the network that is the Internet through a “smart” device which allows for a two-way exchange of information from the end-user to the digital community and is a component of digital social equity. Digital inclusion can be accomplished through a number of ways: through smartphones, tablets, Internet equipped digital media players, computers and other electronic devices. Access through devices other than through a desktop or laptop computer presents supplemental challenges and variables in addition to the challenges associated with computer digital inclusion. These can range from service providers in smartphones to non-standard user-interfaces and browsers. Hence, the vast majority (nearly 91%) of all digital literacy initiatives studied utilize computers with Internet access as the primary digital connectivity tool. The benefit that computers provide over other forms of connectivity is that computers are relatively standard and thereby allow for digital literacy content to be tailored even more to computer-learning. Consequently, the major focus of this study is digital inclusion in terms of access to computers as computers currently provide the most conventionally reliable, standard form of access to the Internet. (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 1, 2009, p. 23)

Identifying digital inclusion and the areas lacking inclusion are integral to providing all individuals with access to the resources best suited to get them online. However, not all forms of digital inclusion are equal, because certain population groups require hardware and programming that varies based upon their needs.
For example, in communities where senior citizens comprise a significant amount of the population, standard computers would not suffice in providing these individuals adequate access to the Internet. In such a case, additional aids such as larger screens, trackball mice, and larger, modified graphical user interfaces would be necessities in establishing an equal level of access to the Internet. In other communities, such as those where English is not the primary form of communication, modifications to the hardware and software may be required to allow all individuals to effectively access the Internet in a language familiar to them. This is particularly the case in globalized cities such as Hong Kong, where there are three predominant languages spoken and two writing systems used. Computer and Internet services provided only in one might exclude a significant number of individuals from accessing important health and government information. By providing customized content in a number of different languages, these groups of individuals can be digitally included and access all of the benefits that the Internet provides. (Federal Communications Commission, 2010, p. 129)

Physical and social access alone does not equal digital inclusion. Education about how to use computers and the Internet is integral to becoming a “digital citizen.” Without this training, the users are effectively dropped into a situation that is tantamount to driving an automobile without driver’s education: they will not know the risks, tips, and tricks to stay safe and drive a car efficiently and effectively. Indeed in some countries and regions, for example, the European Union, there are training programs that grant users a “Computer Driver’s License.” Similar to obtaining an automobile’s driver’s license, it ensures new users possess the minimum skills necessary to traverse the information superhighway, while not penalizing more experienced drivers. (ECDL Foundation, 2010)

**What is Digital Literacy?**

Digital inclusion is only one-half of the issue at hand because computers and the Internet are useless without knowing how to effectively utilize them once connected. Digital literacy is an integral part of
digital social equity that means the convergence of two aspects: it is the awareness of value of digital inclusion and the ability to effectively use computers and the Internet. This ability to use computers and the Internet requires mastery of a set of core competencies that enable the user to effectively evaluate the resources of the Internet and computers and to discern the quality of data, because the United States’ Internet is generally unfiltered and editable by anyone. Digital literacy has become a core competency for almost all professions as well as being an integral part of being a global citizen. Those individuals who are digitally illiterate face increasingly insurmountable obstacles in conducting business, gathering research, or even communicating on a day-to-day business. Similar to providing supplemental resources for special-needs groups in terms of digital inclusion, additional focus and due diligence is necessary for ensuring that individuals who speak foreign languages, individuals who have disabilities, individuals who are uneducated, and individuals who are technology-adverse realize the value proposition that computers and the Internet can offer them. Digital inclusion in combination with digital literacy can create citizen empowerment that mitigates social unevenness and imbalance, facilitating digital social equity.

The implications of digital literacy are enormous: the value proposition of broadband-enabled education, including economic development, improved healthcare, adoption of 21st Century skills, and enhanced public safety are too significant to ignore. Digital literacy is crucial for individuals to begin to understand the value proposition that computers and the Internet can provide them. Far too often, computers have been donated to create computer labs in communities where the need is the greatest without the accompanying education and training of how to effectively use and maintain them. The value of these computers is severely diminished because they cannot be utilized to their full potential. Consequently, with every installation of computers or technology hardware, it is essential that the providers establish education programs that teach individuals how to use the computers and Internet in
a safe and effective way. When a more digitally literate society evolves, the potential for a knowledge-based economy, a more informed public and a more involved citizenry becomes reality. For many, particularly those who are disabled or elderly, digital literacy can result in a significant increase in social inclusion and social equity. Digital literacy today is essential for today’s and tomorrow’s opportunities and citizenship. (Federal Communications Commission, 2010, p. 5)

**What is Broadband and how does it impact Digital Literacy and Digital Inclusion?**

Today, the resources on the Internet are increasingly bandwidth intensive and this is a trend that will only continue in the future. Older dial-up speeds that use telephone-based modems no longer have the capacity to support all of the media and content available on the Internet. Even when services, such as e-health online initiatives become increasingly available, a major impediment in integrating these resources into the communities that need them the most is connectivity. (See Figure 1: How various broadband speeds can support e-health ) Experts have agreed that future connectivity must be through broadband. (Broadband Commission, 2010, pp. 12-13)

![Figure 1: How various broadband speeds can support e-health](Broadband Commission, 2010, pp. 12-13)
The Federal Communications Commission defines broadband as “high-speed Internet access that is always on and faster than traditional dial-up access... providing higher-speed[s] of data transmission... and access to the highest quality of Internet services. While there is debate amongst engineers and policymakers about what data speeds constitute “broadband,” what is clearly evident is that broadband plays a critical role in digital literacy and digital inclusion and that it must be robust, accessible, and affordable. (Federal Communications Commission, 2010)

Broadband and computer access are crucial and public opinion is beginning to reflect the realized importance of this tool. In a global poll conducted by the BBC World Service, four out of five individuals surveyed considered Internet access a fundamental right. 78% said they feel it has brought them greater freedom, 90% say it is a good place to learn new things, and 51% say that they enjoy spending spare time on social networking sights connecting with friends and family. (British Broadcasting Corporation, 2010, pp. 1-2, 6) (Albanesius, 2010)

Crossing the digital divide is also a national challenge. The Internet was developed in the United States and first implemented within its borders. Americans feel that the Internet has given users greater freedom (85% compared to 78% worldwide) and that it is a resource that must be effectively allocated and protected. Some proactive national governments have gone so far as to make broadband a “legal right;” earlier this year, Finland proclaimed that every Finn should have the right to access a broadband connection. (British Broadcasting Corporation, 2010, p. 6) (BBC News, 2010)

A number of individuals agree that the ultimate end-goal of digital literacy and digital inclusion efforts is the creation of an information society, which is described as a society that “makes extensive use of information networks and information technology, produces large quantities of information and communication products, and services and has an industrial structure with diversified contents.” Only
through the rolling out of broadband infrastructure and digital literacy will we make progress towards this ideal by achieving digital social equity on the way. (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. Forward)

Chapter 2: The Service-Providing Stakeholders

Digital literacy and digital inclusion are large issues with far-reaching implications which require many organizations and groups of people to collaborate. These groups have the potential to best address those digitally excluded populations they know best and work together to achieve digital social equity.

The Public Sector

Government officials have a duty to progress many economic and social issues, including digital literacy. From a local, state, and federal level, the public sector can introduce digital literacy initiatives that support education, reduce unemployment, create equal opportunities, and support online government services, thereby increasing digital societal equity. If citizens are not digitally literate, the workforce is less competitive and more work can be outsourced, which has long term impacts on the well-being of the citizens. Digital literacy and digital inclusion initiatives have become a priority for many local, state, and national governments. For example, the Indiana General Assembly and Mayor’s office of Indianapolis have passed numerous proclamations emphasizing the importance of digital literacy and lauded digital literacy organizations and their sponsors and corporate partners’ efforts to bridge the digital divide. On a national level, the National Telecommunications and Information Administration has awarded a total of $293 million to 56 grantees in each of the 50 states, 5 territories, and the District of Colombia. These funds directed at state-created efforts are designed to assist communities in using technology more effectively, investigate barriers to broadband adoption, develop innovative applications that increase access to government services and information, and create programs and
local task forces to expand broadband access and adoption. These examples of government support are integral in facilitating a comprehensive multi-party effort to bridge the digital divide. (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 3, 2009, p. 20) (Net Literacy, 2010) (National Telecommunications and Information Administration, 2010)

The Education System

As the primary institution for educating and socializing youth, educational institutions have a responsibility that is dissimilar from any other stakeholder. While some institutions teach computer and technical skills as important job-skills, computers are also introduced early in classrooms as an important educational research tool, similar to libraries. Schools provide an opportunity for youths to learn digital literacy through a variety of means – whether this is through formal class lecture, extracurricular opportunities such as computer clubs, group or project based learning programs, or peer-mentoring programs. Additionally, the education system, while serving youths first, indirectly engages a secondary segment of the population in the form of the students' parents and guardians. When these individuals take a vested stake in the education of their children, opportunities for increased awareness about digital literacy issues and parent-student education can also take place. (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 3, 2009, p. 22)

Libraries

Libraries in communities serve a special role in education and learning – even beyond one’s typical high school or college graduation. Libraries provide a number of services to its patrons at no cost. From the beginning, libraries have had an important role in increasing digital inclusion and constitute a significant group that has a role in digital literacy. Approximately 99% of the 16,000 public libraries across America
provide free Internet access; over 90% of libraries serving high-poverty areas conduct formal computer and Internet training classes. Low income Americans and racial, cultural, and ethnic minorities depend on libraries to access the Internet in their communities. According to the National Broadband Plan, over half of African Americans and over two fifths of Hispanics who use the Internet do so at a public library. The National Broadband Plan illustrates that libraries serve a function greater than just providing computer and Internet access to the communities; non-adopters and new users frequently depend upon support and assistance from librarians to get online and get support when using the Internet. Such additional support from librarians that is frequently provided on a one-on-one basis offers significant opportunities for the most digitally excluded to learn how to use computers and the Internet. Libraries also serve as an important center that is comfortable and familiar to new users to learn how to use a computer and the Internet. (Federal Communications Commission, 2010, pp. 175-176)

While libraries are a critical digital literacy resource, many libraries lack the computer hardware to meet the growing needs of their digitizing patrons. The National Broadband Plan describes eight in 10 libraries reporting hardware shortages that create a waiting list for patrons seeking computer access during part or all of the day. The National Broadband Plan recommends further investment in library resources. While libraries are part of the solution to digital social equity, they are by no means the sole answer. Computer access in one’s community is the first step, but a computer in every home is the end-goal. (Federal Communications Commission, 2010, pp. 175-176)

**The Private Sector**

While it is generally agreed that digital literacy makes good policy sense, it can also makes good business sense. In an increasing competitive and global economy, digital literacy is becoming a requirement throughout virtually every business sector. Also, many computer, Internet, and telecommunications companies have a significant vested interest in getting those on the wrong side of digital inclusion
These companies, such as Intel, Microsoft, Verizon, Cisco, and Bright House Networks, often provide financial support, expertise, and donations-in-kind that digital literacy programs need to most effectively operate. Additionally, companies are motivated to improve the market uptake of their products and services in population groups with low market penetration. In an increasingly competitive global economy, having a digital literate workforce is becoming more and more necessary. The rate of technological change is increasing and those that are not digitally literate must either be retrained or replaced. (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 1, 2009, p. 18) (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 3, 2009, p. 21) (Net Literacy, 2010)

Non-Government Organizations (NGOs), Nonprofits, Industry Associations and Social Partners

One of the most critical aspects of digital literacy initiatives partnering with NGOs and other social-benefit organizations is reflective of the fact that many of the target groups feel comfortable with the organizations that they know and trust. Overcoming the difficulties associated with technophobia is sufficient to inhibit many non-adopters from pursuing increased digital literacy. Since NGOs often already have relationships with the individuals that they serve, these local organizations or network of organizations can leverage the trust and understanding of their membership. These factors can be integral in and critical to gaining the confidence of their members and enabling the NGOs to show each member their own individual digital literacy value proposition. Critically, however, because many NGOs’ missions are seldom focused solely on digital literacy, these organizations have the benefit of taking a holistic approach to digital literacy – whether the foci are on disability, education, unemployment, or health issues, NGOs that focus on the underserved can leverage digital literacy as a critical tool to

These groups constitute several of the most important service-providing stakeholders in the digital literacy and digital inclusion field. These, however, are by no means the only important organizations that have a significant role in the process of achieving digital social equity. These groups are among the most significant and have the most to contribute to the digital literacy and digital inclusion effort.
Chapter 3: The Current State of Digital Literacy and Inclusion in America

Overview

To best understand how to improve digital literacy in communities, it is essential that clear, detailed information about population groups who lack adequate access to computers and the Internet be gathered and analyzed to determine how best to help these underserved groups.

According to the Broadband Adoption and Use in America OBI Working Paper Series No. 1, published by the Federal Communications Commission and authored by adoption expert Dr. John B. Horrigan, digital inclusion and digital literacy have improved over time; however much work still needs to be done.

The issues of digital literacy and digital inclusion were primarily first addressed by the Federal Government in 1995 where a report authored by the Department of Commerce illustrated that many Americans were “falling through the Net.” This report was targeted first towards telephone service penetration as computer and Internet access was then primarily conducted over telephone lines.

Subsequent follow-up reports began to highlight the pressing issue of digital inclusion and digital literacy in terms of broadband. In that first report, “information disadvantaged” population groups were identified: the poor, minorities, young and old, the less educated, among others. (Department of Commerce, 2000) (Department of Commerce, 1995) (Department of Commerce, 1999)

According to the Pew Internet & American Life Project’s 2010 Home Broadband Survey, total broadband adoption has continued to increase; however, people have adopted broadband at a diminished rate as compared to the earlier years of this decade and this past year has been the lowest increase so far. This trend is widespread and evident across nearly all demographic groups and corroborated through a number of similar independent studies. It is consistent with the “s-curve” pattern reflective of the adoption of new technology, further discussed in the section, Other Examples of Technology Adoption,
and reflective of a product lifecycle’s “late majority” users subscribing to a service at a decreasing rate of growth. (See Figure 2: Year-to-year percentage change in home broadband adoption, 2004-2010 and Figure 3: Historical Broadband Adoption at Home) (Smith, Home Broadband 2010, 2010, pp. 2, 6) (Svennsson, 2010, p. 1)

![Bar chart showing percentage change in home broadband adoption from 2004 to 2010.](source:image)

**Source:** Pew Internet & American Life Project surveys.

*Figure 2: Year-to-year percentage change in home broadband adoption, 2004-2010 (Smith, Home Broadband 2010, 2010, p. 6)*
According to the FCC study, 65% of adult Americans use broadband at home and 67% of households have broadband; the data from the Pew Internet & American Life Project is similar: 66% of Americans have high-speed broadband connection at home; and data from the National Telecommunications and Information Administration is similar: 63% of households have broadband. 22% of Americans, according to the FCC survey, and 21% of Americans, according to the Pew survey, are not Internet users, which is approximately 67 million individuals. Broadband adoption is clearly not distributed evenly (See Figure 4: Broadband Adoption by American Adults by Socio-Economic and Demographic Factors). (Horrigan J. B.,

1 The decrease in the number of Internet Users depicted in Figure 3: Historical Broadband Adoption at Home may reflect the impact of the recession. Internet penetration is predicted to grow as the economy recovers, as additional resources are accessible online, and as digital literacy and digital inclusion efforts continue.

Figure 4: Broadband Adoption by American Adults by Socio-Economic and Demographic Factors (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 13)

The Impact of Digital Exclusion

Digital exclusion is a serious threat to the ongoing growth, global competitiveness, and prosperity of the United States. Digital exclusion compounds societal inequities for historically marginalized groups. Groups that lack basic educational and infrastructural resources in their communities will most likely lack the computers and Internet connections that are necessary to get online. As one generation goes without computer access, it becomes more difficult to explain the value proposition of being connected to following generations. Without increased emphasis and additional resources, digital exclusion will
likely exasperate social inequity, as individuals in the historically marginalized groups become less able to compete in the workforce and realize the empowerment actualized by digital inclusion and digital literacy.

Digital exclusion can come in two forms: partial and complete exclusion. Partial exclusion is defined in terms of what is the ultimate goal for digital literacy: a computer in every home\(^2\). Partial exclusion is realization that this goal is presently not immediately achievable and a small step towards complete inclusion is providing access to computers and the Internet in public settings – in public computer labs, libraries, community and civic centers, religious institutions, and other nonprofits. Partial digital exclusion may be compared to complete exclusion which is simply having no access or extremely sporadic and non-reliable access – because limited access, when one might need it the most, is no access when the service is not available.

While partial exclusion should not be considered a “solving” of the digital literacy problem, it is a step in the correct direction. Libraries have become a critical component of digital literacy by providing free computer and Internet access to its patrons. Three quarters of public libraries across the United States have purported the increased use of the Internet at their branches – to complete job applications, write resumes, find news, and as the government digitizes much of its programs, check into government services for programs such as welfare and insurance. (The Economist, 2010)

\(^2\) Note that in the first section entitled “What Is Digital Inclusion,” the emphasis of this study was defined to focus on digital inclusion in terms of access to computers as computers currently provide the most conventionally reliable, standard form of access to the Internet.
The cost of digital exclusion manifests itself in the form of lost opportunities. With more and more services such as job applications, government services, and financial services migrating to the Internet, individuals who need the greatest help have the potential to be most adversely impacted if not provided these resources.

A report prepared by the Econsult Corporation highlights that for individuals and families, the lack of access results in limited resources to access goods and services which results in higher costs for households, a reduction in educational opportunities which reduces learning opportunities, particularly among children, more significant barriers to completing a job search, which lowers earnings and chances of finding a job, a reduction in access to health information, and increased costs resulting from household management. The Internet Innovation Alliance released an analysis conducted by the wealth-building management firm Dignitas which claims that U.S. consumers can save as much as $7,700 a year by using their broadband connections to more effectively access a range of services and products from travel to clothing. Digital exclusion also creates costs for federal, state, and local governments as they must communicate with their constituents through more traditional forms of communication that are more resource-intensive – mail, telephone, periodical, or face-to-face contact. Governments that provide increased services online must concurrently offer these services offline, in some cases, doubling or tripling associated costs. (Econsult Corporation and Digital Impact Group, 2010, p. 2) (Econsult Corporation and Digital Impact Group, 2010, p. 2) (Gruenwald, 2010) (Internet Innovation Alliance, 2009)

Further, the Econsult Corporation’s report notes that the lack of access constrains local, regional, and national economic performance because of higher jobs search costs which lower the employed population and result in sub-optimal job matching and associated lower earnings, higher costs to employers seeking better qualified candidates for positions who are not accessible via the Internet,
lower educational attainment which affects maximum productivity and development, and higher costs for service-providing companies that find that significant segments of their target market are not online and cut off from these services. (Econsult Corporation and Digital Impact Group, 2010, pp. 2-3)

The most conservative estimate stated by the report puts the annual price tag of digital exclusion at $55.2 billion dollars. The authors note that this figure does not take into account a number of difficult-to-quantify metrics such as the benefits associated with connectivity and civic engagement. However, they contend that these costs are projected to increase significantly. (See Figure 5: Ranking of Costs Associated with Digital Exclusion ) (Econsult Corporation and Digital Impact Group, 2010, p. 46)

<table>
<thead>
<tr>
<th>Special Populations</th>
<th>Degree of Environmental Implications</th>
<th>Extent to Which Exclusion Will Be Far More Costly in the Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Care (3.1)</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Education (3.2)</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Economic Opportunity (3.3)</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Civic Engagement (3.4)</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>E-Government (3.5)</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Energy (3.6)</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Public Safety and Emergency Response (3.7)</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Transportation (3.8)</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Personal Financial Management (3.9)</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Consumer Benefits (3.1)</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Personal Communications and Entertainment (3.11)</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>


Figure 5: Ranking of Costs Associated with Digital Exclusion (Econsult Corporation and Digital Impact Group, 2010, pp. A-9)
Adoption concerns

The data returned from reports indicate that the primary reasons for non-adopters can be divided into two major reasons: digital illiteracy and cost. According to the FCC study, 42% of the main reasons nonusers do not use the Internet is because of digital literacy-related reasons: comfort with computers, worried about bad things that happen on the computers, and relevance topics: believing that computers are a waste of time or there is nothing on the Internet one should see or use. The National Telecommunications and Information Administration study found that digital literacy concerns accounted for 59% of the reasons non-adopters cited for not using the Internet. The Pew study indicates that direct digital literacy concerns (relevance and usability) account for 64% of the reasons why the 21% of adults do not use the Internet. (See Figure 6: Main reasons for not using the Internet.) This graphic created by the Pew study breaks down many of the reasons why individuals do not use the Internet in America. Clearly, some individuals who are concerned about the relevance of the Internet and computer’s resources or how accessing the Internet would impact their life are not fully cognizant of the Internet’s potential to provide information and educational opportunities. (Horrigan J. B., Broadband Adoption and Use in America, 2010, pp. 27-30) (Smith, Home Broadband 2010, 2010, p. 11)
21% of adult Americans do not use the internet; these are the factors they cite as their main reason for not doing so

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just not interested</td>
<td>31%</td>
</tr>
<tr>
<td>Don’t have a computer</td>
<td>12%</td>
</tr>
<tr>
<td>Too expensive</td>
<td>10%</td>
</tr>
<tr>
<td>Too difficult/frustrating</td>
<td>9%</td>
</tr>
<tr>
<td>Think it's a waste of time</td>
<td>7%</td>
</tr>
<tr>
<td>Don’t have access</td>
<td>6%</td>
</tr>
<tr>
<td>Too busy/don't have the time</td>
<td>6%</td>
</tr>
<tr>
<td>Don’t need/want it</td>
<td>4%</td>
</tr>
<tr>
<td>Too old to learn</td>
<td>4%</td>
</tr>
<tr>
<td>Just don’t know how</td>
<td>2%</td>
</tr>
<tr>
<td>Physically unable</td>
<td>2%</td>
</tr>
<tr>
<td>Worried about viruses/spam/spyware</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
</tr>
</tbody>
</table>

Summary of reasons

| Relevance (not interested + waste of time + too busy + don't need/want) | 48% |
| Price (too expensive + don't have computer)                             | 21% |
| Usability (difficult/frustrating + too old + don't know how + physically unable + worried about virus/spam/spyware) | 18% |
| Availability / Access                                                   | 6%  |


Figure 6: Main reasons for not using the Internet (Smith, Home Broadband 2010, 2010, p. 11)

After individuals decide that they want to get online, the Pew study also points out is that current non-users will require help getting online. Over 60% of respondents in the survey indicate that assistance would be integral in becoming connected. This indicates that there is a large need for digital literacy programs that can help these individuals bridge the digital divide and work towards digital social equity. (See Figure 7: Six in ten non-Internet users would need assistance getting online ) (Smith, Home Broadband 2010, 2010, pp. 11-12)
The Internet is a vast and multifarious resource and concerns about the relevance of the Internet and computer’s resources or how accessing the Internet would impact their life are symptoms of not understanding the potential benefits or value proposition that accessing the Internet via computers can provide. 30% of individuals cite the cost of computers or Internet service as the primary barrier to using the Internet. Some respondents who indicate that cost is the primary barrier to adoption may believe the service to be expensive because they do not understand how accessing the internet could impact their lives. It is possible that some of the 30% of respondents might reprioritize their purchases if they understood their own value proposition. (See Figure 8: Main Reasons Nonusers Do Not Use the Internet (by Percentage) ) (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 27)
I am not comfortable using a computer 16
I cannot afford a computer 14
I am worried about all the bad things that can happen if I use the Internet 12
Monthly cost is too expensive 11
The Internet is just a waste of time 7
There is nothing on the Internet I want to see or use 7
The activation and installation fee to get service is too much 5
It’s not available where I live 2
I can access the Internet all I need to at work 1
None of above reasons 9
Combination of reasons 5
Other reason 5
Don’t know/refused 3

Source: Federal Communications Commission survey, October-November 2009; net 450 for nonusers.

Figure 8: Main Reasons Nonusers Do Not Use the Internet (by Percentage) (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 27)

While many of these figures gathered from a number of reports are telling, it is evident that many more surveys will need to be completed to accurately gauge the reasons for remaining not adopting computers and the Internet. Only through similar, methodically designed surveys, will digital literacy programs manage to accurately target the underlying views and motivations that individuals believe are significant enough to not join the millions of other individuals online. While these efforts are a step in the giant direction, there is room for many more paces in the direction of understanding the fluctuating motivations for remaining “off the grid.”
Target Groups

Identifying the groups of individuals who lack the basic computer and Internet access is one of the first fundamental steps required to increase digital literacy and move towards digital social equity. Adding to the difficulty in defining certain populations is the fact that these population groups are ever changing and ever moving. Outlined below are a number of disadvantaged groups whose social or economic position further puts them in a state of exclusion from participation in the community because of their digital illiteracy. These groups are explored in terms of their status in the United States’ digital literacy environment. Each section concludes with a summary of one or more of the reasons how digital exclusion impacts these populations groups – which provides context to why digital literacy and digital inclusion is of critical importance.

Low-Income Households

Low-income households are among the most digitally excluded populations in America. As was noted in the FCC study, only 52% of Americans in the lower half of the household income distribution demographic who make $50,000 per year or less have broadband access at home – far fewer than the 87% of households who have broadband access and make more than $50,000 per year. This sobering statistic is mirrored in the Pew study which found that where household income that was less than $30,000 only 45% of the adults were connected with broadband at home. Further, the National Broadband Plan cited that households with income under $20,000 had an adoption rate of only 40%. This number is far divorced from the broadband adoption associated with households with an income of greater than $75,000, whose adoption rates are 87%. (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 14) (Smith, Home Broadband 2010, 2010, p. 8) (Federal Communications Commission, 2010, p. 167)
Similarly, low income households are also frequently associated with lower levels of academic achievement. According to the FCC study, nearly one-half of American adults have had some college experience. Among these individuals with college experience, 82% have broadband at home. For those individuals whose highest educational attainment is a high school diploma or equivalent, only 46% have broadband access at home. The Pew report textured the data into finer categories but ultimately discovered similar findings: Individuals without a high school diploma or GED have a 33% adoption rate, high school graduates have an adoption rate of 54%, individuals with some college experience have an adoption rate of 76%, and 86% of college graduates have broadband access at home. The National Broadband Plan’s statistics mirror those found in the Pew Study; individuals without a high school degree only had an adoption rate of 24%. (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 14) (Smith, Home Broadband 2010, 2010, p. 8) (Federal Communications Commission, 2010, p. 167)
Figure 9: Broadband adoption trends within demographic groups, 2009-2010, % of all adults with broadband at home, 2009-2010 (Smith, Home Broadband 2010, 2010, p. 8)

The reasons for this are multifaceted because there is some correlation between the definition of broadband adoption, actual broadband adoption, income, race, and education. First, most broadband studies limit the definition of broadband access to those with a personal computer or laptop using broadband at home. This definition may understate broadband use by population groups identified as having low broadband adoption because some population groups access the Internet using other methods. As an example, according to the Pew Internet and American Life Project, African Americans and English-speaking Hispanics lead in both cell phone ownership and wireless Internet usage in the United States. In other words, when it comes to accessing the Internet from a mobile device, those often on the wrong side of the digital divide are actually leading the way. (RCR Wireless News, 2010)
There are multiple reasons for this. Whites tend to earn more than African Americans or Hispanics and disposable income impacts purchasing power which enables a population group to better be able to afford to purchase a computer and broadband. As an example, a study by the Census Bureau found that in 2007, White households ($51,120) earned more than African Americans ($36,067) and Hispanics ($41,501). (U.S. Bureau of Labor Statistics, 2008)

Whites tend to have higher high school graduation rates than African Americans and Hispanics. A study of high school graduation rates from 1946 to 1984 indicated that White’s graduation rates ranged from 85% to 78%, African American’s graduation rates ranged from 79% to 64%, and Hispanic’s graduation rates ranged from 74% to 60%. The reason why high school graduation rates vary by race is outside the scope of this thesis, but those individuals that have lower household incomes generally have fewer resources, change schools more frequently, and are more likely to live in single parent families when compared to more affluent Whites. In 2008, the high school disparity continued, with high school graduation rates of 81% (Whites) vs. 61% (Blacks) and 63% (Latinos). (Heckman & LaFontaine, 2007) (Rampell, 2010)

Consequently, there may an indirect correlation between ethnicity and broadband penetration due to definitional constraints, reflecting social inequity as some races both earn more and are better educated than other races.

Smartphones are used by some as a technology to economically combine broadband and voice services via a smart phone and forgo a home telephone, computer, and broadband connection, and are deemed not to be broadband users by definition. Household income also impacts disposable income and those individuals with lower disposable income may seek to use more efficient ways of accessing broadband and using voice services, or a smartphone. Depending upon the Internet usage requirements of an
individual, they may be defined as non-adopters although by practice and from a need satisfaction perspective, it can be argued that they are broadband adopters. Also, individuals earning less money tend to be less educated, which both correlate to broadband adoption. (U.S. Census Bureau, 2006)

Those that do not have broadband and a computer in their home are not necessarily offline – they may not enjoy full access to the Internet as a broadband adopter, but may be able to access at a friend’s home, at work, or a library (See Figure 10: “Exhibit 10:” Broadband Survey Users on Where They Access the Internet).

<table>
<thead>
<tr>
<th>Exhibit 10: Broadband Survey Users on Where They Access the Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Home</strong></td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Home</td>
</tr>
<tr>
<td>Friend or family member’s house</td>
</tr>
<tr>
<td>Work</td>
</tr>
<tr>
<td>Public library</td>
</tr>
<tr>
<td>School</td>
</tr>
<tr>
<td>Community Center</td>
</tr>
<tr>
<td>Church</td>
</tr>
<tr>
<td><strong>Number of cases</strong></td>
</tr>
</tbody>
</table>


Figure 10: “Exhibit 10:” Broadband Survey Users on Where They Access the Internet (Horrigan J. B., Broadband Adoption and Use in America, 2010)

Low income households represent a significant portion of the digitally excluded population. These groups of individuals have, in some instances, been confined to the lower bands of economic prosperity for reasons beyond their control. Computers and the Internet serve as powerful tools that help provide opportunities for these individuals to better themselves.

Figure 11: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis)

Overlaid on Census Total Population in Poverty Data depicts the concentration of poverty, adjusted to the formal based upon the number of individuals in the household. The visual representation of this map can be misleading, and is used to illustrate the difficulty that the FCC will have identifying
population groups with low broadband penetration levels. First, it uses the most current 2000 census data. Once the 2010 census data is available, the map will be updated and hopefully will more accurately reflect actual levels of income in Marion County. Second and as described in the section entitled Language Minorities below, the maps are color coded to represent densities in census tracks and are impacted by the significant vacant and abandon housing problem in the IPS school boundaries which include the Central Township. I chose to examine this data and compare it to my personal observations and with the information provided by the Indianapolis Public Schools (IPS). IPS indicated that in 2010, 83% of all students within the district are on free (78%) or assisted (5%) lunch programs, which is not apparent in this map that uses 2000 census data. Contributing factors include the significant number of abandon homes as further described in Language Minorities, and also that the population density is further decreased because 72% of the children attending IPS live in single parent households. Single parent families reduces the densities that many maps that use census data rely upon, and must be considered when planning a national digital literacy and digital inclusion program so that resources are efficiently targeted. (Indianapolis Public Schools, 2010)
Figure 11: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total Population in Poverty Data (US Census Bureau, 2010) (Net Literacy, 2010)

Figure 12: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total Population in Poverty Dot Data shows different type of visual representation depicting the poverty in Figure RST represented as “poverty dots” with the size of the dot correlated to the number of individuals deemed at or below the poverty level. This, still using 2000 census data, appears more illustrative of poverty experienced in the Center Township. As the planners target population groups with low broadband usage rates, a variety of map depictions may be useful in helping them plan their approach.
Figure 12: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total Population in Poverty Dot Data (US Census Bureau, 2010) (Net Literacy, 2010)

The point is significant – those individuals seeking to identify high areas of poverty must use census and other data in such a way that it accurately depicts where the highest poverty is located.

Low income households benefit by becoming digitally included for many reasons, including having access to education and distant learning, being able to exercise their civic rights, locating government resources most effectively accessed via broadband, identifying additional healthcare options and resources, and very significantly, the ability to more effectively search for employment as employers increasingly require job applicants to submit applications via the Internet. Those individuals that are categorized as having low income increasingly require digital literacy and digital inclusion to identify
work opportunities. Searching for jobs, applying for jobs, communicating with employees and employers, and enrolling in online training programs to qualify for better jobs are increasingly Internet based, leaving the digitally illiterate and those without access at an increasingly serious and competitive disadvantage. Low-skill, low-wage jobseekers may not require digital literacy skills for their jobs – but they increasingly require them to obtain even other low-skill, low-wage jobs that do not require digital literacy skills. (Dailey, Bryne, Powell, Karaganis, & Chung, 2010) (Federal Communications Commission, 2010, pp. 165-190) (US Broadband Coalition, 2009)

The job search advantages of being online are considerable and extend well beyond the application process itself. Chain employers (e.g., Walmart, Home Depot, and McDonald’s) maintain online career portals as extensions of their corporate websites. “In most cases, individuals are encouraged to create online accounts that enable them to signal their areas of interest, save job searches, submit application materials, and sign up for email alerts or news feeds on relevant job openings and recruiting events. Additionally, these portals frequently feature orientation for job seekers, including sections on employee benefits, store locations, the application process, resume and interview tips, and human resource contact information. The “media room” on the McDonald’s portal includes videos and podcasts on career paths and featured “success stories.” Most of the online application procedures require a phone number but not an email address. But the added value of having an email address and regular access is compelling and a clear advantage in employment searches.” (Dailey, Bryne, Powell, Karaganis, & Chung, 2010)

The Disabled

Individuals who have a disability may have the greatest amount to gain from digital literacy and digital inclusion. For those with access, computers and the Internet can be significant equalizers and mitigate the impact of certain disabilities. While computers and the Internet pose a great resource for disabled
populations, according to the FCC, only 42% and according to the NTIA, only 37.8% of disabled individuals have broadband at home. (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 14) (Federal Communications Commission, 2010, p. 167) (National Telecommunications and Information Administration, 2010, p. 8)

There are many different varieties of disabilities. Some even make using computers and the Internet much more difficult. Individuals that are blind must pay for additional technology to access the internet and their experience is limited to sites that accommodate their equipment. Individuals with hand and motor-skills impairments may have additional difficulties adapting to manipulating the keyboard or mice and could require special equipment or training.

For others who might have mobility impairment or learning disabilities, computers can actually be very beneficial by bringing increased knowledge and access to the first group and new learning opportunities to the second. These individuals have the most to gain from digital literacy and digital inclusion.

(Lyle, 2010)

Figure 13: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis)
Overlaid on Census Total Households Receiving Supplemental Security Income Data uses the most current 2000 census data was created to show the difficult that the federal government has identifying individuals with disabilities. Supplemental Security Income payments are made to help the disabled, and the map indicates that the highest concentrations of the disabled are not in the Center Township. However, IPS indicates that as of 2010, 22% of the student body was enrolled in Special Education. This does not appear reflective of the data in the Marion County map, and highlights the challenges faced by the federal government when working to prioritize population groups with low broadband adoption rates using dated census information, population density that is impacted by a significant number of
single parent families (73% of all IPS students) and by a significant number of abandon homes. The abandon home problem is detailed in Language Minorities section of this chapter. (Indianapolis Public Schools, 2010) (Social Security Administration, 2010)
When the disabled are digitally excluded, they are prevented from having many of the most relevant tools they need to improve their productivity and self-sufficiency. In the 21st Century, job and educational opportunities for the disabled will be increasingly limited as technology and telecommuting become increasingly the norm. The disabled that are digitally excluded cannot engage in Internet commerce, which, depending upon the type of disability, may be especially important for them to live productive and independent lives. Further, those with disabilities and are digitally illiterate may not be able to exercise their civic duties as easily, interfering with the basic right to vote guaranteed to Americans. When disabled children do not have access to broadband services, they are denied an equal
opportunity to the same educational benefits that are available to the peers without disabilities. While in school, there are federally mandates that require reasonable accommodations. However, effect of a disabled student’s access to technology in school is diminished if they are unable to complete their homework because they lack the broadband connectivity or special devices necessary for them to access the Internet and complete their homework. In conclusion, these factors impact the disabled’s ability to enjoy the opportunities available to those without disabilities, and if the disabled are prevented from gaining greater self-sufficiency, additional government resources may be expended because the disabled are unable to care for themselves. (Dailey, Bryne, Powell, Karaganis, & Chung, 2010) (Federal Communications Commission, 2010, pp. 165-190) (US Broadband Coalition, 2009)

The Elderly

The most chilling two statistics in all of digital literacy and digital inclusion studies are the following: 32% of non-adopters are aged 65 or older and only 9% of this population group uses the broadband Internet. (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 24)

Digital literacy initiatives have long recognized that senior citizens and the elderly are most certainly among the most digitally excluded population groups in society. The National Broadband Plan has recognized that Americans over the age of 65 are significantly digitally illiterate and encourage through Recommendation 9.5 that seniors must be prioritized to increase connectivity. Their connectivity is particularly important because as senior citizens age, many freedoms that many adults take for granted – driving, shopping, even walking – many become much more difficult for the mobility impaired to enjoy. As a senior citizen’s physical world begins to shrink, computers and the Internet provide the possibility of opening up a whole new world full of information and communication possibilities that is limited by their physical health and frailty. (Federal Communications Commission, 2010, p. 179)
The report “the Economic Impact of Digital Exclusion” describes that the disabled persons and senior citizens bear a particularly high cost from digital exclusion in the form of additional costs and sub-optimal care. A 25-year, inflation adjusted cumulative estimated benefits of engaging these populations are between $532 to $847 billion dollars, or approximately $24.7 to $39.3 billion dollars per year. Digital literacy and digital inclusion resources must be prioritized to engage these two groups of individuals. (Econsult Corporation and Digital Impact Group, 2010, p. 14)

Broadband and digital inclusion can assist older Americans to continue leading independent and productive lives. Moreover, as lifespans increase and senior citizens find that they will outlive their retirement savings, a greater numbers of senior citizens will continue to work or seek to rejoin the workforce. The need for these individuals to be digitally literacy and digitally included intensifies for these individuals. (Dailey, Bryne, Powell, Karaganis, & Chung, 2010) (US Broadband Coalition, 2009)

“For these individuals – who need to remain gainfully employed – a failure to implement disability safeguards is simply not an option. In the 21st Century, individuals who are without access to broadband will be severely disadvantaged, in terms of their ability to become or continue being gainfully employed, as well as their ability to remain independent and self-sufficient. (Dailey, Bryne, Powell, Karaganis, & Chung, 2010

**Young People At-Risk**

A special population that lacks access to computers and the Internet, at-risk youths pose a serious problem and significant opportunity for digital literacy and digital inclusion. This group is representative of the potential and promise of future generations and without a prioritization of digital inclusion and digital literacy resources to empower these youth, a vicious cycle of digital exclusion and Internet incapacity will continue to beleaguer our youth.
One significant aspect of at-risk youth is their propensity to drop out of school. According to a report from the Civil Rights Project at Harvard University, The Urban Institute, Advocates for Children of New York, and the Civil Society Institute, 32% of all public school students will drop out and nearly 50% of African American and Hispanic students fail to graduate high school. This is a grave situation that has economic and social justice implications for decades to come. (Orfield, Losen, Wald, & Swanson, 2004)

While there are many different reasons why students drop out of schools, the lack of youth-engagement and support have been identified by summits on dropout prevention to be a leading cause of dropouts. As examples, The 2009 America’s Promise Alliance Grad Nation Summit and the Indiana Dropout Prevention Summit: "Hoosier Youth at the Crossroads" cited these as contributing factors. This lack of engagement can be partially attributed to the lack of resources and educational materials in schools; this, in turn, contributes to an increasing dropout rate, a rise in crimes committed by youth, and can lead to social inequity. Computers and connections to the Internet are becoming a mandatory resource for any student in nearly every grade; however, not all students have such access. According to the National Broadband Plan, more than 10 million school-age children lack access to computers connected with broadband and the Federal Reserve reports that 20 million school-age children lack computer access at home. (Federal Communications Commission, 2010, p. 3) (Beltran, Das, & Fairlie, November 2008, p. 3) (America’s Promise Alliance, 2009) (Marion County Commission on Youth, 2009)

Surveys show that computers and the Internet are important tools for academic achievement and vital for student success. According to a report from Cisco and Opinion Research, nine out of ten teens feel that students with an Internet connection will likelier have an easier time completing school assignments. In the same report, nearly 75% of those polled believe that these individuals are better equipped to complete school assignments, particularly with home wireless networks. (Cisco, 2010)
Additional research conducted by the United States government and published in a report by the Board of Governors of the Federal Reserve System in the International Finance Discussion Papers, Number 958 entitled “Home computers and Educational Outcomes: Evidence from NLSY97 and CPS,” also reports that 94.6% of teenagers who have computer and Internet access uses this access for homework and that, after controlling for individual, parental, and familial characteristics, students are approximately at least 6% to 8% more likely to graduate high school when provided access to computers at home than those who do not have access. The 6% to 8% is significant because this quantifiable measure provides legitimacy and concrete evidence that digital literacy and digital inclusion can solve the drop-out problem. While it is by no means a be-all-end-all, one-size-fits-all solution, it is one major component in the dropout issue. (Beltran, Das, & Fairlie, November 2008, pp. 11-13)

“Parents often emphasize the value of broadband at home for children, especially for older children in middle school or beyond. Perceptions of the Internet as a universal library are commonplace in these contexts. Some parents complain that teachers presume that their students have regular Internet access at home and that classes and educational services are being structured accordingly. For many parents who lack home connections, sending or bringing their children to libraries and other third spaces for homework-related activities is part of their weekly or even daily routine. Some libraries are consistently packed during after-school hours with children and teenagers using the computers and printers, getting homework help, and hanging out with friends. A frequently complain of parents is that trips to the library to use computers are difficult. Complains include that the library hours were inconvenient for work schedules. In other cases, members of large families with home connections report that a single home computer was not enough to handle the competing demands of the children, resulting in a reliance on a mix of home access and third-space Internet use. During its distribution
programs, Net Literacy provides two computers to families on free or assisted lunch programs that have more than two children in school.” (Dailey, Bryne, Powell, Karaganis, & Chung, 2010)

School districts are drivers of the broadband process and cause those parents that are not digitally literate or do not have a computer at home to be disadvantaged when keeping track of their children’s performance at school. An increasing number of school districts have moved communications with parents online, including student records and correspondence by teachers to parents. IPS has an application that parents can use to access their children’s attendance, class assignments, disciplinary actions, and academic performance: IPS Online. However, this is not always used because parents are limited in their ability to access these online applications since they are not digitally literate or do not have a computer at home. (Dailey, Bryne, Powell, Karaganis, & Chung, 2010) (Federal Communications Commission, 2010, pp. 165-190) (US Broadband Coalition, 2009)

In Minneapolis-St. Paul, both cities have created a district-wide parent portal for these interactions, making connectivity an increasingly important part of a parent’s participation in his or her child’s education. Five years after the portal’s launch, the Twin cities Daily Planet reported that of the more than 40,000 students attending the St. Paul public schools, only 8,000 families had registered to use the system. The article highlighted factors that hinder portal use, including the over 100 languages spoken by families in the district and the nearly 70% of the children receiving free or reduced-cost lunches – strong indicators of poverty. (Dailey, Bryne, Powell, Karaganis, & Chung, 2010)

**Ethnic and Cultural Minorities**

America continues to draw immigrants from all around the world to its communities. The prospects of political and social freedom, self-determination, and access to education – the “American Dream” - are prime motivating factors that encourage immigration. Computers and the Internet, similarly have great
opportunities for users that parallel many of those considered to be part of the “American Dream.”

Because of the vast resources that the Internet has to offer, populations groups should be able to access content that is relevant to them so that their transition into American society and utilization of the resources available in America is facilitated to them. However, the adoption patterns for these population groups are below average.

Historically, disadvantaged minorities such as African Americans and Hispanics shared a low national adoption rate. Figure 14: Broadband Adoption by Race and Ethnicity, 2005-2009, taken from a report authored by broadband adoption experts Dr. Robert Shapiro and Dr. Kevin Hassett depicts the significant inconsistency in adoption among the African American and Hispanic populations. These meager adoption rates are still disappointing: according to 2010 data, broadband accesses in these groups’ households are at 59% and 49% respectively, according to the FCC study, “Broadband Adoption and Use in America.” Results from a Pew study show similar figures: broadband adoption rates of 56% and 66% for African Americans and Hispanics, respectively. (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 14) (Smith, Home Broadband 2010, 2010, p. 7) (Shapiro & Hassett, 2010, p. 7)

<table>
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<td>29%</td>
<td>33%</td>
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Figure 14: Broadband Adoption by Race and Ethnicity, 2005-2009 (Shapiro & Hassett, 2010, p. 7)

Figure 15: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis)

Overlaid on Census Total Minority Populations Data shows concentrations of minority (non-White) populations in Marion County according to the most current 2000 census data. According to discussion at the Indianapolis Public School district’s 2010 census data, 54% of all students are African Americans
and 23% are Hispanic or another minority. Only 23% of all students are White. This does not appear to be reflected in Figure 15: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total Minority Populations Data, showing the challenges that the federal government has when identifying population groups with low broadband adoption rates so that resources can be prioritized. (Indianapolis Public Schools, 2010)

Figure 15: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total Minority Populations Data (US Census Bureau, 2010) (Net Literacy, 2010)

Those individuals that are digitally excluded are especially impacted when seeking employment, and can be exacerbated by low Internet proficiency and limited English literacy. Increasingly, employers require applicants to apply for jobs online, requiring applicants to be digitally literate. This trend is increasing
with low-paying and low-skilled positions that do not require digital literacy as job requirements indirectly limiting their pool of applicants to those that are digitally literate or who have access to resources that can assist them in completing an application. In addition to job searches, the ability to acculturate into American society is facilitated with access to broadband. Resources can be located more efficiently online, and programs, such as Google Translator, offer users the ability to provide a basic translation of English into 58 other languages. This can significantly help ENL/ESL population groups that have limited resources that allow them to acculturate into American society, and is further discussed in the Language Minorities section that follows. (Dailey, Bryne, Powell, Karaganis, & Chung, 2010) (Federal Communications Commission, 2010, pp. 165-190) (US Broadband Coalition, 2009)

Language Minorities

Minority groups, particularly those who that have difficulty communicating in or comprehending English (sometimes described as English as a Second Language (ESL) or English as a New Language (ENL).

Statistics regarding language and its correlation to digital inclusion and digital literacy have not had the research focus as other population groups of non-adopters. Net Literacy recommended to that the FCC included ENL/ESL population groups as being groups with low broadband adoption rates, and based upon this recommendation, the National Broadband Plan added this as a category when it previously had not been identified as a low broadband adoption population group. While this is an area for improvement in future studies, the report authored by Dr. Shapiro and Dr. Hassett included a fascinating statistic: among English speaking Hispanics in 2009, their rate of Broadband adoption is actually greater than that of White individuals. This number shows that Hispanic individuals highly value a broadband connection to the Internet. Further, this statistic, relative to the “Hispanic-All” adoption rate of only 48%, illustrates the fact that relevancy in language plays a significant role in adoption. (Shapiro &
As depicted in Figure 16: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total ENL/ESL Household Data below, an analysis indicates that the most significant ENL/ESL populations resident in northern Marion County with some concentrations in the eastern and western portions of the county. The Figure is built upon the most recent census data, which is now ten years outdated. In 2010, there are a substantial percentage of ENL/ESL students in the center township, according to discussions with school officials at IPS #78, IPS #14, and IPS #15 in 2008 and 2009. Because 12,000 to 15,000 of the homes are vacant within Indianapolis, the population densities have diminished which mean that while the concentration of ENL/ESL students have diminished, it is not reflective of the percentage of the population that they comprise. As an example, Indianapolis’ Near Eastside vacant homes have increased 27% since 1990, to a total of 2,247 (out of approximately 12,000 homes). The Hispanic population was 13.7% in 2000, although it expected to be significantly higher in the 2010 census. Tracking all demographics in Center Township of Indianapolis is challenging, and reflects the 70% mobility rate reported by the Indianapolis Public School System. I believe that once the 2010 census data becomes available and this updated information is used to recalculate Figure 16: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total ENL/ESL Household Data, the results will be substantially different. This dated information problem increases the challenges in determining where the ENL/ESL populations groups reside in Indianapolis, and throughout portions of the country. It is important because to most effectively target funding and resources, decision makers must have an understanding where the priority population groups reside. (Indianapolis Public Schools, 2010) (Indiana Barrister, 2007) (O'Shaughnessy & Swiatek, 2008) (Net Literacy, 2010)
While Figure 16: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total ENL/ESL Household Data uses the most current 2000 census data and shows the highest ENL/ESL rates are not in the Center Township. This may be a microcosm at the national level identifying the concentration of ENL/ESL population groups that require digital inclusion resource prioritization.

Figure 16: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total ENL/ESL Household Data (US Census Bureau, 2010) (Net Literacy, 2010)

In Figure 17: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total Immigrant Population Data depicts the density of immigrants, and generally correlates to the ENL/ESL Figure 16: Net Literacy Computer Labs and Donations within Marion County,
Indiana (Indianapolis) Overlaid on Census Total ENL/ESL Household Data. The challenges of outdated information described above are consistent with this figure too and until the 2010 census data becomes available, will make it more challenging for population groups with low broadband adoption rates to be effectively targeted for resource prioritization.

Figure 17: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) Overlaid on Census Total Immigrant Population Data (US Census Bureau, 2010) (Net Literacy, 2010)

The problems facing those without regular Internet access, in the context of employment, are obvious and can be exacerbated by low Internet proficiency and limited English literacy. Large employers with online hiring portals often recommend reserving at least 30 minutes to one hour to complete electronic job applications – a length of time that bumps up against typical time limits for Internet access in many
public libraries and community centers. For new users with limited skill sets, an hour may be spent trying to sign on to an email account. In addition to job searches, the ability to acculturate into American society is facilitated with access to broadband. Resources can be located more efficiently online, and programs, such as Google Translator, offer users the ability to provide a basic translation of English into 58 other languages. This can significantly help ENL/ESL population groups that have limited resources that allow them to acculturate into American society. Net Literacy integrated this functionality into its recently launched DigitalLiteracy.org website, and is in the process of re-launching all of its programmatic websites with this additional functionality. (Federal Communications Commission, 2010, pp. 165-190) (US Broadband Coalition, 2009)

**Compounded Disadvantages: Individuals in overlapping target groups**

The target groups listed above constitute only a portion of the total population that are digitally excluded. Each group’s adoption patterns have been primarily analyzed as a homogenous population group without including the additional complexity of overlapping disadvantages (e.g., a disabled individual of Hispanic ethnicity who is both a senior citizen and is deemed ENL). This additional analysis may correlate to a compounded rate of digital exclusion, lower broadband adoption, and greater social inequity as their ability to realize the American dream is impaired. After an extensive search and discussing this with the US Internet Industry Association, the survey raw data that would allow an analysis of overlapping targets groups does not appear available online. While the Pew and FCC research that was conducted contains this raw data, the sample size of respondents may not allow a statistically significant projection to access the impact of these overlapping target groups with a reasonable confidence level.

As examples, 58% of Americans with disabilities do not have broadband at home, 65% of senior citizens do not have broadband at home, 51% of Hispanics do not have broadband at home, and 60% of
Americans whose annual household income is less than $20,000 have broadband at home. It appears reasonable to assume that disabled Hispanic senior citizens earning less than $20,000 would be less likely to have broadband at home than any single of the population groups they belong to, but additional research with a larger sample size is required.³ (Horrigan J. B., Broadband Adoption and Use in America, 2010)

Additional studies must be conducted to further identify how multiple categorizations magnify digital exclusion and digital literacy efforts should be focused on these populations.

To summarize, it is difficult to correlate the compounded patterns and impacts of exclusion for ENL/ESL, ethnic, racial, and cultural minorities because the information was not available based upon the

³ This creates a philosophical question: once the information is known, does it impact the national digital inclusion resource allocations and prioritizations? Should resources be prioritized for individuals in overlapping target groups? The disadvantage is that it may take longer and be more expensive to help them become broadband empowered. From a social equity perspective, members of overlapping target groups may most benefit from having broadband access and being digital literate. Alternatively, an argument can be made that resources should be focused on the population that can most efficiently, effectively, and expeditiously become broadband adopters since this strategy would maximize the number of individuals able to become broadband enabled. In my comments to the FCC in behalf of Net Literacy, I proposed that resource priority be given to the families of K-12 students on free or assisted lunch programs since, impact this group may provide the greatest lifetime net present value on a population group basis while being resource efficient. (Kent, Reply Comments of Net Literacy Corporation, 2009)
research that was conducted. It is likely that the sample size is of insufficient size to calculate statistically significant projections with reasonable confidence levels. While many studies, such as those conducted by the FCC and the Pew Internet and American Life Project have great breadth, they lack in depth, particularly regarding analyzing the adoption habits of those population groups with multiple disadvantages. Based upon the limited data that is available, we are able to construct a notion that these populations do suffer from digital exclusion and further research should be conducted to determine if individuals in overlapping target groups should be prioritized by digital literacy and digital inclusion efforts since they are the most vulnerable and have the potential of experiencing greater social inequality. (Dailey, Bryne, Powell, Karaganis, & Chung, 2010) (Federal Communications Commission, 2010, pp. 165-190) (US Broadband Coalition, 2009)

**Approaches for Remediation of Urban Social Divisions**

With the advent of the PC and its connection to the Internet, large-scale rollouts of computer hardware and Internet connections were the traditional model of digital inclusion. These efforts usually were partially subsidized and coincided with an expansion of network infrastructure in the community. (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 1, 2009, p. 14)

While a significant number of these projects were started with the best of intentions and great enthusiasm, their sustainability has considerable variation. In the 2009 Report published by the EU Commission on Digital Inclusion, including primary data collected from 464 digital literacy “good practice” initiatives from 32 countries, only 39% remaining ongoing and 4% had either been transferred or expanded into a new project, for a total of 43% of these highlighted “good practice” projects. The remaining digital inclusion and digital literacy were either no longer functioning or their current disposition could not be ascertained or was unknown, as of 2009.
Increasing digital inclusion and digital literacy is a complex process and has many variables and potential points of failure, similar to the healthcare or K-12 education processes. Further analyzing these good practice models, there appears to be a correlation between those projects that have a greater number of stakeholders involved in the digital literacy project and sustainability. This underscores the importance of partnerships, particularly between the public sector, private sector, and NGOs. However, as is noted in the report, more stakeholders in a project do not necessarily obfuscate the outcome. Some digital literacy programs have larger numbers of stakeholders reflecting locally organized program efforts with deep relationships within their communities. The ability for local community organizations to tailor programs to the specific needs of communities is very significant if not imperative. However, it is important to note that according to the report, size does not have a clear impact on the continuity of digital literacy projects. (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 1, 2009, pp. 17-18, 20)

**Other Examples of Technology Adoption**

One way of analyzing digital inclusion is to view the issue according to a historical adoption trend. From the data that are available, the patterns exhibited are consistent with the “s-curve” pattern that is reflective of new technology adoption. This process is described by the Department of Commerce in a brief:

“Historically, when a new technology is first introduced, the number of users expands rapidly but from a low base. Over time, as a group reaches the middle range of the S-curve, the growth rate tends to slow while the point change continues to increase. Once the penetration nears its saturation point (at the higher end of the S-curve), both the percentage point change and the expansion rate begin to decrease...The adoption rates along these curves depend on a number of factors, including the awareness of the new technology, the affordability of that technology, adaptations to the technology to
widen its potential market, and the attraction for people to use the technology as its usage becomes widespread.” (Department of Commerce, 2000)

One information and entertainment technology that appears to be roughly analogous to broadband is that of cable television’s basic video product. Initially, the cable industry started simultaneously in several different locations across the United States. Cable television was seen as a significant improvement when compared to the “over-the-air” broadcast transmission of television programs. Cable television subscriptions increased from 14,000 in 1952 to 850,000 customers by 1962. (National Cable and Telecommunications Association) (The Museum of Broadcast Communications, 2010)

The deregulation of the cable television industry in the 1970s served as the catalysis for the proliferation and expansion of cable television as the standard for television service transmission increasing the rate of growth consistent with the classic product lifecycle curve. Further deregulation in the 1980s through the Cable Communications Act of 1984 spurred the increase in cable television service adoption. The Communications Act of 1984 also required cable operators to offer a regulated low-cost basic level of primarily “over-the-air” television broadcast stations, forcing cable operators to unbundle their higher-cost video package of services. This lower-cost tier of video service was not popular as a standalone service, but did increase basic video adoption over time by 3% to 5%, depending upon the specific market location. In addition, a combination of decreasing cable infrastructure costs resulting from increasing economies of scale in combination with new products and services that increased the average the revenue per customer increased industry cash flow and the equity value of cable service providers. A consolidation of cable companies in the 1980s and 1990s enabled these organizations to form large Multiple Service Operators (MSOs) that further increased MSO efficiencies and equity valuations. These favorable economic dynamics caused MSOs to expand cable plant to lower density areas, which increased basic cable television video availability and adoption. (National Cable and

Until the early 2000, cable household penetrations continued to increase, but at a slower rate as a result of competition from satellite delivered multichannel video technology, Direct Broadcast Satellite (DBS), and the transition of the cable television industry evolving from maturity to saturation (from a product life cycle perspective). Beginning in 2002, cable television subscribers as a percentage of households have begun to decline, decreasing from 66.9 million basic video customers to 62.1 million basic video customers in 2009. Additional product innovations, such as broadband, have enabled MSO total revenues to increase, although the basic tier of cable television service revenues continues to decline. Basic cable television’s product life cycle is consistent with the “s-curve” pattern that is reflective of new technology adoption. It should be notated that the total percentage of households with a multichannel video product from cable, DBS, Satellite Master Antenna Systems (SMATV), and Multipoint Multichannel Distribution Systems (MMDS) continues to slowly increasing. (See Figure 18: Cable TV Subscribers as a Percentage of Households with TVs (National Cable and Telecommunications Association) (The Museum of Broadcast Communications, 2010) (Parents Television Council, 2004) (Satellite Broadcasting & Communications Association, 2010) (Federal Communications Commission, 2005)

Residential broadband is an information and entertainment technology and has enjoyed rapid growth consistent with the early stages of technology’s product life cycle curves. While residential broadband rate of growth has been higher than of basic cable television service (increasing from 20% to 60% of American households in five years as compared to the ten years that cable television’s basic video product to realize the same 20% to 60% of household penetration), the growth rate appears to reflects the US Commerce Departments historical experience when new technology is first introduced. Since 2000, the number of residential broadband users has expanded rapidly but from a low base. Consistent
with product life cycle curves including the cable television’s basic video product, the rate of broadband penetration’s rate of growth is decreasing, although residential broadband penetration is continuing to increase at a lower rate of growth. (National Cable and Telecommunications Association) (Department of Commerce, 2004) (Pew Research Center, 2010) (Website Optimization, 2010) (Turner, 2005)

As a product and from a product life cycle perspective, residential broadband has some significant differences when understanding the variation in rates of growth when compared to cable television’s video service. First, cable television was heavily regulated by thousands of local franchising authorities, which inhibited cable television’s rate of growth. Second, the industries have two very different content delivery models: while cable must acquire and program content, the residential broadband providers primarily provide access to the content that is contained on the vast number of websites on the Internet network. Third, more of infrastructure required to provide residential broadband was in place when residential broadband first was delivered by upgrading the existing infrastructure of telephone companies to first provide Integrated Services Digital Network (ISDN) and Digital Subscriber Line (DSL) service and with facility upgrades Fiber to the Premises (FTTP) service and a hybrid fiber-coaxial infrastructure. In contrast, the cable television industry was required to construct a coaxial cable plant from inception before it could begin to penetrate households with a video product. Fourth, the cable television industry was not challenged by a multichannel video provider during the first thirty years of its existence. Residential broadband growth was facilitated because two large incumbent technologies, the cable television industry and the telephone industry, rapidly upgraded and deployed broadband facilitates to capture market share. Finally, residential broadband growth was further facilitated by incumbent broadband providers in response to existing or emerging forms of technology, including Wireless Internet Service Providers (WISPS) offering fixed wireless services, Broadband over Power Lines (BPL), and 4G fixed wireless broadband providers. In combination, these factors significantly facilitated

Also, residential broadband adoption increased partially as a result of the faster pace of technology adoption in general in the dotcom-post-dotcom era. Rodger’s Adoption Innovation Curve suggests residential broadband has attracted the innovators, early adopters, early majority, and is rapidly penetrating the late majority, assuming that eventually more than 90% of all American households will have access to broadband. Consequently, portions of the late majority and the laggards remain targets for digital inclusion. Broadband adoption, digital inclusion, and digital literacy are impacted because of the barriers previously discussed above. However, the cable television industry has existed for over sixty years while the residential broadband first became generally available approximately thirteen years ago. Consequently, it is likely that technological innovations and enhancements during the next forty seven years will reduce many of the barriers to entry that currently inhibit broadband adoption. (Rogers, 1995) (Oxman, 1999) (The Museum of Broadcast Communications, 2010) (Parents Television Council, 2004) (Turner, 2005)

Broadband adoption will continue to increase as new applications and services migrate to this platform. The cable television and the telecommunications industries products are migrating to the Internet. Service including Internet Protocol Television (IPTV) and streaming video programs threaten the cable television industry’s legacy video product. Voice Over Internet Protocol (VOIP) threatens the legacy telephony products of the telecommunications industry. New products and enhancements of offline services including social networking, e-heath applications, Amazon’s personalized customization book selection application, EBay online garage sale service, and the efficiency of searching for government resources via online filtering and websites will encourage broadband adoption. Further, some existing
services, such as telephone companies’ white pages, newspapers, and magazines may reduce or discontinue production as more customers utilize these services online via broadband connectivity, encouraging laggards to be forced to subscribe to broadband. (Federal Communications Commission, 2010) (Oxman, 1999) (National Cable and Telecommunications Association) (The Museum of Broadcast Communications, 2010) (Parents Television Council, 2004)

What is an important take-away from this Cable television discussion is that 100% complete digital literacy and inclusion is probably not possible. Cable television offers consumers a value proposition that includes a source of information and entertainment that is affordable to most American households. However, sixty years after cable television was first deployed and forty years after DBS was deployed, approximately 10% of US households have chosen not to subscribe to any multichannel video service. Substitute products (e.g., free “over-the-air broadcast television”), limited disposable income for the poor that may have subscribed to a multichannel video provider in the past but cannot afford to repay delinquent past due balances, and those that believe television is ‘not for them’ have been cited as objections in studies conducted by multichannel video providers. (The Museum of Broadcast Communications, 2010) (National Cable Telecommunications Association, 2009) (National Cable Telecommunications Association, 2009)

While broadband penetration will continue to increase and is already in the process of transitioning from an amenity to a utility, some households may choose not to subscribe to broadband, for reasons not dissimilar to multichannel video (e.g., dial-up service is sufficient to meet their needs and more affordable, limited disposable income for the poor that may have subscribed to a service offered by a broadband provider in the past but cannot afford to repay delinquent past due balances, and for those that believe broadband is ‘not for them’). Also, this paper defined broadband adoption to as a connection of broadband to a home computer. It is likely that technology innovations will enable
tablets, e-books, and products not yet conceived to utilize broadband services, increasing the value proposition of non-adopters to a tipping point where the remainder of the late majority and laggards choose to subscribe. Lastly, while future technology could create a competitive or a substitute to broadband, this possibility has not been widely discussed. However and from the perspective of technological innovations over time, it would be unwise to completely discount this as a possibility in the future. Consequently, not everyone might become digitally literate or digitally included in the future; however, it is a goal to work towards. (National Cable Telecommunications Association, 2009)

Figure 18: Cable TV Subscribers as a Percentage of Households with TVs (National Cable Telecommunications Association, 2009)
Figure 19: Broadband Penetration versus Dialup (Website Optimization, 2010) (Pew Research Center, 2010)
Chapter 4: Digital Literacy Programs Abroad and At Home:

Hong Kong

Hong Kong is a globalized metropolis occupying a mountainous island at the mouth of Zhujiang River Estuary in the South China Sea. Initially settled by the British in the mid-19th Century, Hong Kong citizens transformed their city from a backwater imperial outpost into a center for commerce, culture, and urbanism. While previously an industrial center, Hong Kong’s economy has shifted to predominantly service-oriented businesses. With an official population nearing seven million, Hong Kong has integrated cultures from the Occident and the Orient and mixing natives and immigrants and the rich and poor in the bustling streets of the city. As a globalized city, Hong Kong must be connected to the Internet for commerce and communication and indeed many of the businesses in Hong Kong are data hubs for South East Asia; however, not all of Hong Kong’s inhabitants are digitally empowered. (McDonogh & Wong, 2005)

The Hong Kong Digital Environment

The Digital 21 Strategy

During the major adoption of computers and the Internet, Hong Kong, as a nexus for international commerce and media, recognized that information technology would play an increasingly important role in the Special Administrative Region’s economy and the lives of its residents. Following the 1997 address of the Chief Executive of Hong Kong, Tung Chee Hwa, who stated that Hong Kong should be a leader, not a follower, in the information world of tomorrow, the Hong Kong Government commissioned the Digital 21 Strategy, a comprehensive, multi-faceted strategy to bring the rest of Hong Kong online and remain competitive in the upcoming 21st Century. This Digital 21 Strategy has continued to be revised and updated every few years to take into account the changing technology field: First in 2001,
then in 2004, and most recently in 2008. (Information Technology and Broadcasting Bureau, November 1998) (Hong Kong Special Administrative Region, 2010) (Hong Kong Special Administrative Region, 2010)

The government of Hong Kong has recognized the importance of digital literacy and digital inclusion and has taken steps to bridge the digital divide. In the most recent strategy report, the 2008 “Digital 21 Strategy: Continuing to Build on Our Strengths Through Technology Across the Community,” five areas were identified to “achieve the vision of enhancing Hong Kong’s status as a world digital city.” These five areas include: facilitating a digital economy, promoting advanced technology and innovation, developing Hong Kong as a hub for technological cooperation and trade, enabling the next generation of public services, and building an inclusive knowledge-based society. This last goal, building an inclusive knowledge-based society, forms the core of the mandate to increase digital literacy and digital inclusion. (Hong Kong Special Administrative Region, 2007, pp. 1-6)

Similar to the United States Federal Communications Commission’s National Broadband Plan, the Digital 21 Strategy broke down digital literacy and digital inclusion into several portions that allow for segmentation of priorities and measuring of progress. For example, Section 7.18 of the 2008 Digital 21 Strategy notes that Hong Kong Government should take a leading role in bridging the digital divide through the forging of partnerships with NGOs and expanding the availability of free computer access facilities. Section 7.21 identifies segments of the population that are particularly critical to bridging the digital divide: the elderly, new arrivals, female homemakers, single parents, children of low-income families, disabled peoples. (Hong Kong Special Administrative Region, 2007, pp. 71-73)

Although relatively new, many different government and NGO groups have already taken part in the Digital 21 Strategy project. One example is the government’s Office of The Telecommunications Authority’s website, Blue Tone’s Tips for Broadband Service. This website targets youth and new
computer users with media-rich content that is easy to understand and visually appealing. It discusses a wide variety of topics including how users can stay safe online, obtain technical support, use good ergonomic and posture techniques when utilizing computers, and how computers and the Internet works. (See Figure 20: Blue Tone's Tips for Broadband Service Users) (Office of the Telecommunications Authority, 2009)

Another website, “Be-NetWise,” is a clearinghouse of information for computer and Internet users of all ages that provides important information about Internet safety techniques. This website, produced by
the Office of the Government Chief Information Officer, also integrates social media and streaming video content. (Office of the Government Chief Information, 2010)

Factors to consider when comparing Internet penetration, broadband adoption, digital inclusion, digital literacy, and other information for Hong Kong and the United States.

Alerting the reader about the limitations of research and the comparative analysis included in a paper enables the document to be more accurate read, interpreted, and accessed with an appropriate understanding of the limitations inherent in the data, research, and conclusions. My disclosure is an essential component of the academic honesty of this paper. The preponderance of the information about Hong Kong was derived via secondary research, and the limited primary research that I conducted occurred during a one week visit to Hong Kong. In Indianapolis, the information presented is the results of a nonprofit that I founded, and it may inadvertently include bias from a perspective that is not based upon primary research conducted by an independent third party.

I also believe it essential to the academic honesty of this thesis to further disclose limitations in the methodology and analysis in this paper. Limitations include, but are not limited to (a) comparing research derived from different sources, (b) Internet penetration, broadband adoption, digital inclusion, and digital literacy may not have the same meanings in the context of two different cultures, and (c) the research necessary to fully analyze the impact of important factors including the average broadband speed in each country, broadband pricing by population group in each country, and the impact of broadband adoption having a national priority earlier in Hong Kong than the United States, among other factors, may impact and limit the completeness of the thesis.

(a) Comparing research derived from different sources. When contrasting Hong Kong versus United State Internet and broadband adoption penetration, one must consider cultural and definitional differences. Also, the accuracy of data must be considered, from the level of confidence of a
statistical sample to the variances in basic calculation methodology. Additionally, readers should consider that the level of detail, frequency, and duration of different research studies can bias results and conclusions. Two important studies used to write this report are The 2010 Princeton Survey Research Associates International for the Pew Research Center’s Internet & American Life Project and Hong Kong’s Census and Statistical Department’s Thematic household Survey Report – Report No. 43 A review of the methodology and questionnaire indicates that the Hong Kong survey contained significant more detailed research information that was made possible because of the use of a larger sample size to project results from a significantly smaller universe of respondents. While I believe that the information from these reports are reasonable accurate, my observation of the difference in the surveys’ sample size, differences in the level of detail in the questions, and differences in the specific questions asked should be disclosed. (Pew Internet and American Life Project, 2010) (Census and Statistics Department, Special Administrative Region of Hong Kong, 2009)

(b) Internet penetration, broadband adoption, digital inclusion, and digital literacy may not have the same meanings in the context of two different cultures. As an example, digital inclusion and digital literacy are not solely a calculation of broadband connections to homes with computers; they can occur at locations other than an individual’s primary dwelling unit, including public libraries, the home of a relative, a cyber café, or via a mobile device that accesses the Internet. Also, the determination of if an individual is digitally literacy can vary based upon the culture and the individual’s specific needs and requirements versus the capabilities of the Internet enabling device used to access the Internet. A smartphone may be sufficient if a user’s sole use of the Internet is to text or send emails. A user whose access is limited to a smartphone would be digitally excluded if this individual were unable to complete a homework assignment due to limitations resulting from the device or Internet connection. As one example, in 2010, 48% of
Hong Kong residents had used their mobile device to go online wirelessly versus 59% of Americans. It is beyond the scope of this paper for me to conduct the primary research necessary to derive complete and conclusive conclusions regarding digital inclusion and digital literacy without the ability to quantify the impact of this and other factors. (Kent, Reply Comments of Net Literacy Corporation, 2009) (Pew Internet and American Life Project, 2010) (Cheng K., 2009)

(c) The research necessary to fully analyze the impact of important factors including the average broadband speed in each country, broadband pricing by population group in each country, impact of Hong Kong’s greater density and smaller geographic area, and the impact of broadband adoption being a national priority earlier in Hong Kong than the United States, among other factors, is beyond the scope of this thesis. As one example, consumers in each country may realize differing broadband experiences on some applications as a function of different average broadband speeds. Broadband speeds in Hong Kong average 8.6 Megabytes per second (Mbps) compared to America’s average of 4.6 Mbps. Depending upon the application, Hong Kong broadband users may realize a richer broadband experience and this may impact broadband enabled applications, broadband adoption rates, digital inclusion, and digital literacy. (Website Optimization, 2010)

According to the 2009 Edition of “Hong Kong as an Information Society,” a report compiled by the Census and Statistics Department of the Hong Kong Special Administrative Region, sixteen of the Hong Kong Special Administrative Regions have Internet Centers that are accessible to the public, increasing broadband access to individuals that do not have them in their homes. (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, pp. 10-11)
Since Hong Kong enjoyed a significantly higher broadband penetration than the United States in 2004, growth in household adoption rates for Internet connections during the last five years has been less dramatic increasing from 66% in 2004 to 73% by 2009 versus America’s Internet adoption rate increase from 54% to 70%. This higher Internet penetration rate in 2004 and 2009 may be partly reflective of the national priority and focus that Hong Kong placed on broadband adoption in 1998, ranked as the fourth most connected city in the world according to a 2007 study. (See Figure 21: Percent of Households with PCs at home connected to the Internet in Hong Kong) (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, pp. 10-11) (Daily Wireless, 2007)

![Percent of Households with PCs at home connected to Internet in Hong Kong](image)

**Figure 21:** Percent of Households with PCs at home connected to the Internet in Hong Kong (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. 10)

Additionally, the data reflect that a large digital divide grows among the elderly (See Figure 22: Persons aged 10 and over who have used PCs in Hong Kong by age ). This is also the case for individuals who are
less educated (See Figure 23: Persons aged 10 and over who have used PCs in Hong Kong by educational attainment) and people who are economically not-active, with the exception of students (See Figure 24: Persons aged 10 and over who have used PCs in Hong Kong by economic activity status ). (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, pp. 12-14)
### Persons aged 10 and over who have used PCs in Hong Kong by age (2009)

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of Persons</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-14</td>
<td>371,400</td>
<td>99.4%</td>
</tr>
<tr>
<td>15-24</td>
<td>851,500</td>
<td>99.4%</td>
</tr>
<tr>
<td>25-34</td>
<td>906,900</td>
<td>95.6%</td>
</tr>
<tr>
<td>35-44</td>
<td>958,900</td>
<td>86.6%</td>
</tr>
<tr>
<td>45-54</td>
<td>867,500</td>
<td>68.7%</td>
</tr>
<tr>
<td>55-64</td>
<td>313,600</td>
<td>39.0%</td>
</tr>
<tr>
<td>≥65</td>
<td>79,600</td>
<td>9.4%</td>
</tr>
<tr>
<td>Overall</td>
<td>4,349,400</td>
<td>70.2%</td>
</tr>
</tbody>
</table>

Figure 22: Persons aged 10 and over who have used PCs in Hong Kong by age (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. 12)

### Persons aged 10 and over who have used PCs in Hong Kong by educational attainment (2009)

<table>
<thead>
<tr>
<th>Education Attainment</th>
<th>No. of Persons</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Schooling/Pre-primary/Primary</td>
<td>389,900</td>
<td>25.20%</td>
</tr>
<tr>
<td>Secondary/Sixth-form</td>
<td>2,710,400</td>
<td>80.60%</td>
</tr>
<tr>
<td>Post-Secondary</td>
<td>1,249,100</td>
<td>97.10%</td>
</tr>
<tr>
<td>Overall</td>
<td>4,349,400</td>
<td>70.20%</td>
</tr>
</tbody>
</table>

Figure 23: Persons aged 10 and over who have used PCs in Hong Kong by educational attainment (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. 13)

### Persons aged 10 and over who have used PCs in Hong Kong by economic activity status (2009)

<table>
<thead>
<tr>
<th>Economic Activity Status</th>
<th>No. of Persons</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economically active</td>
<td>2,975,100</td>
<td>82.30%</td>
</tr>
<tr>
<td>Economically Inactive</td>
<td>1,374,300</td>
<td>53.20%</td>
</tr>
<tr>
<td>---Students</td>
<td>854,500</td>
<td>99.60%</td>
</tr>
<tr>
<td>---Home-makers</td>
<td>371,200</td>
<td>49.40%</td>
</tr>
<tr>
<td>---Retired Persons</td>
<td>133,300</td>
<td>14.60%</td>
</tr>
<tr>
<td>Other</td>
<td>15,300</td>
<td>26.30%</td>
</tr>
<tr>
<td>Overall</td>
<td>4,349,400</td>
<td>70.20%</td>
</tr>
</tbody>
</table>

Figure 24: Persons aged 10 and over who have used PCs in Hong Kong by economic activity status (Census and Statistics Department of Hong Kong Special Administrative Region, 2009, p. 14)
The Hong Kong Digital Literacy Programs

While the Hong Kong Special Administrative Region Government has had a significant impact on past digital inclusion and digital literacy programs, two NGOs have become the vanguards of the next step in connectivity in Hong Kong. These two organizations are the products of partnerships between Internet professionals seeking a more just and equitable environment where some of the most excluded individuals are brought online. The first organization discussed, the Hong Kong Internet Service Providers Association, is an example of how a trade organization views digital literacy as an important component of the future of information technology. The Hong Kong Internet Professional Association is a grassroots organization that brought together young professionals in the technology field to advance important technology issues and provide services to their communities.

The Hong Kong Internet Service Providers Association

Digital literacy and digital inclusion have been and continue to be one of Hong Kong’s major concerns. The Hong Kong Internet Service Providers Association recognizes this, particularly because populations groups need these skills to realize their financial aspirations and because broadband adoption increases the skill and versatility of the workforce in an increasingly competitive and global business environment.

The Hong Kong Internet Service Providers Association was founded 15 years ago and was Hong Kong’s first information technology organization. Invited by the Hong Kong Special Administrative Region Government to help develop a plan to provide accessible and affordable broadband to the community, the organization has held an integral role in shaping community public policy. It has furthered its mission of providing a forum to discuss the development and deployment of the Internet in Hong Kong, and promoting development of the Internet industry by working with the Hong Kong Council of Social Services and the Federation of Youth Groups to help facilitate getting digitally excluded youth and senior citizens online. (Yip & Mok, 2010) (Hong Kong Internet Service Providers Association, 2008)
Additionally, the organization has set up 33 cyber centers in collaboration with the Hong Kong government, with another 17 more to be completed soon; however, they acknowledge that 50 may not even be enough. To accommodate all the needs of Hong Kong hundreds more may be necessary. Additionally, some of these cyber centers are not as effective as they could possibly be because many of them are operated by different NGOs and not open to all groups. For example, some may be open to senior citizens, but not open to disabled individuals. (Hong Kong Internet Service Providers Association, 2010) (Hong Kong Internet Service Providers Association, 2008) (Yip & Mok, 2010)

**The Hong Kong Internet Professional Association**

In December of 1999, thirty information technology professions formed an NGO to serve their community by establishing the Hong Kong Internet Professional Association. After 11 years, the Hong Kong Internet Professional Association has over 2,500 members and still serves to “Advance the art and science of Internet technology and its proper application, Broaden Internet accessibility by the general public in Hong Kong, Narrow the digital divide through constructive direct actions, and build social recognition of Internet professionals in Hong Kong.” (Internet Professional Association, 2010) (Hung & Quat, 2010)

Part of its mission is to narrow the digital divide for different groups and sectors of Hong Kong. The organization accomplishes this through its e-Inclusion campaign that targets individuals who are the most digitally excluded and have the most to gain from digital empowerment. For example, there are specific programs tailored for handicapped individuals, visually impaired individuals, women, youth, and the elderly. (Hung & Quat, 2010)

To target all of these different groups of individuals, the Hong Kong Internet Professional Association has established a number of programs and initiatives to address different segments of the population that
need instruction to become more digitally literate. The Hong Kong Internet Professional Association provides comprehensive education “kits” to NGOs that enable each NGO to conduct their own classes. Because these materials are provided on a pro bono basis, NGOs only have to recruit clients for classes and train the trainers. (Hung & Quat, 2010)

Another program, School Web Care, encourages and equips student to teach parents and elderly members of their family basic computer knowledge and Internet skills. The Hong Kong Internet Professional Association has allied with teacher and parent associations and expanded this program to primary and secondary schools across the Special Administrative Region. Participation, relevancy, and practice are further encouraged by the holding of a competition where students and parents compete together to compete challenges researching information on the Internet. (Internet Professional Association, 2005) (Internet Professional Association, 2010)

This e-Inclusion Campaign has been a success. When the e-Inclusion Campaign was first started, adoption rate for target seniors were only 2%; in 2010, it has quintupled to 11%. While there are still a significant number of individuals to train, this is concrete measurable progress that has provided one group of individuals’ additional options and a richer quality of life. (Hung & Quat, 2010)

The Web Care Awards is another imitative from the Hong Kong Internet Professional Association, where organizations with easily accessible content and published online in a format that is disability-conscious are lauded for their inclusion efforts. This program serves to make sure that even when individuals with disabilities become digitally literate, issues such as visual-impairment does not prohibit them from using the resources on these websites. Judging for the Web Care Awards is done by an elite judging panel with subject matter experts and hundreds of NGOs and thousands of volunteers have participated in the review process. (Hung & Quat, 2010)
In cooperation with the Hong Kong Public Libraries, the Hong Kong Internet Professional Association has organized discussions in 24 public libraries to promote computer and Internet usage and knowledge and demonstrate how such technologies can be relevant in the day-to-day lives of the audience. These “Talks on The New Digital Era” covered subjects on a wide range of topics, including e-office, video-conferencing, e-learning, web searching, PDA, GIS tech, wireless Tech, and viruses. This program attracts over 900 attendees annually. (Hung & Quat, 2010)

Rewarding volunteers who take part in the e-Inclusion campaigns and the Web Care programs is integral for maintaining motivation and spreading the word about the programs. Each year, youth volunteers are encouraged to volunteer by a “web ambassador” who is well known and has in the past been pop-stars. Since the start of the program, over 1,000 awards have been given out to individuals aged 13 to 70.

In 2005 another program was created that would teach students important e-Inclusion topics and basic computer and Internet skills. During that first year, 30 schools participated and 610 students were trained. Since then, over 5,000 students have benefited from this training. Stemming from this program’s success, an “Internet Safety” program is being instituted in 2010 with 200 youth volunteers participating in educating their peers about the importance of staying safe on the Internet. (Hung & Quat, 2010) (Internet Professional Association, 2010)

Lastly, in collaboration with other NGOs and civic groups, the Hong Kong Internet Professional Association has created 50 “Digital Cyber Centres that cover each district in Hong Kong and have a training room and computer lab. These Public Computer Labs have provided computer and Internet Access to over 25,000 individuals. (See Figure 25: Cyber Centres in Hong Kong) (Hung & Quat, 2010) (Internet Professional Association, 2010)
Indianapolis-Central Indiana

Located in the heartland of the United States, Indianapolis is a medium-sized city that is representative of many regional-hubs across the world. Initially, Indianapolis grew along the banks of the White River but soon began to build outwards with the completion of the National Road in 1827 and several railroad lines. The capital of the Hoosier State was previously dominated by manufacturing industries during the early 20th century. Towards the latter half of the century, Indianapolis businesses diversified and soon included a number of service-oriented companies. The city is a locus for education and culture within Indiana with universities, colleges, art museums, and monuments located within the city. Uni-Gov, a city-county government system was instituted in 1970 and reflects the growth of Indianapolis to the boundaries of Marion County. As a metropolitan area representative of many mid-sized cities, Indianapolis has its positives and negatives Previous Internet proficiency was rather typical of the “rust belt” of the United States – rather mediocre. Today, however, things have begun to change because of digital literacy and digital inclusion efforts such as those of Net Literacy. (Indianapolis, 15th Edition)
Net Literacy

Genesis

Typically, most digital inclusion initiatives start through the identification of a need in their community and this was the genesis of Net Literacy. For the volunteers of Net Literacy, this need arose from the realization that some of the volunteers discovered as they participated in a computer training program at their local public library.

The public library, a critical information resource in many communities, served as the catalyst for the volunteers of Net Literacy. In 2001 and 2002, I, along with many soon-to-be volunteers at Net Literacy, volunteered at our public library in a program organized by the library’s reference department to teach basic computer and Internet skills. These individuals were typically older patrons of the library – and a significant number of them were senior citizens. Many of the senior citizens lived in retirement communities and several noted that they had friends and neighbors who wanted to learn how to use computers and the Internet, but were disabled and could not get around easily or lacked generally reliable transportation to the library. (Net Literacy, 2010)

As middle school student volunteers, we valued the empowerment that actionable education provides and believed that no one should be denied the opportunity to learn, particularly about digital literacy since this is a resource that furthers other learning opportunities. We also believed that a situation where mobility-impaired senior citizens were unable to access public funded resources had social justice implications. As some senior citizens age, their loss of independence and disabilities can tend to make their world seem a little smaller. Through the digital inclusion and digital literacy, accessing the Internet can help their world grow a little larger. We also hypothesized that if the digital literacy training were further customized to meet the specific needs of senior citizens, it would be more efficient and help
seniors more effectively realizes the options and riches that are offered by accessing the Internet. (Net Literacy, 2010)

We first contacted government agencies in Indianapolis, and finally in Washington D.C., to determine if there was a public organization that could help us and this population group. Finding none, to ascertain demand for a program that would establish computer and Internet training programs that targeted senior citizens, we conducted a community assessment of retirement communities, long-term care facilities, and nursing homes to gauge their interest in a partnership that would establish computer labs and Internet training classes at these facilities. The results were supportive – nine out of ten facilitates expressed that this was something that they were very interested in pursuing. (Net Literacy, 2010) (Senior Connects, 2010)

After developing a computer and Internet training lesson plan with help from the public library, it soon became apparent that the majority of the retirement homes lacked public computers labs and Internet connections. So our next step towards helping teach senior citizens was to obtain computers. (Net Literacy, 2010) (Senior Connects, 2010) (Computer Connects, 2010)

Our first attempts at obtaining surplus computers from businesses were unsuccessful. As middle school students, some adults did not seem to view our initiative as credible. Consequently, we appealed directly to the mayors, town managers, and county executive in our local area requesting that they allow us to conduct a county-wide computer drive within their city and town halls. The five municipalities we contacted enthusiastically endorsed our idea. We next asked the city, town, and county counsels to issue proclamations supporting our Senior Connects initiative, and to jointly issue a press release to help generate media attention. Our concept, which included computer drives, building computer labs within senior citizen’s facilities, and middle school students teaching senior citizens on a one-to-one basis,
attracted significant media attention. A front page article in the *Indianapolis Star* resulted in the donation of over one hundred of computers during our first computer drive. Since we were too young to drive cars, we recruited our parents to transport the computers to our organization’s first warehouse, the basement in my family’s home. We received a donation of licenses from Microsoft and began repurposing the computers to give them a second life. Several weeks after the computer drive, the public library and several local businesses contacted us to donate additional computers in support of our initiative. Soon were able to provide retirement homes and independent living facilities throughout our community with computers. This was done in a partnership where Senior Connects would provide computers and the retirement homes would pay for the Internet connection. Classes began shortly thereafter and hundreds of senior citizens soon began receiving instruction and became digitally literate. As the word spread throughout the nonprofit sector and as we continued to receive the support of the media, senior centers, retirement apartments, and independent living facilities throughout central Indiana began contacting us for help. (Net Literacy, 2010) (Senior Connects, 2010)

During the computer drive, we learned that many donors would have appreciated a receipt and asked if we were a nonprofit organization. We decided that there was sufficient demand and made the long term personal commitment that warranted incorporating as a 501(c)(3). Previously, our costs were very modest and had been funded by our allowances. But because we wanted to scale the Senior Connects program to meet the demand, we knew that the additional funding that would be required would only be possible if we incorporated and were awarded a tax exempt status. We didn’t know if this were possible, could a group of middle school students, all minors, incorporate a 501(c)(3) in Indiana? After some research and talking with an attorney, we discovered that there was nothing that prohibited minors from incorporating a nonprofit and servicing as its officers and board of directors. The cost of incorporating and scaling to meet the increasing demand was not an inexpensive proposition, and so I
donated the money I had saved up for a car for funding. By 2004, we received our 501(c)(3) incorporation and our Federal and state tax exemption. This legal status provided credibility for the organization and established formal governance structures and bylaws for the program. (Net Literacy, 2010) (Computer Connects, 2010) (Community Development Law Center, 2010)

Senior Connects continued to expand, and we decided to expand the scope of the population groups that we served. Also, many of our potential donors had difficulty donating funding us directly since all of the officers and board members were minors and could not enter into legally binding agreements. We met as a team and decided that because we believed it important to help increase digital inclusion and digital literacy to students on free or assisted lunch programs and populations groups that included families with incomes below the poverty level, the disabled, people of color, among others, and because we believed it important to increase our offering to emphasize Internet safety, we should consider modifying our bylaws to allow adults to join as officers and board members but structure the organization so that students retained ownership and would continue to be responsible for all of the volunteering. As a team, we met with the Community Development Law Center, a nonprofit pro-bono law firm, and attorney Shelia Jenkins helped us by revising our bylaws that would enable us to accomplish our objectives. (Community Development Law Center, 2010) (Net Literacy, 2010) (Senior Connects, 2010)

In 2005, we rebranded ourselves as Net Literacy, reflecting the expanded scope of our mission and constituencies that we served. Net Literacy would serve as the umbrella organization that would encompass programs catering to specific needs identified by the students. (Net Literacy, 2010)
Since 2005, Net Literacy has grown into a credible, reputable organization that has provided over 150,000 individuals increased computer access and raised awareness about important cyber-issues such as Internet safety and digital literacy. Net Literacy has also engaged over 3,000 student volunteers through its direct programs. Net Literacy continues to be a student-managed nonprofit that promotes youth philanthropy through a series of community outreach programs. The company’s mission is to increase computer access, computer and Internet literacy, and Internet safety awareness. Student volunteers learn work skills, leadership skills, and have the opportunity to engage in youth philanthropy and provide service back to their communities. Core to Net Literacy’s mission is to help increase student success. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

With the reorganization of the nonprofit, students comprise 50% of the Board of Directors and the adults that serve on the boards are individuals who are from different backgrounds that help provide insights and expertise to the organization – educators, lawyers, technology executives, board members from grantors that fund us, and community leaders. We also formed an Honorary Board of Directors to help solidify our public-private partnership. Net Literacy’s Honorary Board is Co-Chaired by US Senators Lugar and Bayh, and members of our Honorary Board include the Lt. Governor, Congressmen, and Mayors. These individuals mentor and serve as role models for the student volunteers. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Today, there are five core programs that are engaging youth and digitally excluded populations in communities across the world.

**Senior Connects**

Still a core component of Net Literacy, Senior Connects continues to increase computer availability in independent living facilities and is a program where students teach senior citizens computer skills on a
one-to-one basis one day per week for up to three months. Specially modified training manuals with large fonts and filled with pictures and illustrations are more “senior friendly” and facilitate the training process. Student volunteers teach seniors, who sometimes are even 90 years “young,” important ways that computers and the Internet can be relevant to their lives. Some seniors are technophobes, having unsuccessfully attempted to learn how to use a computer in the past. We present ourselves to seniors as “your friendly high school student volunteers that are happy to volunteer to teach computer and internet skills.” With this approach, students are paired with seniors and some seniors adopt the students, maintaining a relationship long after the training has been completed. Discovering each senior citizen’s value proposition is essential in maximizing the completion of the computer, Internet, email, and Internet safety training courses. During ten minutes at the end of each training class, student volunteers and seniors, using the seniors’ offline hobbies as a guide, explore the Internet together, playing online card games, browsing for health information, researching government programs, and sending e-mails to friends and family. To provide these services, Senior Connects has established or expanded public computer labs in well over 100 facilities and senior centers impacting over 40,000 residents and members in three states. In a new initiative to help increase digital inclusion and digital literacy capacity, Net Literacy is also teaching the facility’s activity directors how to use the Senior Connects methodology to teach senior citizens. (Net Literacy, 2010) (Senior Connects, 2010)

Sometimes, students teach senior citizens inside independent living facilities and other times, schools adopt senior centers and some schools invite senior citizens into their computer labs to be taught by students after school. Through this program, as the digital divide is being crossed by seniors, the intergenerational divide is being crossed by student volunteers. (Net Literacy, 2010) (Senior Connects, 2010)
Computer Connects & Computer Recycling

The Computer Connects program has grown out of the refurbishing process and has been established as its own separate program under the Net Literacy umbrella. At Computer Connects, student volunteers conduct computer drives and repurpose thousands of computers in an EPA compliant and environmentally friendly manner. Through this program, computer drives are held in conjunction with municipal governments and donations are received from businesses, cities, and the state. Over 11,000 computers have been repurposed from 2007 to 2009. In 2009 alone, over 3,500 computers were donated to schools at no cost to any school. In 2010, Net Literacy is on target to donate over 4,000 computers in support of our other programs. Computer Connects teaches student volunteers computer leadership, refurbishing, job, and life skills. Computer Connects programs are conducted in the schools during school, after school, during weekends, and throughout the summer. (Net Literacy, 2010) (Computer Connects, 2010)

One major focus of Computer Connects is to dispose of unusable hardware in an environmentally friendly manner. This is becoming an increasingly important priority in many communities as more and more hardware becomes obsolete. According to an EPA study, over 157.3 million computer component units were decommissioned or thrown in landfills out of a total of over 205.5 million computer component units disposed of in 2007. This calculates to a dismal recycling rate of only 23%. In partnership with computer and equipment refurbishing companies, Computer Connects volunteers dispose of unusable computers, monitors, and laptops by bringing them to these facilities so that they can be properly recycled. Net Literacy’s student volunteers are members of the digital millennium, and being a green organization is especially important to us. We have also partnered with the Indiana Recycling Coalition to promote e-Waste awareness and protect the environment. (Indiana Recycling
Throughout the year, student volunteers repurpose thousands of computers for elementary schools, HUD apartments, Section 8 apartments, libraries, independent living facilities, assisted living facilities, pre-schools, community centers, senior centers, and other nonprofits. The repurposing facility has Internet access so that drivers can be downloaded and software and operating licenses can be activated via the Internet. Student volunteers use customized "one click" slipstream CDs that we created to efficiently load the operating system, an office suite, antispyware, and antivirus applications. (Net Literacy, 2010) (Computer Connects, 2010)

Each summer, high schools conduct “Computer Connects Summer Programs” that have resulted in thousands of computers being repurposed. Most of these summer programs engage students without a technical background, and recently, Net Literacy has initiated programs that focus on teaching homeless students and special education students that are unable to receive classroom instruction due to physical, learning, or emotional disabilities. Not only does this program provide a safe, educational environment for students to spend their summers, it also teaches at-risk student volunteers important job and life skills. (Net Literacy, 2010) (Computer Connects, 2010)

Community Connects

Community Connects objective is to provide computers to create public computer labs in nonprofits that serve low income and other population groups that have low broadband adoption rates. When families do not have a computer at their homes for students to complete their homework, this program helps make technology more accessible to student that live too far to walk to public libraries through two initiatives – building computer labs that are accessible to students and donating thousands of computers
to schools where guidance counselors select the K-12 students on free or assisted lunch programs and without a computer at home that should receive priority receiving a computer at home. We also provide the resources that enable our partner nonprofits to teach computer and Internet literacy using our proven Net Literacy methodology. Community Connects increases computer access where the digital divide is the greatest. (Net Literacy, 2010) (Community Connects, 2010) (Net Literacy Alliance, 2010)

Community Connects has provided computer access to over 110,000 underserved resident and members targeting schools, after school programs, churches, HUD Apartments and Section 8 Apartments, community centers, libraries, and other nonprofits. (See Figure 26: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) ) One example of Net Literacy’s Community Connects program is our collaboration with the Techpoint Foundation. Through this initiative, Net Literacy helped raise $15,000 to expand the center by 4,000 square feet and build a 24-seat computer lab for Save The Youth, a safe, anti-gang inner-city facility for 200 at-risk youths. During a subsequent Community Connects program, Net Literacy donated 75 computers directly to the nonprofit so that they could be distributed to at-risk youth. (Save the Youth, Inc., 2010) (Techpoint Foundation, 2010) (Net Literacy, 2010) (Community Connects, 2010)
Figure 26: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) (US Census Bureau, 2010) (Net Literacy, 2010)

Safe Connects

Safe Connects grew out of the concern about cyber bullying and net predators that affected an increasing number of students in the early 2000s. Safe Connects teaches 4th through 12th grade students and their parents about Internet safety in three age-appropriate modules. Students teach other students and their parents together in schools, after the school day, using a media-rich presentation and discuss real-life scenarios and stories that make Internet safety relevant to the students and parents. These modules are approved by the Indiana Department of Education (IDOE) and Safe Connects is one of four resource websites listed on the IDOE’s website. As an example, during the 2010-2011 school year, the Indianapolis Public School system will use the Safe Connects program to satisfy e-Rate requirements for
Net Literacy’s Internet safety program’s goal is also to increase awareness of important Internet security issues. Through the generosity of its partners, the Safe Connects program has conducted a $100,000 annual media awareness campaign. The program was announced by the IDOE’s Superintendent of Public Instruction at a press conference jointly held by the IDOE and Net Literacy at the State House. More than 850,000 Hoosiers viewed newscasts about the launch of the Safe Connects program that were covered broadcasters throughout the state. Students, with the help of media production crews, scripted and filmed dozens of Public Service Announcements (PSAs) that cover important digital security topics such as cyber bullies, hate websites, computer viruses, password safety, netiquette, spyware and adware, spam, and distributing embarrassing or explicit pictures; as of September 2010, these PSAs had been running on television for twenty-five consecutive months, since March of 2008. (Net Literacy, 2010) (Safe Connects, 2010) (Net Literacy Alliance, 2010)

Financial Connects

In 2009, the Financial Connects program was created to help make the instruction of financial literacy more engaging to youth. It is comprised of 20, soon to be 40, financial literacy videos created by students and 200 “best of web” financial literacy videos, web based games, and financial calculators after an exhaustive review of 5,000 of the leading financial literacy websites on the web. Key to the Financial Connects program is to make financial literacy relevant to youth – it is done so through the interactive website and the videos to show that financial research and planning, particularly when done online, is important and can affect the rest of their lives. (Net Literacy, 2010) (Financial Connects, 2010)
Based upon its success, Net Literacy won an additional $115,000 in funding from the Lilly Endowment, Intel, and State Farm insurance to develop a contest and prizes for students that developed financial literacy games and videos to create a national financial literacy website. (Net Literacy, 2010) (Net Literacy, 2010) (Financial Connects, 2010)

Dr. Tony Bennett, Superintendent of Public Instruction for the IDOE, stated, “I am proud that Net literacy, an organization made of Indiana students, successfully competed for State Farm’s financial literacy grant. This is the type of service learning project that encourages student success and I congratulate them on this endeavor.” He has since sent a note to all superintendents and principles through the state encouraging them to participate in the program. (Net Literacy, 2010) (Financial Connects, 2010)

_Tangible, Measurable Outcomes Regarding Increasing Access to Technology_

In its strategy to increase digital inclusion and digital literacy, Net Literacy decided against focusing on a single constituency or market segment, such as senior citizens or public housing, because it was hypothesized that there is a social aspect to increasing digital inclusion and broadband adoption. Creating a critical mass of users generates synergy and facilitates establishing the value proposition to non-adopters. Since public housing residents utilize community centers, schools, churches, and other nonprofits, a holistic approach of increasing computer access and a digital ecosystem was deemed more likely to create the critical mass of technology that is necessary for digital literacy sustainability. During the first phase of its operations in Marion County which commenced in 2003, Net Literacy first targeted independent living facilities, senior centers, and senior apartments and provided computers so that 61 computer labs could be built or expanded. During the second phase which began in 2005, Net Literacy expanded the scope of its offering an additional 115 computer labs constructed or expanded throughout Marion County. This excludes Net Literacy operations and services provided in 23 other counties.
throughout Indiana, and in other states. (See Figure 27: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) with a five block radius highlighted (Net Literacy, 2010) (Net Literacy Alliance, 2010)

In 2006, the third phase of Net Literacy’s initiative to create a digital literacy ecosystem was expanded to include public, parochial, and charter schools within Indianapolis’ core city area. Since 2008 in Marion County alone, 7,214 computers were donated to 51 preschools and K-12 public, parochial, and charter schools for use in classrooms, computer labs, and to be loaned to students on free or assisted lunch programs without a computer at home. Indianapolis Public Schools (IPS) is Indiana’s largest school
district, the district embraced the Net Literacy program establishing chapters in its high schools, and the district received the bulk of the computers. IPS has a 48.6% 2008-2009 graduation rate, reflecting poverty (83% of the Indianapolis Public Schools’ students are on free or reduced lunch programs vs. 55% of Indiana’s schools). IPS students have an extremely high student mobility rate, 18% of IPS students have disabilities which require additional instruction and resources, 75% of IPS students live in homes with one parent or a grandparent, and 12% of the students have limited English proficiency. The Pew Internet and American Life Project and the National Broadband Plan identified population groups with disabilities, low income, English as a second language, and disabilities as having low broadband penetration, validating Net Literacy’s original computer distribution and digital literacy priorities. As shown in Figure 28: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) with a five block radius highlighted with Indianapolis Public Schools Service Region, the computer labs in community centers, senior centers, schools, churches, and other nonprofits generally correlates with IPS’s school boundary. Within Indianapolis’s core city area, single parent families, some of whom work more than one job, makes transportation to public library’s computer labs problematic for many young students. Assuming that computer facilities within a five block area was within walking distance (an average of 1250 feet and a maximum of 2500 feet), a digital ecosystem cloud was created that encompassed more than 50% of IPSs school boundary area. This is a significant and vital component of increasing digital inclusion and access to technology in lower income areas, since there will be students that will not have a computer and broadband in their homes for the foreseeable future. (Net Literacy, 2010) (Indianapolis Public Schools, 2010) (Department of Education, Indiana, 2010) (Net Literacy Alliance, 2010)
Computer labs were targeted to facilities that served population groups with low broadband penetration, including community centers, churches, and other nonprofits. Overlaying the computer lab and donation sites to demographic information confirmed that the Net Literacy’s digital literacy ecosystem focused on areas with higher poverty rate. Population groups with higher poverty rates are an important predictor of groups with low broadband adoption rates and lower high school graduation rates. (Beltran, Das, & Fairlie, November 2008, pp. 11-13) (Net Literacy, 2010) (Net Literacy Alliance, 2010)
Net Literacy’s computer distribution to students without a computer at home may impact future high school graduation rates. As an example and as an independent variable, students with a computer at home are approximately 6% to 8% more likely to graduate from high school than students without a computer at home. Assuming that 20% of the 7,214 computers donated to schools during a three year period were used in classrooms and to build computer labs and the remaining 80% were loaned to students on free or assisted lunch programs, 5,771 households received computers. Assuming that the average household attending IPS has 2.3 students, approximately 13,273 students were impacted.

Figure 29: Net Literacy Computer Labs and Donations within Marion County, Indiana (Indianapolis) with a five block radius highlighted overlaid on Census Median Household Income data (US Census Bureau, 2010) (Net Literacy, 2010)
through the donation of 5,771 computers. Assuming that having a computer at home increases likelihood that a student will graduate from high school by 6% to 8%, then 796 to 1062 students may be more likely to graduate from high school based upon this single aspect of the Computer Connects program to schools in Marion County. The Alliance for Excellent Education estimates that the average loss of income for an individual without a high school diploma is $260,000 and while there is not sufficient information to be able to estimate that 796 additional high school graduations will result in $206,960,000 in additional lifetime earnings for these individuals, funding that would enable additional research to be conducted is required to quantify the impact to the individuals and the community. Net Literacy’s programs created a digital literacy ecosystem increases computer literacy and may impact future high school graduation rates and Indianapolis’ digital literacy proficiency. This is significant because Net Literacy believes that digital inclusion and digital literacy creates additional options and opportunities for the underserved. In an environment all too common in urban centers throughout the country, poverty and welfare appears to be intergenerational. Through the distribution of the 5771 computers to students’ homes together with the thousands of computers used to build or expand public computer labs, and thousands of individuals that have received computer, Internet, and Internet safety training within Indianapolis, Net Literacy is creating a digital ecosystem that breaks the pattern of poverty, despair, limited options, and social inequity. Through the novel and innovative use of technology, digital inclusion and digital literacy has become an instrument for creating social equity. (Beltran, Das, & Fairlie, November 2008, pp. 11-13) (Alliance for Excellent Education, 2007, p. 4) (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Net Literacy in the Media: Awareness of the Digital Literacy Issue

Net Literacy has worked hard to create awareness about the impact of student engagement, youth philanthropy, the cost of the digital divide, the importance of Internet safety, and how digital inclusion
helps create social equity. The media has been kind by increasing awareness and covering our programs.

We have been fortunate to have received awards and recognition from many local and national leaders, which range from General Powell to Senator Dole and former President Clinton to former President Bush in a private White House ceremony. Former City of Fort Wayne Mayor Graham Richard, wrote a magazine article about how his own mother learned how to use the Internet through our Senior Connects program, after which he joined Net Literacy’s Honorary Board of Directors. Recently, Lt. Governor Skillman, Congressman Carson and Mayor Ballard have joined Net Literacy’s Honorary Board, showing their support of student empowered programs that help reduce the digital divide and generating additional media coverage from their support. Net Literacy has also generated media coverage through the recognition was has been deemed a novel use of student engagement to address the digital divide. Since last year, Net Literacy has received media coverage by being named one of the “91 most promising digital inclusion models in the world” by the European Union’s Commission on Digital Inclusion, the Above and Beyond Award by the National Medal of Honor Society, the Jefferson Award for Public Service awarded by US Senators Lugar and Bayh in a Washington DC ceremony, the Indiana Governor’s Award, and having three programs cited by the FCC in the National Broadband Plan presented to Congress. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

**Partnerships**

Partnerships are critical: Net Literacy has the endorsement or sponsorship of almost 400 companies and organizations; and this creates real synergy.

Net Literacy has long recognized the importance of keeping at-risk students engaged and off the streets. As examples, Net Literacy has partnered with national organizations including the Afterschool Alliance
and America’s Promise, two alliances of public, private, and nonprofit groups committed to raising awareness and expanding resources for afterschool programs or increasing high school graduation rates. (Afterschool Alliance, 2010) (America’s Promise Alliance, 2009) (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Tied closely with keeping youth engaged is promoting student success. Net Literacy is proud to have partnered with Indiana University Purdue University Indianapolis and Harrison College to provide over $300,000 in scholarships for student volunteers. These scholarships encourage and help enable Net Literacy student volunteers to take the skills they learned volunteering to the next level and turn a passion into a career. The scholarships also encourage some students, especially those whom would be the first in their families to attend college, to more seriously consider continuing their education after graduation from high school. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Increasing digital inclusion is good public policy and Net Literacy has partnered with counties, cities, and states in ways that reflect the needs of each community.

In some cities such as Indianapolis and Fort Wayne, the mayors have joined Net Literacy's Honorary Board of Directors to signify their city's support of the Net Literacy programs and mission. Other cities and towns have issued proclamations supporting Net Literacy programs, ranging from computer drives to promoting digital literacy training for senior citizens, and recognizing organizations and foundations that support Net Literacy. Municipalities have also supported Net Literacy by featuring its programs on public access channels and municipal websites. Cities and towns have shown dedication and support to Net Literacy through their partnering with Net Literacy and allowing computer drives to be conducted in their city and town halls and donating city and town surplus computers to Net Literacy. (Net Literacy, 2010) (Net Literacy Alliance, 2010)
In Fort Wayne, Indiana, Net Literacy has partnered with the City of Fort Wayne, Fort Wayne Community Schools, and the Urban League. Hundreds of students have participated in Community Connects, Senior Connects, and Computer Connects programs in Fort Wayne since the program was established in 2006. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

In February of 2009, and in partnership with the Indiana College Success Coalition, Net Literacy held a College Access Pep Rally to create excitement about College Goal Sunday activities. It was a perfect blend of leveraging technology to research... Indiana Core Requirements, college planning, Twenty-first Century Scholars and other financial aid resources. Net Literacy participants were trained on Online College Access curriculum which includes accessing websites such as KnowHow2Go.org and TriptoCollege.org. Drive of your life.org was viewed via a big screen TV connected to a laptop at a Fort Wayne mall to allow students the opportunity to make the correlation between the journey to college and the destination. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Most notably, Indianapolis Mayor Greg Ballard has shown his support to Net Literacy by having the City of Indianapolis donate surplus city computers to Net Literacy and issuing numerous city proclamations honoring Net Literacy and the foundation and companies that support our digital literacy mission. Mayor Ballard was elected to Net Literacy’s honorary board of directors and further showed his commitment to Net Literacy by attending Net Literacy’s summer programs and meeting with Net Literacy’s Student Board. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Net Literacy has also partnered with the state of Indiana both have benefited from this partnership. The State of Indiana has donated over 10,000 computers to Net Literacy from 2008 to 2010 alone, and Lt. Governor Becky Skillman became a member of the honorary board of directors. Net Literacy has successfully lobbied the Indiana General Assembly to pass Resolution 85, the Net Literacy Resolution,
and in 2009, the Indiana General Assembly passed Resolution 95, the Safe Connects Resolution, asking all Indiana PEG channels to carry Net Literacy’s Safe Connects programming. In December, 2010, the State of Indiana will announce a new partnership between the IDOE, the Indiana Department of Administration, and Net Literacy that will provide funding to expand Computer Connects and enable Net Literacy to donate computers to 15 school districts in rural parts of the state. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

The IDOE has also been intimately involved in Net Literacy’s success since 2004 when they helped vet and review the Safe Connects program that has since instructed thousands of students on Internet safety. Additionally, Dr. Tony Bennett, Superintendent of Public Instruction of the IDOE, sent a letter to each superintendent and principal in Indiana encouraging their districts and schools to participating in Net Literacy’s programs. The IDOE has also linked to Net Literacy on its website highlighting Net Literacy as a best of class resource, and provided Net Literacy support in many student success related initiatives. (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Net Literacy has also received the support of Indiana’s national leadership, when Indiana Senators Evan Bayh and Richard Lugar agreed to serve as Co-chairpersons of the Honorary Board of Directors and when Congressman Andre Carson joined the Honorary Board of Directors for his support and championing Net Literacy of the Seventh Congressional District, which includes Indianapolis. (Senior Connects, 2010) (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Many of Net Literacy’s partners are fellow nonprofits. During 2010, Net Literacy began a partnership with the Indiana Association of United Ways, donated computers to build or expand computer labs in 16 United Ways that served 17 counties, and provided computers to 95 United Way agencies. (Net Literacy, 2010)
While managed by student volunteers, Net Literacy is empowered through the generous donations and support that the corporations and foundations provide. Further attesting to how much of a “team effort” Net Literacy is, the financial support and the in-kind donations provided by these companies and organizations have played an integral role help to enable Net Literacy to have the impact that it has enjoyed. Technology companies and organizations such as Intel, Microsoft, the Techpoint Foundation, the USIIA, and Cisco, media and communications companies such as Verizon and Bright House Networks, grantor foundations such as the Lilly Endowment, Clowes Fund, the Junior League, the Lumina Foundation for Education, and the Hoover Family Fund, and other companies as State Farm Insurance have made the once-middle-school student’s dream increasing social equality through the of digital literacy a reality. (Net Literacy, 2010) (Net Literacy, 2010) (Net Literacy Alliance, 2010)

Wiki-management

Wiki-Management is one of the “secret ingredients” that uses the power of the Internet and student collaboration. It has been described by some as the simultaneous creative construction and destruction of a program where students swarm like a hive of bees making changes in collaboration.

In 2005, Net Literacy realized that “everything is local” and that with digital inclusion, “one size does not fit all.” Using the Wiki concept, Net Literacy partner schools began refining and fine-tuning the Net Literacy model based upon their own experiences. Net Literacy partner organizations and schools continuously update and share their best of class practice with other Net Literacy programs and processes continue to evolve as these best practices are incorporated into the “global” Net Literacy model. (Net Literacy, 2010)

Net Literacy’s students empowered all-volunteer organization illustrates this term where a model continuously evolves in a changing online environment to maintain a constant mission. Wiki-
management differentiates Net Literacy’s digital inclusion model from other, more traditional digital inclusion models. As the Internet progresses from Web 2.0 to Web 3.0, wiki-management will become recognized as an Internet empowered and Net savvy way of collaborating and efficiently conducting business in an online, synergistic, and real time manner. (Urban Dictionary, 2010) (Net Literacy, 2010)

**The Net Literacy Methodology**

One differentiator that separates Net Literacy from many other digital literacy and digital inclusion initiatives is Net Literacy’s computer instruction method. This pedagogy, known as the “Net Literacy Methodology” grew out of the realization in Senior Connects that the best way to educate and engage the digitally excluded is through a individually tailored, one-on-one, instructional basis. The theory is that while one can teach large groups of individuals by lecturing at them, digital literacy taught to population groups with low broadband adoption are more likely to complete their courses and become digitally literate when the instruction is customized and the individual’s personal broadband value proposition is emphasized. Also, Net Literacy’s student volunteers are better able to overcome technophobia that some non-adopters experience. This makes for a more effective program with better outcomes based upon qualitative research of comparing Senior Connects computer and Internet training graduation rates with other programs used by digital inclusion nonprofits. While this is not the least expensive training model, considering the value an individual realizes via digital literacy and its social equity implications, Net Literacy believes that this is the most appropriate and long-term cost effective methodology. (Net Literacy, 2010)
Chapter 5: Lessons Learned and What Remains to be Done and Next Steps for The United States

Ongoing Digital Literacy Program Issues and Limitations

Funding & Resources


Net Literacy is a low cost provider because its computers are donated, it receives free or significantly discounted software, and its training and computer repurposing are conducted by an all-volunteer group of student volunteers. In other digital inclusion programs, computer hardware costs ranges from $250 to $400. Some training programs are extensive, and provide users ongoing telephone technical support to new adopters. Well-financed digital inclusion programs hire full-time trainers, offer periodic training refresher programs, and have higher administrative expenses. (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 3, 2009, pp. 37-39) (Shapiro, Hilding-Hamann, Nielsen, & Pedersen, 2009, p. 39) (McClure, 2009) (Net Literacy, 2010)

4 These costs may include hardware, computer and Internet training, Internet safety training, and a home computer installation, but they exclude broadband installation costs and reoccurring monthly broadband access fees.
During the 2010 Computers For Youth Network’s Home Learning Annual Conference, the thirteen digital inclusion nonprofits cited fund-raising as their most significant challenge. While there are hundreds of nonprofits that have a digital inclusion focus listed in the Net Literacy Alliance database, most nonprofits experience fund raising challenges similar to those experienced by Net Literacy. (Net Literacy, 2010)

In the United States, it is important for digital literacy programs to diversify their revenue streams by seeking funding from multiple sources – through public and private sources as well as from grants and individual donors. Programs relying on just fewer sources of funds may be less sustainable because most revenue sources require annual requests. As an example and as depicted in Figure 30: Net Literacy’s 2010 Revenue by Source, Net Literacy has two significant revenue sources (state funding and corporate grants). Foundational grants and federal funding are small funding sources, but approximately $110,000 categorized as corporate grants are effectively foundation grants in the form of direct corporate contributions. The federal funding category has been growing rapidly. A weakness in Net Literacy funding program is that unlike most nonprofits, there is no public outreach initiative to attract individual donors. One reason for this fund raising strategy is that since students manage the nonprofit, it has been more difficult to create effective donor programs that target individual donors. The use of social media is more effective for larger and well-known nonprofits, and the online efforts tested by Net Literacy have resulted in few donations. Also, the Net Literacy student board decided that their mission would best be accomplished by focusing on their efforts reducing the digital divide and effectively using the available resources to encourage repeat donations. Since 2006, this has proven effective as revenues have increased from $355,000 to almost $1,600,000. However, the student executive committee continues to discuss how best to execute an individual donor program, and has not yet identified a good solution. (Net Literacy, 2010)
In 2008 when the stock market meltdown decimated grantors’ endowments, many American nonprofits experienced a decline in revenues. Some digital inclusion initiatives have tried introducing subscription or membership fees for programs. While this can generate a steady stream of funds, it is highly contingent on both the financial ability of and the satisfaction of the individuals. Since digital inclusion and digital literacy programs target the underserved, which as a group have low disposable income, the individuals the most need the resources may be the least able to afford them. Additionally, collecting membership fees can be difficult for digital literacy programs that do not have a track record of success.


Combining local funding with regional and national funding presents an opportunity for some digital inclusion programs. Further, donations from companies – whether it is donations-in-kind or monetary support can help sustain and grow digital literacy programs. Both the Hong Kong Internet Professional
Association and Net Literacy have received funding from government sources, reflective of the view that governments view increasing digital inclusion and digital literacy as good public policy. The Hong Kong Internet Professional Association, the Hong Kong Internet Service Providers Association, and Net Literacy differentiate their services from other digital inclusion providers to offer funders and supporters a distinct value proposition. The Hong Kong Internet Professional Association has distinguished itself by its tenure and the depth and breadth of its successful and high visibility digital inclusion initiatives. The Hong Kong Internet Service Providers Association leverages its contacts and strategic position as the preeminent ISP organization to collaborate with Hong Kong NGOs. The Hong Kong Internet Service Providers Association has worked with the government to help develop a plan to provide accessible and affordable broadband to the community, and the organization has held an integral role in shaping community public policy. It has furthered its mission of providing a forum to discuss the development and deployment of the Internet in Hong Kong, and promoting development of the Internet industry by working with the Hong Kong Council of Social Services and the Federation of Youth Groups to help facilitate getting digitally excluded youth and senior citizens online. Since its inception, Net Literacy has never charged any individual or organization a fee for training, computer equipment, or other services. We have further differentiated ourselves as being the nation’s digital inclusion low cost provider. At an average of $15.00 per individual trained and computer donated made possible by its all-volunteer digital literacy corps of student volunteers and the significant in-kind donations that enables Net Literacy to obtain all of its computers at no cost. Net Literacy compensates for low revenues that are partially a result of Net Literacy’s decision that all grants be written by student volunteers. (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives, Topic Report 3, 2009, pp. 37-39) (Shapiro, Hilding-Hamann, Nielsen, & Pedersen, 2009, p. 39) (McClure, 2009) (Net Literacy, 2010) (Yip & Mok, 2010) (Hung & Quat, 2010)
All of the programs presented in this report are highly sensitive to funding and resource allocation. As is typical for most nonprofits, funding is often tight and unpredictable. The Hong Kong Internet Professional Association, the Hong Kong Internet Service Providers Association, and Net Literacy both maintain cash reserves for unexpected expenses or reductions in revenues. Net Literacy compensates for these uncertainties by maintaining sufficient funds to provide a cash reserves to support one year of operations and an emergency $25,000 contingency fund. (Net Literacy, 2010) (Yip & Mok, 2010) (Hung & Quat, 2010)

**Personnel**

Tying in with funding, man-power is a significant challenge faced by digital literacy programs. For many nonprofits, including the Hong Kong Internet Service Providers Association, the Hong Kong Internet Professional Association, and Net Literacy, a large full-time paid staff is not an option. Increasing digital literacy requires the diffusion of knowledge from individuals with skills, competencies and experience to those who are lacking these traits. All three organizations use volunteers to help further their mission via the donation of in-kind services. Personnel and employees, while possessing a significant amount of skill and being able to devote the entire traditional business day to digital literacy programs, can create unaffordable overhead for nonprofits. In some instances, however, employees are critical to direct the day-to-day activities of large-scale digital literacy projects; if a digital literacy program is primarily supported through grants, hiring a grant writer could be essential to the continuity of a program. (Net Literacy, 2010) (Yip & Mok, 2010) (Hung & Quat, 2010)
Best Practices from Hong Kong and Indianapolis Case Studies

Awareness

One of the largest challenges that digital inclusion and digital literacy initiatives face is creating awareness of the broadband value propositions and overcoming objections to use of the Internet. To some in the most connected communities, it is incomprehensible that individuals, perhaps in a different part of the city, are without reliable access to computers and the Internet. For others, awareness about the value proposition that connectivity can provide them is among the greatest barriers to them getting online. (Shapiro, Hilding-Hamann, Nielsen, & Pedersen, 2009, pp. 48-49)

From Net Literacy’s Safe Connects’ PSAs to The Hong Kong Internet Professional Association’s Awards with celebrity spokespersons, every digital literacy program must undertake campaigns to increase awareness of the digital literacy issue.

Collaboration

No one program or organization will be able to solve the “digital literacy” problem. The Hong Kong Internet Service Providers Association, The Hong Kong Internet Professional Association, and Net Literacy have partnered with hundreds of businesses, local, state, federal, or provincial government organizations, NGOs, and other organizations to further digital literacy. Collaboration is the key to future success in increasing connectivity. (Shapiro, Hilding-Hamann, Nielsen, & Pedersen, 2009, pp. 25-28)

Digital Relevancy: Establishing a Value Proposition

The Digital Literacy case study programs use the concept of digital relevancy, or finding a way to establish a value proposition to nonusers of computers and the Internet, to encourage learning how to use computers and navigate through the Internet. The Hong Kong Internet Professional Association
incorporates digital relevancy into its School Webcare campaign by pairing students and adults and showing how digital communication and research can help improve their lives. The presentations are conducted in collaboration with Hong Kong Public Libraries also reinforce how different technologies impact the daily lives of library patrons. Net Literacy’s Senior Connects program uses senior citizen students’ interest and hobbies to show that many of them can be explored or approached in new ways via the Internet, such as participating in virtual online cyber-bridge tournaments with players across the country. As was mentioned in the section, Adoption Concerns, results from the Pew Home Broadband survey indicate that 48% of approximately 22% of American adults who do not use the Internet, do not use the Internet because of relevancy related factors: no interest, waste of time, too busy, don’t need or want. The benefit of the Internet is that it has something to provide to everyone and that such respondents in the survey are just not aware of the benefits that could be afforded to them. (Smith, Home Broadband 2010, 2010, p. 11) (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 14) (Smith, Home Broadband 2010, 2010, pp. 3, 5) (Federal Communications Commission, 2010, p. 168)

In Hong Kong, 55% of individuals having a computer at home but choosing not to connect to the Internet cited similar reasons – no need or no interest in using the Internet (Census and Statistics Department of Hong Kong Special Administrative Region, 2009)

It is crucial for digital literacy organizations to show non-users the benefits of computer and Internet use and tailor programs to establish a value proposition for the users.

To identify how best to make the Internet relevant, survey questions on studies polled new-Internet adopters about how they used the Internet. By analyzing these statistics, digital literacy programs can more effectively address its target audience of nonusers unaware of the value proposition that computers and the Internet.
The primarily driver of the hundreds of millions of households that are online is email, instant message, chat, and other forms of communications. In surveys, 61% cite this reason as a reason to get online and 31% cite it as the most important reason. 46% of Internet users indicate that their almost unlimited access to music, movies, and other forms of entertainment is a primary reason why they subscribe to an Internet service. Parents are also very cognizant of the growing importance of computers and the Internet in their children’s education; 35% of parents have purchased a computer and the Internet because their children need it for school. Jobs requiring Internet skills have increased by 50% in the United States between 2003 and 2007 and jobs in the information technology and communications sector where computer and Internet skills are mandatory, they are growing 50% faster than in other sectors of the economy. Reflective of this, 20% claimed that due to the increasing importance of being connected for their job, they purchased a computer and Internet connection. There are many other value propositions for joining the Internet community – and it’s important to recognize that every person may have a different value proposition or reason for connecting to the Internet, and often individuals subscribe to the Internet for a combination of reasons. (See Figure 31: Broadband Survey Users on Their Reasons for Getting Online (% among Internet users who have been online for 2 years or less) ) (Horrigan J. B., Broadband Adoption and Use in America, 2010, pp. 19-20) (Federal Communications Commission, 2010, pp. 3-4)
<table>
<thead>
<tr>
<th>Reason</th>
<th>% who cite most important reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>To e-mail and stay in touch with family and friends</td>
<td>61</td>
</tr>
<tr>
<td>To gain access to music, movies and other entertainment</td>
<td>46</td>
</tr>
<tr>
<td>To share my photos or videos with family and friends</td>
<td>41</td>
</tr>
<tr>
<td>My child(ren) wanted Internet access</td>
<td>41</td>
</tr>
<tr>
<td>My child(ren) needed it for school</td>
<td>35</td>
</tr>
<tr>
<td>I needed it for school</td>
<td>27</td>
</tr>
<tr>
<td>An Internet provider made a special offer too good to pass up</td>
<td>21</td>
</tr>
<tr>
<td>My job required online access</td>
<td>20</td>
</tr>
</tbody>
</table>


Figure 31: Broadband Survey Users on Their Reasons for Getting Online (% among Internet users who have been online for 2 years or less) (Horrigan J. B., Broadband Adoption and Use in America, 2010, p. 19)

Digital Literacy Corps

The Internet Professional Association and Net Literacy both leverage and mobilize local youth to aid in computer and Internet instruction and the furthering of digital literacy. Enrolled students tend to have a higher level of digital literacy that can be utilized for teaching their peers as well as other members in their communities. Students may be the group that potentially has the most to gain through digital literacy volunteer programs. Many students are now well-versed in computer and Internet skills which have become a requirement for their researching and learning in the classroom. This base of support provides a win-win opportunity as the learning will be mutual inasmuch that students who teach computer and Internet skills will provide a valuable service in their community, learn the importance of giving back, and acquire important communication, teaching, and other job skills that could be used later in life, and the most digitally illiterate population will have a large number of knowledgeable volunteers to teach them. Additionally, peer-instruction, for student-on-student training, can break barriers and sometimes enable teaching in a way that is more effective than the traditional teacher to student classroom model. Also, peer-instruction allows for more relatable subject matter. (Hilding-

Net Literacy recommended that the FCC include a digital literacy corps as part of the National Broadband Plan. As proposed by Net Literacy, the digital literacy corps would consist of a group of individuals who are tech-savvy, promote digital literacy awareness, teach digital literacy skills, and provide the resources to become digitally included. The National Broadband Plan that was presented to Congress stated that “the federal government should launch a National Digital Literacy Program that creates a Digital Literacy Corps, increases the capacity of digital literacy partners and creates an Online Digital Literacy Portal” as Recommendation 9.3. (Kent, Reply Comments of Net Literacy Corporation, 2009)

This Corps, supported by the Federal Government, should encourage peer-to-peer training, mentoring models, and one-on-one teaching methods that have proven successful in both Hong Kong and Indianapolis. This Digital Literacy Corps is a win-win: as the Corps serves important underserved population groups, Digital Literacy Corps volunteers will also learn important skills for themselves. (Kent, Reply Comments of Net Literacy Corporation, 2009) (Federal Communications Commission, 2010, pp. 174-178, 188)

**How to Get People Online: the Six Most Important Next Steps to Increase Digital Literacy and Digital Inclusion in the United States**

It is important that we expedite enacting the Adoption and Utilization recommendations established in the National Broadband Plan. The 360-page National Broadband Plan document contains approximately 200 policy proposals for the FCC, Congress, and other agencies to implement over the next decade. Chapter 9, Adoption and Utilization, is an integral component of the plan and while all of the policy
proposals must be promptly and simultaneously addressed for the adoption and utilization issues to be enacted, this recommendation focuses solely on Chapter 9 of the National Broadband Plan. (Federal Communications Commission, 2010, pp. 165-190)

1. Create a Special Advisor to the President (Effectively, a National Broadband Czar)

The National Broadband Plan requires a champion that can help coordinate execution between the FCC, Congress, and the other agencies. Currently, the National Broadband Plan has no single leader to help coordinate and negotiate the plan through the normal partisanship that is part of the American political system and reflective of the conflicting priorities and objectives of the wide range of industries, companies, and special interests groups that this undertaking affects. When urgent and bold national initiatives are undertaken that require focus and coordination between Congress and various agencies, the President has often appointed special advisors so that a single entity, focus, and priority can be assigned. Beginning in 1933, President Franklin Roosevelt appointed 11 “czars,” or individuals, some not requiring Congressional approval, to take leadership over an initiative. Subsequently, every American President has appointed “czars.” President Bush had 32 individuals with “czar” titles and since 1939, President Obama has appointed 39. If there is an initiative that requires coordination and is of important national consequence, Presidents have used “czars” to provide programs an important focus during the last 75 years. It is recommended that a special advisor to the President be created to facilitate the legislative and execution process. (FactCheck.org, 2010) (Federal Communications Commission, 2010, pp. 165-190)

2. A Digital Inclusion Cost/Benefit Analysis Should be Conducted to Maximize Taxpayer ROI

Broadband adoption is naturally increasing, but the Government Accountability Office or a similar nonpartisan government entity should conduct a cost/benefit projection to estimate a taxpayer return on investment for all components of the proposal.
America’s current deficit is unsustainable, according to current Treasury Secretary Timothy F. Geithner, but taxpayer investments in broadband may be able to be made that will ultimately reduce the deficit. As an example, the electronic filing of personal income taxes was enacted to increase government efficiency and reduce government processing costs. Digital inclusion and digital literacy initiatives that cost effectively maximize the numbers of individuals that enjoy the benefits of broadband while will increase national security and competitiveness in the global economy. Software companies, such as SAP, provide ROI applications that analyze public programs. The President, Congress, and the American public are becoming increasingly concerned about the long-term effect of our current and projected Federal fiscal deficit. However, some government expenditures have been analyzed and generally accepted as prudent investments of government tax monies, such as the NASA program. While it may be difficult to precisely quantify every aspect of broadband adoption, this type of analysis and vetting will help provide bipartisan support, public support, and be fiscally healthy for the country. (NASA, 2010) (Zumbrun, 2010) (SAP, 2010)

3. The FCC should continue its public outreach strategy

The FCC should continue its strategy of public outreach used to formulate the National Broadband Plan by engaging the public in its execution through the establishment of a broadband adoption and use working and/or advisory groups.

To date, the FCC’s implementation of the National Broadband Plan has effectively engaged the public via continuing their use of Requests for Information (RFI). While this was one of the important components of engaging the public and obtaining their feedback to help vet the strategies and tactics of the National Broadband Plan’s formation, increased ongoing substantive support representing the diverse public interests are necessary now that most of the authors of the National Broadband Plan have completed their engagement, left the FCC, and returned to the private sector. Since many of the architects of the
National Broadband Plan represented a broad coalition of subject matter experts, the FCC has fewer resources available on staff now that the important execution phase of all recommendations has commenced, including those that focus on broadband adoption and use. There is a well-established precedence of engaging subject matter experts to serve on advisory committees with the purpose of providing input to public officials, including an Internet Policy Working Group that was established by former FCC Chairman Powell, the FCC/NARUC/NASUCA Working Group on Lifeline and Link-Up and the Universal Service Working Group established by current FCC Chairman Genachowski. In fact, Recommendation 9.8 in the National Broadband Plan’s Adoption and Use chapter recommends a Broadband Accessibility Working Group to maximize broadband adoption by people with disabilities. These working groups should be expanded, as may be reasonable. Recommendation 9.9 proposes an Accessibility and Information Forum. While forums are useful to the extent that they expand the public dialogue, increase the public’s knowledge of the plan, and provide additional input to the FCC and others working to execute the National Broadband Plan, they provide snapshots of information and lack the continuity of a working group. It is recommended that the working adoption and use working groups be project based and terminate once the task is completed, but one or more broadband adoption and use standing working group be established to provide input on a more macro, high level basis, and continuing basis. (Federal Communications Commission, 2005) (Federal Communications Commission, 2006) (Engebretson, 2010) (Federal Communications Commission, 2010) (Federal Communications Commission, 2010, pp. 165-190)

4. Review of International Digital Literacy and Digital Inclusion Programs and International Broadband Plans

Chapter 9, the National Broadband Plan’s Adoption and Use section, contained 165 endnotes. Only one endnote, submitted by Net Literacy, referenced the broadband adoption and use works performed by
an organization outside of the United States (see Endnote 80 that referenced the European Union’s Commission on Digital Inclusion). Subsequent to Net Literacy’s filing and the release of the National Broadband Plan, Net Literacy has visited Hong Kong and South Africa and has met with subject matter experts from Australia, the United Kingdom, South Africa, and India to discuss digital inclusion and broadband adoption. Net Literacy has also reviewed other national broadband plans and reviewed in detail, the broadband and adoption surveys and good practices in Hong Kong. Some of these good practices are applicable to or can be modified to meet America’s broadband adoption and digital inclusion requirements, in Net Literacy’s opinion. To help facilitate the inclusion of international best practices by America and for the international community, Net Literacy launched a Digital Literacy “best practices” beta website. The website was endorsed by International Internet Industry Alliance (IIIA), which also includes the Internet Industry Association of Singapore, the African Internet Industry Association (AfriISPA), and the European Internet Service Providers Association (EuroISPA). Net Literacy was invited to join the IIIA as the first member whose organization focus was on digital inclusion and digital literacy. While the beta version of the site is at www.digitalliteracy.org, a production version with enhanced functionality and look and feel will be launched shortly. Consequently, all nations can learn about digital literacy and digital inclusion by reviewing the good practices of other programs. (Federal Communications Commission, 2010, pp. 165-190) (Net Literacy, 2010) (Hilding-Hamann, Nielsen, & Pedersen, Supporting Digital Literacy: Public Policies and Stakeholders’ Initiatives, Topic Report 2, 2009) (International Internet Industry Alliance, 2010) (Internet Industry Association of Singapore (IIAS), 2010) (AfriISPA, 2010) (EuroISPA, 2010) (Net Literacy, 2010)

5. The Recommendations should be prioritized, have an ROI, and a completion timetable

The recommendations in the Adoption and Use Chapter should be prioritized, costs and benefits projected and quantified with an ROI, and a timetable established for their review and execution that
incorporates the other components of the National Broadband Plan. This recommendation is contingent upon and incorporates components of 1. Create a Special Advisor to the President (Effectively, a National Broadband Czar), 2. A Digital Inclusion Cost/Benefit Analysis Should be Conducted to Maximize Taxpayer ROI, 3. The FCC should continue its public outreach strategy, and 4. Review of International Digital Literacy and Digital Inclusion Programs and International Broadband Plans, and while this recommendation is limited to the Adoption and Use chapter, a similar organization may be appropriate to help prioritize and execute recommendations in other chapters. Most significantly, a project management plan (e.g., Program Evaluation Review Techniques (PERT), the Critical Path Method (CPM), or another project management planning tool) should be used to determine the critical path items that should be considered when implementing and executing the plan. Costs of implementing the entire National Broadband Plan range from $20 billion to $350 billion – and the enormous spread of these estimates together with the magnitude of costs require the quantification of costs and prioritization of components of the plan as recommended in this section. Unless quantitative analysis is completed, America will continue to spend money on a project without an understanding of its total cost and unable to estimate a ROI on taxpayer dollar investments. (Federal Communications Commission, 2010, pp. 165-190) (Paul, 2010) (Wuorio, 2010)

Compounding the challenge of estimating the costs of merely extending broadband to those households without service are additional complex technology and broadband capacity impactful questions. A study conducted by the State of Wyoming indicated that the per customer mean upfront capital costs to serve the average household ranged on a terrestrial basis ranged from a high of $18,932 (cable) to $4,570 (telco) to $1,324 (fixed wireless). However, some technologies, such as fixed wireless, have more significant bandwidth constraints and the price projections cited do not include upgrading wireless to meet the FCC minimum bandwidth standards stated in the National Broadband Plan (a goal of

6. Funding Broadband Adoption and Use as a component of the National Broadband Plan. Once the aforementioned five recommendations have been addressed or are being implemented, the issue of funding sources, cost of implementation, and prioritization of implementation should be addressed. Digital inclusion is a national problem and the National Broadband Plan was written to address broadband adoption and use from a national perspective and basis. From a funding perspective, incremental programs that address the national digital literacy challenge must be funded on a national basis since generally, nonprofits, businesses, local government, and state government does not have the incremental resources necessary to effectively address this issue in a consistent manner across the country. The American Recovery and Reinvestment Act has already set aside $7.2 billion for nationwide broadband deployment, and current estimates put the total cost of the FCC's nationwide broadband plan between $20 and $350 billion -- an enormous spread. (Paul, 2010)

While there are hundreds of nonprofits and other organizations whose mission includes increasing digital inclusion and digital literacy, most are local and community based organizations. Thousands of other nonprofits have missions that are more effectively accomplished when their members are digitally literate, but many nonprofits do not have the resources or the capacity to accept additional projects. Most business’ interest in digital inclusion is indirect: a digitally literate workforce is often required to provide a competitive product, but the hiring process often ensures only qualified applicants are accepted. Some businesses have an excellent track record giving back to the communities they serve, but increasing digital inclusion and digital literacy are only one of many worthy initiatives where needs significantly exceed requirements. Generally, local and state governments are experiencing increasing
fiscal pressures as a result of declining tax revenues. Often times, municipalities most impacted by budgetary shortfalls are where the digital divide is the greatest and as a result have limited resources to address these issues. Consequently, the funding to execute the adoption and use recommendations must come from the Federal Government. Funding resources are required at the national, state, and local levels. (Gopal, 2009) (National Public Radio, 2000) (Federal Communications Commission, 2010, pp. 165-190) (McClure, 2009) (Kent & McClure, Digital Inclusion: Bringing the Rest of America Online With Broadband, 2009) (Paul, 2010)

(a) National Funding With National Implementation.

Since increasing adoption, use, digital inclusion, and digital literacy are national problems, some issues can most effectively be addressed on a national basis, despite the budgetary and fiscal constraints being experienced at the national level. Increasing awareness of broadband’s value proposition should be approached from both a national “top down” (as well as a local “bottom up”) campaign, as discussed in Net Literacy’s Request for Information filing. (Government Accountability Office, 2010) (Kent, Reply Comments of Net Literacy Corporation, 2009)

As an example, targeted media information or PSAs can reinforce the value proposition of broadband and overcome the objections to broadband by populations groups with low broadband penetration. A Net Literacy Safe Connects program hosted on the Indianapolis Public School’s website in December 2010 has received significant state acclaim. Comcast Cable and Bright House Networks, Indiana’s two largest cable operators, have agreed to carry the 30 minute Internet safety video on their “local on demand” service on cable systems throughout Indiana. In accordance with Indiana General Assembly House Resolution 095 which encourages Public, Education, and Government (PEG) Channels to carry Safe Connects programming, these cable operators that serve over 80% of Indiana’s cable customers will coordinate carriage of this programming on the PEG Channels in their franchise footprint. As depicted in
Figure 8: Main Reasons Nonusers Do Not Use the Internet (by Percentage), Internet safety is the primary reason that 12% of Americans do not subscribe to broadband. Through mass media programs such as this but on a national basis, adoption objections can be overcome and the Internet can become a safer place for existing broadband customers. Net Literacy and Indiana is the only state where such an initiative exists, and an Internet safety awareness campaign would be most effectively coordinated throughout the country on a national rather than a state or local basis. (Indiana General Assembly, 2009) (IPS Tube, 2010) (Net Literacy, 2010)

Examples of other programs that increase broadband adoption and use require national implementation and coordination include the recommended national digital literacy website or defining the universal broadband service offering, recommend in the Plan. The national digital literacy site will have national, state, and local contributors, but it will be most efficient a single national single source best practices website is maintained. (Federal Communications Commission, 2010, pp. 165-190)

Another example is the universal broadband service recommend in the National Broadband Plan. When determining the pricing of the service, qualifications necessary to receive the service, and establishing other criteria, those individuals in population groups with low broadband adoption groups should be treated fairly, consistently, and on a basis that consider adoption and use as a national rather than state or local challenge. (Federal Communications Commission, 2010, pp. 165-190)

(b) National Funding With State Implementation.

$7.2 billion of the $787 billion in the economic stimulus package was allocated to broadband, included adoption programs but primarily focused on middle mile, plant, and wireless construction. As an example, the Broadband Technology Opportunity Program (BTOP) awarded on a national basis, the programs were vetted and prioritized by committees established in each
part of the national vetting and prioritization process. Since states have a more detailed and different perspective of their needs compared to the federal government, they were included as component of the qualification and prioritization process. States can most effectively help resources to communities since their perspective is more local and more detailed when federal government. While some states may prefer to have more control over the funding their state, it is my recommendation that states’ primarily responsibility be to help coordinate manage digital inclusion and digital literacy efforts within the state in accordance with the Broadband Plan and based upon the priorities resulting from execution of the suggestions in the above, 5. The Recommendations should be prioritized, have an ROI, and a completion timetable States should also be responsible for overseeing the effective execution of the local implementations. Most states do not have the financial strength to assume additional funding mandates, so it is recommended that Federal dollars be used for implementation and states be allowed to contribute additional monies if their situation permits. (Amadeo, 2010) (National Telecommunications and Information Administration, 2010) (Paul, 2010) (McNichol, Oliff, & Johnson, 2010)

(c) National Funding With Local Implementation.

Net Literacy has argued that digital inclusion and digital literacy can be most effectively executed on a local and street-by-street basis in its filings with the FCC. The three most resource intensive components of digital literacy are purchasing computer hardware, paying reoccurring broadband connectivity service fees and providing digital inclusion and digital literacy training. One challenge is that publically available cost estimates do not exist. Consequently and for the purpose of this thesis, assumptions were made and costs were estimated to create the basis of a local cost hypothesis necessary to increase digital inclusion and digital literacy at the local level regarding hardware, training,
and broadband costs.⁵ (Kent & McClure, Digital Inclusion: Bringing the Rest of America Online With Broadband, 2009) (Kent, Reply Comments of Net Literacy Corporation, 2009)

**Estimating Costs**

While the National Broadband Plan’s implementation cost has been estimated, costs estimate to execute the digital inclusion and digital literacy component has either not been calculated or the information has not been made publically available. Cost is an important component of assessing the ROI of the National Broadband Plan, and with limited information, I believe it to be a useful exercise to gain an appreciation of the order of magnitude of the digital inclusions component. Until completing this estimate, I did not know if it would cost $1 billion or $10 billion to complete this component. It should be noted that in deriving this cost estimate, I used the digital literacy corps model proposed in the National Broadband Plan and the cost estimates are designed only to provide the readers a sense of what the cost could be based upon two sets of assumptions. The four sections below are (i) assumptions used to estimate the financial order of magnitude using two digital inclusion scenarios, (ii) purchasing computer hardware, (iii) paying reoccurring broadband connectivity service fees and (iv) providing digital inclusion and digital literacy training. (Federal Communications Commission, 2010, pp. 165-190)

A December 2008 Nielsen study estimated that 19.4% of American households did not have a computer at home. A 2009 Child Trends Data Bank study found that 90% of all children have computers at home.⁶

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⁵ Please note that these are estimates based upon Net Literacy experience and the use of data and analysis that are footnoted. Testing the assumptions is outside the scope of this thesis, but this exercise was necessary to gain an appreciation of the order of magnitude of digital literacy and digital inclusion costs.
The “s-curve” analysis in this paper (Other Examples of Technology Adoption) suggests that no technology product will receive 100% penetration, just as Pew research approximates that 2% of all American households do not have any form of fixed or wireless telephone service in their home (2.3 million households and as of 2010). As previously discussed in this paper (Other Examples of Technology Adoption), 10% of all American households do not subscribe to a multichannel video provider (11.5 million households). (Nielsen Company, 2008) (Pew Research Center for the People & the Press, 2010) (Child Trends Databank, 2010)

**1) Assumptions Used to Estimate the Financial Order of Magnitude Using Two Digital Inclusion Scenarios**

For the purposes of estimating the number of individuals requiring digital literacy training and the associated costs, it was assumed that 18% of all 115 million American households do not have a computer at home in 2010, 5%\(^7\) of all households would not be interested in a home computer under any circumstances, and 21% of the 13% of households do not subscribe to broadband because of costs

\[\] 6 Note: this has not been Net Literacy’s experience working with the Indianapolis Public School system (87% on free or reduced lunch programs) and where surveys at five elementary schools indicate that 32% of families have a working computer at home – consequently, local variations in demand may be significant.

\[\] 7 Research is required to project the requirements and an estimate and assumptions were used since no publically available data exists. The 5% estimate used to quantify computer costs was derived analyzing information regarding the 2% and 10% of households that do not subscribe to telephone or a multichannel service provider, respectively. 19.6% of households did not have a computer in 2008 and it is estimated that this number is 18% in 2010. (Pew Research Center for the People & the Press, 2010)
(see Figure 6: Main reasons for not using the Internet), then approximately 3,139,000 households would require computers if, hypothetically, the National Broadband Plan were executed so that this group would receive computer hardware to overcome their cost objection. Please note the inaccuracies inherent in this overly simplistic analysis, and the purpose of the calculation is to merely estimate an order of magnitude for the cost implementing of this component of the National Broadband Plan. (U.S. Census Bureau, 1996)

(II) Assumptions Used to Estimate the Purchasing of Computer Hardware

Estimating that the average cost of a computer would be $250\(^8\) (a personal computer with 2 gigabytes of RAM and a 250 gigabytes of storage, an office and antivirus application and an extended four year hardware warranty and a four year call center support contract) reflecting a reduced cost because of efficiencies likely in the bulk purchase of this magnitude of computers, it would cost $785 million to purchase a computer for 3,139,000 households. This excludes costs required by special accommodations and hardware required for some population groups, such as the blind or those that are unable to use a keyboard. Computers are typically amortized over a three to four year period and for purposes of calculating a reoccurring cost, the net present value of future computer costs should be included in the calculation, but this is beyond the scope of this simple cost estimate.

At $25 per month for a limited universal service, the 3,139,000 households would require $942 million in funding per year to pay for a form of universal broadband service. While it is expected that some of

\(^8\) The $250 estimate is based upon discussions with the Indianapolis Public Schools that purchased 12,000 computers for their students in a competitive bidding process, and then further discounted because of the increased order of magnitude of this computer order. Information was provided to Net Literacy in confidence.
these reimbursements would be reduced or phased out over time, the $942 million is the funding that
would be required to provide a limited universal broadband service for purposes of this scoping cost
estimate. It was assumed that installation and any required consumer premise equipment would be
donated by the broadband provider in consideration for these incremental customers being charged on
a bulk billing. While the actual monthly subscription cost would gradually decrease as non-adopters
were trained to be digitally literate and were converted to paying all or a portion of their broadband
costs, for purposes of establishing a running data point, the full cost was assumed in the estimate below.

The $25 monthly cost of broadband was estimated as follows: it is difficult to determine the
government’s cost of providing broadband service to 3,139,000 households since existing costs are
impacted by technology, the amount of competition in a market area, discounts associated with
packaging or bundling with other products offered by the provider, and sales promotions. Also, I
expected that broadband costs will increase as broadband providers significantly increase the
bandwidth provided to consumers to comply with the standards described in the National Broadband
Plan. The actual cost of providing broadband to 3,139,000 users in 50 states using a variety of
technologies will calculated once an RFP process is completed. Also, the accounts on these universal
service customers may be flagged to ensure that they receive a defined and enhanced level of customer
service. Consequently, the $25 per month is my best reasonable estimate given the many variables that
have not yet been finalized. (Federal Communications Commission, 2010)

(III) Assumptions Used to Estimate the Reoccurring Broadband Connectivity Service Fees

The most difficult cost to estimate is the cost of teaching these population groups computer, Internet,
and Internet safety skills, together with identifying their own personal value proposition so that they are
not only digitally included, they are digitally literate. Costs range significantly depending upon
assumptions. In Net Literacy’s model, a Digital Literacy Corps of student volunteers provide the service
at no cost and as a community service. The National Broadband Plan cites Net Literacy’s Digital Literacy Corps as an example, but it leaves open if the program would be based on another model such as AmeriCorps or another public service model. Also, there are other models that should be considered and may be more appropriate for working with selected population groups with low broadband penetration. (Federal Communications Commission, 2010, pp. 165-190) (Kent & McClure, Digital Inclusion: Bringing the Rest of America Online With Broadband, 2009)

At the low cost end of the spectrum is an enhanced version of the Net Literacy model. It would be comprised of a national Digital Literacy Corps that utilizes the 30 million high school and college students (many of which have school district mandated community service requirements). Some funding would be required to teach and recognize nonprofit adult volunteers that helped coordinate the program, and it is contemplated that there would be a level of paid administrators so that the program is effectively coordinated on a national basis and within local communities. Net Literacy’s existing model partners with local nonprofits that have members that are included in population groups with low broadband penetration and is all volunteer, but this may not be quickly scalable on a national basis. (Net Literacy, 2010)

While 3,139,000 households require a computer and broadband and the average home has 2.53 occupants, determining who requires digital literacy training is far more complex and nuanced than a simple mathematical equation. As an example, some individuals in homes that have a computer and broadband access are not digital literate. Other individuals in households without a computer and broadband at home are digitally literate and use computers at libraries, work, or the homes or friends or family to access the Internet. Also, every year, the number of individuals that are digitally literate continue to increase, even without a national coordinated digital literacy initiative. Part of the increase in broadband penetration is a result of senior citizens passing due to old age (a population group with
low broadband adoption) and being replaced by digital natives (that are a population group with high broadband adoption rates). Net Literacy has proposed in its second FCC filing that additional research is required to better understand and effectively target the digitally excluded. But the digital literacy corps program will accelerate digital inclusion conversion and also help increase the skills of those that are only partly digitally literate. Net Literacy believes that there is an opportunity cost for individuals that are not digitally literate – and consequently, facilitating digital inclusion is a necessary and important national initiative. The major advantage of a concerted effort to increase digital inclusion and digital literacy is that this initiative will increase the speed of conversions to digital literate and digitally included individuals (Kent, Reply Comments of Net Literacy Corporation, 2009) (Net Literacy Alliance, 2010) (Kent & McClure, Digital Inclusion: Bringing the Rest of America Online With Broadband, 2009)

Net Literacy has also identified a social component to creating a broadband value proposition, and as more individuals come online, social pressure is increased for non-adopters to become digitally literate. This also will serve as a catalyst to naturally increase broadband adoption. (Kent & McClure, Digital Inclusion: Bringing the Rest of America Online With Broadband, 2009) (Kent, Reply Comments of Net Literacy Corporation, 2009)

Also, some individuals in population groups with low broadband penetration will need additional accommodations, such as the illiterate, the disabled, or even those that speak English as a Second Language (ENL) and will require additional assistance to understand how digital inclusion can empower them in the context of American society. (Kent, Reply Comments of Net Literacy Corporation, 2009)

(IV) Assumptions Used to Estimate the Costs of Providing Digital Inclusion and Digital Literacy Training

For purposes of this exercise of scoping potential costs of local digital inclusion and digital literacy efforts, I assumed that 8 million Americans require either computer or computer and Internet training
and the objective is to train 8 million Americans in four years (or 2 million per year). The 8 million estimated was derived by assuming that one person in the 3,139,000 households would require training (3.1 million), one person in 3% of America’s remaining 112 million households would require training (3.4 million), and approximately 25% of the households that do not have access to broadband will require training once broadband becomes available (1.5 million). The National Broadband Plan estimates that approximately 4% of America’s households do not have access to broadband (5.7 million households). (Federal Communications Commission, 2010, pp. 165-190)

*Digital Inclusion Program Scenarios:*

**Scenario One**

An enhanced Net Literacy digital literacy corps student volunteer model working through existing nonprofits and schools coordinate by teachers and a paid staff.

- **Team** – 250,000 high school and college student volunteers receiving an average of $100 in pizza and $100 gift cards = $50 million/year
- **Leadership** – 8,333 teacher or nonprofit “volunteers” receiving an average of $1000 in expenses, gift cards, and recognition = $8.3 million/year
- **Leadership paid** 1,000 individuals earning $40,000 per year = $40 million/year
- **Number of individuals trained per student volunteer**: 8 digitally excluded individuals trained per student team member per year (excludes leadership)
- **Total costs** are $98 million/year or $49/person trained (note: excludes supplies, transportation, training materials, and other expenses), and an estimate for these is included in the calculations below.
Scenario Two

A Digital Literacy Corps compensated of a size similar to AmeriCorps and compensated on the same basis as AmeriCorps employees working through existing nonprofits and schools coordinated by a paid staff.

- Team - 43,000 individuals earning $15,000 per year (salary and education award) = $645 million/year
- Leadership – 4,000 individuals earning $40,000 per year = $160 million/year
- Number of individuals trained per team member: 46 digitally excluded individuals trained per team member per year (excludes leadership)
- Total costs are $805 million/year or $402 in costs per person trained
- Cost per individual trained = $402/person trained (note: excludes supplies, transportation, training materials, and other expenses) and an estimate for these is included in the calculations below.

(Northern Arizona University, 2010)

Digital Inclusion and Digital Literacy Costs for Training 8 Million Americans:

- $784 million – computer hardware costs ($196 million per year) assuming no net present value for future computer hardware costs or the incremental costs necessary for those individuals with disabilities.
- $942 million – universal broadband service costs on an annual basis once all targeted households are online (cost estimates below project 25% in year one, 50% in year two, 75% in year three, and 100% in year for of the annual $942 million to be incurred).
- $98 million to $805 million per year for training costs, limiting the cost estimates to the two digital literacy corps cost scenarios.
• $200 million in training materials, transportation costs, and other associated costs per year since insufficient information exists to accurately calculate the expenses

• Based upon these assumptions, the four year costs to provide equipment, broadband, and digital literacy training range from $4.3 billion to $7.1 billion (or from $538 to $888 per American trained and broadband enabled).

It should be noted that Net Literacy’s digital literacy corps model contemplates utilizing computer labs in schools and public labs in nonprofits. At Net Literacy, costs to build or expand computer labs at schools, community centers, churches, and other nonprofits have been modest. Since Net Literacy receives its computers as donations and enjoys licensing discounts from Microsoft, using student volunteers, Net Literacy has provided approximately 11,000 computers within the central Indiana area during the last three years at an average cost of $12.60. This includes transportation, refurbishing, warehouse, facility, licensing, and pizza costs. (Net Literacy, 2010)

In early 2010, Honorary Board Member Lt. Governor Becky Skillman asked Net Literacy to begin a program that focused computer donations in more rural areas of the state. The program commenced in March and working with the Indiana Association of United Ways, 525 computers have been donated to 17 United Ways serving 18 counties and providing computers to build or expand computer labs in 95 agencies. An additional 145 computers are ready for a January 2011 delivery that will provide computers to two additional United Ways serving five Indiana counties. Because Net Literacy uses a Department of Transportation approved moving company to deliver the computers and conducts additional quality assurance programs on these computers, costs are higher and average approximately $27.00 per delivered computer. In 2010, the 95 United Way agencies served over 28,000 Hoosiers, and consequently, the costs to equip nonprofits is relatively modest. It has been Net Literacy’s experience that nonprofits that do not have a computer lab are willing to purchase the wireless local area
networking equipment and broadband to receive the donated equipment, with no only one agency (a preschool) rejecting the broadband connection requirement, which Net Literacy waived. Consequently, partnering with nonprofits is inexpensive and since it supports the nonprofits’ missions, they are an efficient and effective training location to help teach digital literacy. (Net Literacy Alliance, 2010) (Net Literacy, 2010)

In conclusion, if non adopters that are digitally illiterate and digitally excluded can receive training, a computer, and broadband for less than $1,000 per person, how much is that worth the digitally literate consumer? From the consumer’s perspective, the Internet Innovation Alliance estimated that the average person saves $7,707 when shopping online (with entertainment, travel, housing, food, and apparel accounting for the majority of the savings). The amount saved by a consumer would depend upon their disposable income and purchasing habits, but an argument can be made that those individuals that shop or use the Internet to search when making purchasing decisions do save some amount of money if they have access to an online service. A consumer’s individual ROI may become part of each individual’s value proposition, and this calculation may help provide our national leadership with the ROI calculation outlined in 5. The Recommendations should be prioritized, have an ROI, and a completion timetable

(Internet Innovation Alliance, 2010)
Conclusion

“Digital empowerment refers to the ability to use the wealth of resources in computing and the Internet to learn, communicate, innovate, and enhance wealth—to move from being a digital novice to a digital professional or innovator. An effective Digital Inclusion Strategy provides a path to full participation in Digital Society... People also have to understand that the Digital Economy is moving forward and that digital literacy and access is your ticket.” –Karen Archer Perry, Founder and Principal Consultant, Karacomm (Microsoft Corporation, 2007, pp. 3-10)

While much digital inclusion and digital literacy work has been accomplished by organizations including the Hong Kong Professional Internet Association, the Hong Kong Internet Provider Service Organization, and Net Literacy, much work remains. Millions of individuals on the wrong side of the digital divide are missing out on the richness and promise that access to broadband provides. Digital inclusion and digital literacy leverage technology so that many of the underserved are able to breakout out of a cycle of poverty and gain digital social equity through this process.

Due to the rapidly changing nature of computers and the Internet and the ever changing adoption patterns of population groups, it is crucial that surveys be conducted to gauge the rate of adoption and identify target groups that have low broadband adoption rates so that resources can be appropriately allocated to most effectively increase digital inclusion and digital literacy. Only with robust and accurate data will digital literacy programs be able to effectively meet the needs of the communities across the world. Through the compilation of this paper, addition areas where metrics and statistics were lacking have appeared. For example, through subsequent conversations with the Hong Kong Internet Professional Association, it became apparent that women and men might have different patterns of adoption. This area has not been sufficiently studied and should be explored further. Quantitatively measuring the impact of digital literacy programs on individuals is one of the largest challenges
programs and governments face. Some aspects of digital literacy are difficult to assign a metric to, particularly digital literacy improvement.

Digital Literacy is constantly evolving; such rapid growth is a sign of its success. While the statistics published in this paper might soon be out-of-date; the tried-and-true methods and best practices outlined will continue to serve as models that are proven to be scalable and replicable throughout many communities.

While digital literacy and digital inclusion programs are expensive, the costs associated with digital exclusion are astronomical. It is a global economic and social equity that the target groups of individuals who need the most digital literacy training receive the resources that will enable them to become digital citizens. With digital literacy skills becoming a requisite condition to employability across an increasing number of occupations, failure to include these individuals will become more than just a disservice to future generations, it will become a crisis. Further, those on the wrong side of the digital divide will be increasingly excluded from the richness and resources that individuals, businesses, and governments are placing online. Digital inclusion creates digital social equity and digital literacy is the most efficiency way of impacting this social paradigm.
Post-Conclusion Findings

During my travels to Hong Kong, he had the opportunity to meet with members from Intel’s World Ahead Program. While not presented as a case study in this work, the program is significant and some of the findings are presented below:

Existing multi-national companies have the unique assets and leverage to increase digital literacy and inclusion. Many companies already have programs that provide resources to individuals in need. One such company that is a leading example is Intel Corporation’s Intel World Ahead Program.

“The Intel World Ahead Program aims to enhance lives by accelerating access to uncompromised technology for everyone, anywhere in the world. Focused on people in the world’s developing communities, it integrates and extends Intel’s efforts to advance progress in four areas: accessibility, connectivity, education and content.” (Intel Corporation)

Digital literacy and digital inclusion cannot be achieved without hardware - the physical computers – and developing infrastructures. The Intel World Ahead Program does this through a number of ways including donating computers and developing low-cost, full-featured for first-time computer users.

Although a prerequisite for access to the Internet, computers without connectivity do not allow individuals to tap into the global information source that is the Internet. Intel has worked to provide low-cost broadband Internet access across the world extending over number of different technologies to best meet the needs of the environment where users live. Intel has stressed that governments around the world recognize that broadband is becoming the “fourth utility” – alongside water, heating, and electricity. (Intel World Ahead, 2010) (Intel Corporation)
The Intel World Ahead Program recognizes that without proactive education, millions upon millions of individuals, and most importantly, youth, will lack “21st Century skills” that will allow them to be competitive in a global marketplace. Intel has trained over 5.5 million teachers in over 40 countries how best to utilize technology and in turn, teach other individuals in their communities how to use computers and the Internet. (Intel World Ahead, 2010, p. 7)

Lastly, to provide a value proposition for new adopters, Intel has worked with governments, NGOs, education and healthcare leaders, and local businesses to create customized content that is applicable for the communities. It is critical that these digital services be in language and cultural context (Intel Corporation)

Intel is in a unique position as a global market leader in technology that has resources to devote to digital inclusion and digital literacy efforts and has already leveraged these assets in a proactive, forward thinking manner. Similar companies across all industries should appreciate how Intel is making a difference and seek to replicate its successes for the benefit of their business and the future of our society.

Epilogue

DigitalLiteracy.org

The Hong Kong ISP Association, the Hong Kong Internet Professional Association, and Net Literacy all have programs that have developed innovative techniques for increasing digital literacy and promoting digital inclusion. The 2009 report published by the European Union Commission on Digital Inclusion noted that many of the 464 programs investigated tended to “re-invent the wheel.” This not only is financially expensive, it also costs a significant amount of time. (Hilding-Hamann, Nielsen, & Pedersen,
Much discussion at different conferences and summits over the course of the last fifteen years have called for a clearinghouse to share digital literacy and digital inclusion lessons learned and best practices. Also included in Recommendation 9.3 in the National Broadband plan was the establishment of an Online Digital Literacy Portal. Included in this would be a portion dedicated to free, age-appropriate digital-literacy content. As a part of this project and the increasing need for a comprehensive digital literacy website, Net Literacy has launched DigitalLiteracy.org – a clearinghouse of information that will benefit national and international organizations and governments seeking to improve digital literacy in their communities. Constructed during the research phase of the writing of this thesis, the Alpha 1.0 version of the site was launched on September 3, 2010, and has since provided over 350 best practice ideas and lessons from over a dozen partners, contributors, and supporters. The site is completely free and open to the wiki-management style pioneered by Net Literacy. When launched, the final site will ultimately contain thousands of digital inclusion best practices from around the world, translatable into 59 major languages. DigitalLiteracy.org will officially be launched in early 2011. (See Figure 32: DigitalLiteracy.org Screenshot and Figure 33: DigitalLiteracy.org Translation Feature Screenshot) (Federal Communications Commission, 2010, p. 177) (Net Literacy, 2010)

DigitalLiteracy.org has already begun to receive widespread international acceptance. Net Literacy presented its new Digital Literacy “best practices” website at South Africa’s iWeek Conference. The “best practices” website that focuses on digital inclusion and digital literacy was acclaimed by Internet Service Provider associations from India to South Africa; and they asked to become Digital Literacy “best practices” partners. Meanwhile in America, the Wireless Communications Association International and the Wireless Internet Service Providers Association joined a growing number of Digital Literacy partners
ranging from Intel to the US Internet Industry Association to Internet Industry Association, in Australia. Also, Net Literacy met with the International Internet Industry Alliance (I-Alliance) and the I-Alliance decided to include digital inclusion and digital literacy as one of their five top priorities for the sharing of information so that digital literacy and digital inclusion can be facilitated. Digital Literacy’s website shares international digital inclusion and digital literacy “best practices” and helps the I-Alliance achieve their goals. Net Literacy was honored by being invited to join the I-Alliance. The I-Alliance is comprised of ISP Association that represents over 200,000 Internet-related organizations in five continents. (iWeek 2010, 2010)

Figure 32: DigitalLiteracy.org Screenshot (Net Literacy, 2010)
Figure 33: DigitalLiteracy.org Translation Feature Screenshot (Net Literacy, 2010)
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