An Integrated Model of Community Technology:
An Asset-based Approach to Community-based Computer Learning Programs

Ming-Chun Lee

A dissertation
submitted in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy

University of Washington

2008

Program Authorized to Offer Degree:
Urban Design and Planning

University of Washington
Graduate School

This is to certify that I have examined this copy of a doctoral dissertation by

Ming-Chun Lee

and have found that it is complete and satisfactory in all respects,
and that any and all revisions required by the final
examining committee have been made.

Chair of the Supervisory Committee:

_____

Hilda J. Blanco

Reading Committee:

_____

Daniel B. Abramson

_____

Hilda J. Blanco

_____

Jeffrey Hou

Date: November 14, 2008

In presenting this dissertation in partial fulfillment of the requirements for the doctoral degree at the University of Washington, I agree that the Library shall make its copies freely available for inspection. I further agree that extensive copying of the dissertation is allowable only for scholarly purposes, consistent with “fair use” as prescribed in the U.S. Copyright Law. Requests for copying or reproduction of this dissertation may be referred to ProQuest Information and Learning, 300 North Zeeb Road, Ann Arbor, MI 48106-1346, 1-800-521-0600, to whom the author has granted “the right to reproduce and sell (a) copies of the manuscript in microform and/or (b) printed copies of the manuscript made from microform.”

Signature_____

Date_____

University of Washington

Abstract

An Integrated Model of Community Technology:
An Asset-based Approach to Community-based Computer Learning Programs

Ming-Chun Lee

Chair of the Supervisory Committee:
Professor Hilda J. Blanco
Department of Urban Design and Planning

This research investigates how city-sponsored community technology centers (CTCs) in a dense urban area operate and sustain their services. In this research, a working CTC is interpreted as both being able to continually provide computer access and training to underserved populations, as well as being sustainable, both institutionally and financially. This research also attempts to build a linkage between the community technology movement and the rich body of knowledge regarding asset-based community development.

Based on three major bodies of literature: 1) the digital divide, 2) CTC practice, and 3) asset-based community development, this research establishes a three-layered CTC operation model, which identifies 15 key factors relating to CTC operation and sustainability. The current research, by testing the applicability of this theoretical model, further characterizes these locally-led and community-based CTC initiatives in greater depth. The key concepts and methodologies emerging from the theoretical model together build the empirical framework for the current research, which in turn guides the qualitative analysis of the study. The primary research tools include: 1) semi-structured interviews, 2) surveys, and 3) document reviews and secondary sources.

The research findings emerge from examining five CTC projects in the City of Seattle. These findings confirm that the five study cases help empower individual learners by providing a supportive learning environment and offering useful and practical learning materials. The findings also show that the five programs maintain their functioning and

service capacities by building a strong foundation and securing three critical operating resources: 1) technological, 2) facility, and 3) personnel resources. The evidence also shows that these programs nurture community partnerships with other organizations and institutions as a means to leverage key operating resources from within the communities, which they serve. The research findings prove that the five programs take an asset-based approach to identifying resources already existing within their communities. They focus internally on community needs and relate their services to issues facing community members. They also employ relationship-driven strategies to maintain and strengthen partnerships with community members and other concerned parties, including issuing newsletters or other publications to keep members informed and fostering personal relationships among volunteers and support groups.

The empirical findings identify two additional factors and lead to a revision of the theoretical model. This re-conceptualization of the CTC practice helps clarify the actual working relations among all CTC operating factors identified in the theoretical model. The current research also offers policy recommendations for both public and non-profit sectors, which suggest more tangible forms of assistance from both city agencies and community-based organizations.

TABLE OF CONTENTS

Page

List of Figures v

List of Tables vi

Chapter 1 - Introduction 1

1-1. Information Society 2

1-2. The Digital Divide - Being Disconnected Means Being Disadvantaged 3

1-3. Community Technology 4

1-3-1. Community Technology Centers – CTCs 7

1-3-2. Models of CTCs 8

1-3-3. Brief History of CTCs 8

1-3-4. Public Investment in CTCs 9

1-4. Seattle Experience – The Technology Matching Fund 16

1-4-1. Digital Divide in Seattle 16

1-4-2. Seattle's Context for the Community Technology Movement 16

1-4-3. Brief History of Seattle's Community Technology Initiatives 17

1-4-4. Community Technology Planner 18

1-4-5. Technology Matching Fund 19

1-4-6. Neighborhood Matching Fund 20

1-4-7. TMF-sponsored Community Technology Projects 21

1-4-8. The impacts of TMF on CTCs 22

1-5. Structure of Seattle's Technology Matching Fund 22

1-5-1. Eligibility Requirements 22

1-5-2. Application Review Process 23

1-5-3. Application Scoring Criteria 24

1-6. Ideas behind Community Technology 25

1-6-1. Re-conceptualize the Digital Divide 25

1-6-2. Multifaceted Concept of Access 26

1-6-3. The Interconnection between Community Technology and Community Development – the Asset-based Approach 27

1-7. Research Questions 28
1-7-1. Assumptions and the Real-world Questions 28
1-7-2. Research Questions for the Current Study 30
1-7-3. Research Approach – Model Building and Testing 32
Chapter 2 - Review of Literature 33
2-1. The Digital Divide 33
2-1-1. Data, Studies, Reports on the Digital Divide 34
2-1-2. Debate about the Digital Divide 35
2-1-3. ICTs – Inter-operative Technologies 37
2-1-4. From Digital Divide to Digital Inequality 38
2-1-5. Conceptualizing the Digital Divide 39
2-2. Access – Closing the Digital Divide 41
2-2-1. Multi-faceted Meanings of Access 42
2-3. Synthesis – A Comprehensive Model for Understanding the Digital Divide 45
2-3-1. Individual Focused – Individual Empowerment 46
2-3-2. Summary of Studies 46
2-3-3. A Synthesized Model of the Digital Divide 50
2-4. Community Technology 53
2-4-1. Bridging the Digital Divide with CTCs 54
2-4-2. Strategies for Running a CTC 58
2-4-3. Operating Model of CTC – Digital Divide Model Expansion 62
2-4-4. Summary of Studies 65
2-5. CTC – An Essential Community Infrastructure 68
2-5-1. Theories of Community - Place-based vs. Interest-based 69
2-5-2. Leveraging Available Resources from a Community 71
2-5-3. Community development 71
2-5-4. Asset-Based Community Development 73
2-5-5. Asset-Based Community Development and Community Technology 74
2-5-6. An Asset-based Model of CTC 76
Chapter 3 - Research Design 79

3-1. Theoretical Framework 79
3-1-1. Research Criteria & Indicators 81
3-2. Empirical Framework 84
3-2-1. Research Questions 84
3-2-2. Research Methodology 84
3-2-3. Research Locale: Seattle's Technology Matching Fund 86
3-2-4. Case Selection 87
3-2-5. Data Collection 88
3-2-6. Surveys 89
3-2-7. Interviews 90
3-2-8. Data Analysis 92
3-2-9. Coding 92
Chapter 4 - Data Analysis and Research Findings 95
4-1. Narrative Descriptions of the Cases 96
4-1-1. Youth Media Institute (YMI) 102
4-1-2. Special Technology Access Resource (STAR) Center 107
4-1-3. Literacy Source 111
4-1-4. East African Community Services (EACS) 117
4-1-5. RecTech Coalition 123
4-2. Cross-case Analysis 129
4-2-1. Findings regarding Individual Empowerment 130
4-2-1-1. Technology Resources 131
4-2-1-2. Knowledge Resources 132
4-2-1-3. Content Resources 134
4-2-1-4. Social Resources 138
4-2-1-5. Psychological Resources 140
4-2-2. Findings regarding CTC Sustainability 143
4-2-2-1. Technological Resources 144
4-2-2-2. Facility Resources 145
4-2-2-3. Personnel Resources 146
4-2-2-4. Funding Resources 149

4-2-2-5. Social/cultural Resources 152
4-2-2-6. Institutional Resources 154
4-2-3. Findings regarding Community Partnerships 158
4-2-3-1. Asset-based Approach 159
4-2-3-2. Internally Focused 162
4-2-3-3. Relationship Driven 164
4-2-3-4. External Connection 165
4-3. The Role of Seattle Community Technology Program 166
4-4. Summary 171
Chapter 5 - Discussion and Implications 175
5-1. Recapitulation of the Research Findings 176
5-2. Model Revisited 178
5-2-1. Digital Divide & ICT Access 179
5-2-2. CTC Practice 181
5-2-3. Asset-based Community Development 182
5-3. New Factors 183
5-4. Model Revision 185
5-5. Future Research 189
5-6. Policy 192
5-6-1. At the City Level 193
5-6-2. At the CTC Level 196
Bibliography 200
Appendix A. An Annotated Literature Review on the Digital-Divide Studies 217
Appendix B. An Annotated Literature Review of ICT-Access Studies 220
Apendix C. Survey Questionnaires 225
Apendix D. Interview Protocal 237

LIST OF FIGURES

Figure Number Page
Figure 2-1. Model for closing the Digital Divide 52
Figure 2-2. ICT – the Gateway to the Information Society 53
Figure 2-3. Resource-based Model of CTC 68
Figure 2-4. Community-based Model of CTC 78
Figure 2-5. Asset-based Model of CTC 78
Figure 4-1. The locations of the selected CTCs 98
Figure 4-2. Media Lab and Video Recording Studio in the Youngstown Cultural Arts Center 104
Figure 4-3. STAR Center Computer lab in Center Park 109
Figure 4-4. Computer skills workshop and adult basic education class in Literacy Source 115
Figure 4-5. EACS computer lab in the New Holly Neighborhood Campus 120
Figure 4-6. RecTech CTC at the Garfield Community Center 126
Figure 5-1. Revised Model of CTC 187

LIST OF TABLES

Table Number Page
Table 1-1. Examples of three approaches to local community technology initiatives..... 12
Table 1-2. TMF 2008 grant cycle review process..... 23
Table 1-3. TMF application scoring criteria 24
Table 2-1. A summary of all the digital-divide models found in six articles 48
Table 2-2. A summary of all the access models found in nine articles 49
Table 2-3. Resources needed for running a CTC 65
Table 3-1. Factors derived from the theoretical framework 83
Table 3-2. Operationalization of concepts as empirically observable factors and as workable questions..... 91
Table 3-3. Operationalization of concepts for the interview..... 92
Table 3-4. Basic Coding Dictionary..... 93
Table 4-1. Brief descriptions of five cases..... 99
Table 4-2. Socio-economic indicators of neighborhoods 101
Table 4-3. Asset sources in communities..... 162

ACKNOWLEDGEMENTS

Deepest thanks to all those who have taught and helped and encouraged me:

My mentor and the chairperson of my supervisory committee, Dr. Hilda Blanco, for her guidance and endless support throughout my stay at UW planning doctoral program.

My committee members, Dr. Daniel Abramson and Dr. Jeffrey Hou, for their assistance and professional guidance on dissertation writing.

The hardworking staff of UW Department of Urban Design and Planning, Jan Brooks, Sue Letsinger, and Dorothy Sjaastad, for their help with teaching and research assistantships over the past five years, which afforded me needed financial sources for the duration of my doctoral work.

The volunteers, community workers, and managers in the five selected community technology centers, for their gracious sharing of their creative experiences for this study.

The manager of Seattle Community Technology Program, David Keyes, and the manager of Seattle Technology Matching Fund, Delia Burke, for their generous assistance with critical background information for this research.

I thank my parents for their support and encouragement. Most of all, I thank my beloved wife Hsien-Tzu and my wonderful son Jamie for happiness and love they have brought to my life.

Chapter 1 - Introduction

The research described here examines how city-sponsored community technology centers (CTCs) in a dense urban area operate and sustain their services. The research concerns a particular approach that links the potential for individual empowerment afforded by community development efforts with the opportunities that information and communication technologies (ICTs) present.

In addition to examining the operational factors of CTCs, the current research investigates how CTCs seek help—volunteers or any forms of resources critical to their operation—by building partnerships from within the communities in which they are located and for whom they offer services. The current research also identifies and characterizes the role that public agencies can play in helping CTCs achieve their goals as enablers of positive changes—both personal and social—in their communities.

The answers to these questions have implications for policy-making as well as for CTCs' sustainability. Knowledge about whom and what resources CTCs rely on for their continual operations helps public officials better coordinate their support efforts to overcome digital inequality and realize digital inclusion in local communities within their jurisdictions. Moreover, new knowledge about the social roles that CTCs can play in community development also helps CTCs understand the mutual two-way relationship between CTCs and their communities. For instance, it appears that realizing the fact that CTCs have to first function effectively as public places and as forces for positive changes at the community level is the key for CTCs themselves to successfully obtain on-going assistance in return from the communities.

The conceptual framework for the current research is based on three parallel concepts in the literature: (1) the concept of the digital divide and the multi-faceted notion of ICT access; (2) the concept and the practical knowledge of the community technology movement; and (3) the concept and the methodology of asset-based community development. These concepts and methods together build the empirical framework for the current research, which in turn guides the qualitative analysis, from which the research findings are drawn. The primary research tools include: (1) semi-structured interviews, (2) surveys, and (3) document review and secondary sources. To conclude, the empirical findings from the field are used to test the applicability of the conceptual model developed from the literature.

The study site of Seattle, Washington, and the research subject, the Community Technology Program conducted in the Department of Information Technology of the City of Seattle, together afford the opportunity to examine a set of CTCs in a dense urban area, one with a tradition of community technology initiatives and active community-based movements.

The first chapter of this dissertation includes:

1. Definitions of key concepts, including: *Information Society*; *The Digital Divide*, *Community Technology*,
2. A discussion and a brief description of the policy context for the current study—Seattle's Community Technology Program, and
3. A statement of the research questions.

1-1. Information Society

We now live in a type of society in which information and information access plays a crucial role, economically, socially and individually. An information society is a society in which the creation, distribution, diffusion, use, and manipulation of information is a significant economic, political, and cultural activity (Wikipedia, n.d.). The proliferation

of computers and the Internet (or ICTs, in general) has changed many aspects of American society, from the way we shop, educate our children, find employment, pay taxes, use the library, to the way we interact with our friends, or even with elected officials (Bimber, 1999; Dutton, et al., 1999; Brodie, et al., 2000; Bucy, 2000; Lauman, 2000; Hacker & Van Dijk, 2000; DiMaggio, et al., 2001; Katz, Rice, & Aspden, 2001; Marsh, 2001). In the U.S., computer and Internet movements are characterized generally by technological optimism: the belief that computer/Internet access and expertise can provide transformative powers to the individual. For instance, computer and Internet training may translate into improved job opportunities for some individuals (Strover, 2004).

ICTs are not just a communications tool, a means of commerce, or an entertainment medium. They are also a technological revolution that promises to enhance productivity in many aspects of life and increase the standard-of-living for all those who use it (Kling, 2000; Wilson, Wallin, & Reiser, 2003; Cooper, 2004). ICTs change society very quickly. The ability to access and use these technologies effectively will be the key to economic success or social well-being for both individuals and communities. The ability of a household to participate and prosper in the new information society will be severely restricted if a household is cut off from digital technology (Cohen, 2002).

1-2. The Digital Divide - Being Disconnected Means Being Disadvantaged

ICTs are rapidly transforming our economy and society. They are changing how we live and work. ICTs have the ability to generate great wealth and prosperity, but they can also exacerbate economic disparity and magnify existing inequities. Many low-income communities are isolated from recent technological advances and do not have access to personal computers, the Internet, and the interactions and opportunities these technologies provide. This experience currently defines the so-called “digital divide”—that space between those who do and those who do not have access to

information technology (Bridges.org., 2001; Kirschenbaum & Kunamneni, 2001; Cullen, 2001; Norris, 2001; Patterson & Wilson, 2002).

The "digital divide" is a modern-day reflection of historical social and economic divides that have plagued our society for years (Pinkett, 2003; Katz & Rice, 2003). The move towards an increasingly digital society has had economic and social impacts that threaten to exacerbate existing inequalities. Failure to address the technology gap will likely aggravate current levels of poverty and isolation (Goslee, 1998) and increase the already large gaps in education and access to opportunity between historically privileged and historically disenfranchised groups (Blakely, Hadi, & Johnson, 1995).

Access lies at the core of the digital divide research (National Telecommunications and Information Administration, 1999). This body of research demonstrates that while certain groups in society have access to technology and the Internet, certain other groups are deprived of access to such technology. Information is critical to the growth of a community and its people, and therefore, the digital divide creates critical gaps in society (Hindman, 2000; National Telecommunications and Information Administration, 1995, 1998, 1999, 2000; Dutta-Bergman, 2005).

1-3. Community Technology

Over the past decade, the community technology movement has gathered momentum toward closing the digital divide with programs targeted at access, training, content, technological fluency, and more (Pinkett, 2003). Community technology finds its ideological roots within progressive education and community development environments. Community technology tends to focus on *individual empowerment* with the hope that it leads to community development. It is clear that education and access to computer-based technologies has a direct *individual* impact. The potentials for personal enrichment, educational advancement and access to employment are the most tangible benefits offered by the community technology movement. "To profit from the potentials

opened up by ICTs, we must participate in it" (Sanyal & Schon, 1999). This is particularly true for the poor, who are already excluded from the economic, social, and cultural mainstream. Community technology initiatives have emerged as key efforts to help low-income communities and the urban poor gain access to and use ICTs (Servon & Nelson 2001).

In addition to helping individuals gain access to the digital technologies and hope to bridge the digital divide for those who are currently on the wrong side of the technology gap, the community technology movement is also being expected by many community activists to be able to produce public goods for the community. Beamish argues that community technology can be defined as "using the technology to support and meet the goals of a community" (Beamish, 1999).

Given the fact that the term "community" is in the title of this movement, we can anticipate that the community technology movement takes a "community-based approach" to implementation. This argument can be further justified by the following two viewpoints:

First of all, practically speaking, it is almost impossible to close the digital divide by simply giving out computer equipment to every single household. In reality, taking a community-based approach becomes a reasonable choice for community technology advocates to distribute digital technologies by offering public access to those "have-nots". Community is therefore regarded as "an operating unit" for the community technology movement to be carried out.

Furthermore, community implies *connection*: some combination of shared beliefs, circumstances, priorities, relationships, or concerns (Chaskin, 1997). From this perspective, the term community technology suggests that digital technologies, with their communications and information-generating/-storing/-sharing capabilities, may have a potential to function as an electronic form of connection or channel or platform for

community members to share beliefs or concerns, and to nurture their relationships.

Community development, well-established in both the academic field and the practice front, has long been seeking "tools" for researching or practicing, and, further, for achieving community goals. Indeed, community development or community building efforts can benefit from access to information and communication technologies (ICTs). For example, creative use of ICTs can increase discussion, collaboration, and information sharing among individuals and communities; it can increase communities' access to information and allow communities to access information more quickly and cheaply (O'Neil, 2002). In this regard, community technology can be seen as an approach that links community development efforts with the opportunities that ICTs present. It provides *new* ways of approaching *old* problems of community development, enhancing civic society, and strengthening local communities (Pigg, 2001, Gurstein 2001). It brings together theories of ICTs with the pragmatic field of community development (Romm and Taylor, 2000).

Even though it is the *community* part of the movement that extends its scope from the focus of individual empowerment to social welfare and community building, it is however the *technology* part of the movement that makes it unique among various community development practices. Others include, for example, housing development conducted by Community Development Corporations (CDCs), community organizing or the self-help type of community building efforts organized by grassroots community-based organizations (CBOs). Any attempt to support the community technology movement has to start with understanding the technological nature of the movement, which involves many practical considerations regarding its technical requirements and operational procedures. This is exactly the central theme of the current study.

1-3-1. Community Technology Centers – CTCs

Community technology centers, the most commonly practiced form of the community technology movement, have emerged at the grassroots level. Broadly defined, CTCs are community-based efforts to provide computer access and training to disadvantaged populations that would otherwise not have such access. CTCs endeavor to fill a critical niche in remedying imbalances in access to ICTs (Breeden, 1998; Servon & Nelson 2001; CTCNet, 2002). CTCs have the potential to help close the technology gap by providing access to ICTs, training residents of low-income communities to use ICT tools, and distributing content targeted at and created by these communities (Servon & Nelson 2001; CTCNet, 2002).

Community technology centers are becoming neighborhood focal points that help provide the means by which people in inner cities or rural villages can begin to help themselves out of the social safety net (Bolt and Crawford, 2000). Community technology centers are helping to address the problem of access to ICTs as well as access to intellectual development. CTCs offer opportunities to improve education levels, gain job-related skills, and build personal and community capacity. They also function as a place where participants gather together and link with the entire community (Coetzee, 2007).

CTCs include a wide range of public and private organizations and institutions, such as libraries, youth organizations, multi-service agencies, stand-alone computing centers, settlement houses, and various other nonprofit organizations that offer an array of technology-based services and programs to a variety of populations. Despite the diversity of organizations that fall under the CTC umbrella, CTCs share a commitment to bridging the digital divide and fostering community development, particularly in low-income communities (Servon & Nelson, 2001).

1-3-2. Models of CTCs

CTCs are generally non-profit, locally-based organizations that provide ICTs to groups that do not get access to them in other ways. CTCs differ along three dimensions: 1) their organizational type, 2) their programmatic orientation, and 3) their target population (Davies, et al., 2003).

There are three primary organizational types of CTCs: stand-alone centers; CTCs housed in multi-service agencies; and networks of CTCs (which may comprise one or both of the previous two types).

CTCs also differ in terms of their programming and available services. Some centers focus on providing access to technology. Other CTCs offer either general or specialized classes. Many CTCs, for example, offer basic classes in keyboarding, how to use email, and popular software applications such as Word and Photoshop. Others are more oriented towards providing specific training that can help participants obtain jobs in ICT-related industries.

CTCs differ with respect to their target populations. Although most CTCs target low-income and urban people, they target different segments of that larger population. Some programs target youth, while others target unemployed and underemployed workers, and still others serve senior citizens, the disabled, the homeless, and/or a particular neighborhood (Davies, et al., 2003).

1-3-3. Brief History of CTCs

The community technology movement in the United States has its formal roots in the early 1980s' personal computing revolution that transformed work and learning environments. The first recognized public community-based computer lab was established by Antonia Stone in Harlem to address the lack of technology access for inner

city communities. Ms. Stone's *Playing To Win Network* (PTWN) offered public access to computers along with training and education in the effective use of these new tools (Sullivan, 2003).

In the early 1990s, Ms. Stone cooperated with the Educational Development Center in Newton, MA on an application to the National Science Foundation. This successful grant resulted in a five-year ($1.9 million) grant to support the extension of the network's services, the expansion of its membership and its evolution into an independent, self-governing non-profit organization. The grant also supported the sustained, professional evaluation of the Network and its affiliates. At the start of the grant PTWN changed its name to the Community Technology Centers' Network (CTCNet). Consistent with its NSF grant goals, CTCNet has now incorporated in Massachusetts as a non-profit, tax-exempt organization with a board of directors representing its affiliate organizations (Chow, 1998; Sullivan, 2003).

To date, the Community Technology Centers Network (CTCNet – http://www.ctcnet.org) has grown into a national, non-profit membership organization of more than one thousand independent community technology centers where people get free or low-cost access to computers and computer-related technologies, such as the Internet, together with learning opportunities that encourage exploration and discovery. While CTCNet represents a significant number of community-based technology endeavors, hundreds of unaffiliated centers operate outside of the organization's scope (Sullivan, 2003).

1-3-4. Public Investment in CTCs

Policies aimed at tackling digital inequality have directed a great deal of public resources towards resolving the problem at all levels of government.

The Departments of Education, the Department of Housing and Urban Development (HUD), and the National Telecommunications and Information Administration (NTIA)

all initiated programs to support community or school-based efforts to establish sites for computer and Internet access.

The Federal Communications Commission E-Rate program (NTIA) balances support of competitive interests with a scheme of telecommunications discounts to lower the financial burden of connectivity for public institutions such as schools, libraries, health care institutions, and institutions of higher education (NTIA, 1999).

The Telecommunications and Information Infrastructure Assistance Program (TIIAP) and The Technology Opportunities Program (TOP), created in 1994 and administered by NTIA in the U.S. Department of Commerce, has sponsored numerous planning, demonstration, and access projects with the overarching goal of linking schools, libraries, and hospitals to the information superhighway while also trying to ensure equal access to telecommunications services among the haves and have-nots (Bartfai et al., 1999; Frechtling et al., 1999). Both TOP and TIIAP were terminated in 2004.

The Office of Vocational and Adult Education in the U.S. Department of Education launched The Community Technology Centers Program (CTC) in 1999 to create or expand community technology centers to provide disadvantaged residents of economically distressed urban and rural communities with access to information technology and the training to use it (U.S. Department of Education, 1999).

HUD created Neighborhood Networks in 1995 to encourage property owners to establish multi-service community learning centers in HUD insured and assisted properties. Neighborhood Networks was one of the first federal initiatives to promote self-sufficiency and help provide computer access to low-income housing communities.

In addition, a number of state governments initiated their own broadband policies, sometimes by assessing statewide broadband infrastructure (North Carolina, Ohio, West Virginia, Texas), by mapping network routes and capacities (North Carolina, Georgia,

Oregon), by undertaking legislation to create incentives for better telecommunications infrastructure (Michigan), by creating programs to enhance Internet access in localities (North Carolina), or by establishing special agencies or commissions tasked with enhancing access (Texas, North Carolina).

Finally, at the local level, community information networks or community technology centers (CTCs) have shown to be an important and rapidly growing part of the community technology movement. In general, this type of local community technology initiatives has been carried out in a number of different ways:

1. Home-computer purchase/acquisition programs (San Francisco, Riverside, California);
2. City-sponsored computer labs/centers (San Francisco, Riverside, Atlanta, New York City, Boston, Denver, Pittsburgh, Albuquerque);
3. City/region-wide technology fund (Cleveland, Austin, Multnomah County-Oregon, Seattle).

Table 1-1 provides some examples for each of these three approaches to local community technology initiatives.

Table 1-1. Examples of three approaches to local community technology initiatives

	Home-computer Purchase/Acquisition Programs	City-sponsored Computer Labs/Centers	City/Region-wide Technology Fund
San Francisco, CA	San Francisco TechConnect is a citywide initiative to promote digital inclusion. Among various programs, TechConnect's PC Purchase program provides ways for San Franciscans to more easily obtain a computer for their home.	The City of San Francisco also offers computer training classes at various library branches, recreation centers and City College campuses throughout the City.	
Riverside, CA	The SmartRiverside Digital Inclusion Program is a program designed for bridging the Digital Divide in their local communities. This is accomplished through donations of computers, monitors and other electronic equipment by large local firms, educational institutions and the public. Refurbished computers are offered at no cost to qualified low-income residents on a first come first served basis.	A number of computer labs in the City of Riverside, California, are also available for use to assist with homework, Internet access, tutoring, and much more. The Department of Parks, Recreation and Community Services of the City of Riverside teaches, hosts, and instructs the program in their park facilities.	
Atlanta, GA		In 1999, the City of Atlanta created the Atlanta Community Technology Initiative. This initiative established a Mayor's Office of Community Technology and opened thirteen Community Cyber Centers and seven kiosks.	
New York City, NY		New York City Department of Parks & Recreation manages 27 Computer Resource Centers, which offer free computer access and instruction to New Yorkers of all ages. The Centers offer technology training, career services and academic and arts programs into all communities throughout New York City.	
Boston, MA		The City of Boston, through a non-profit corporation—The Boston Digital Bridge Foundation (BDBF)—provides technology training and computer equipment to underserved Boston communities. Since 1996, BDBF has networked each of the Boston Public School's 135 school buildings and 26 public libraries and further use these facilities as public access points to allow Boston residents to use computer equipment and receive technology training.	

Table 1-1. Examples of three approaches to local community technology initiatives (continued)

	Home-computer Purchase/Acquisition Programs	City-sponsored Computer Labs/Centers	City/Region-wide Technology Fund
Denver, CO		The Denver Public Library helps to bridge the digital divide by providing public access to computer equipment and offering classes to help introduce residents to the world of computers. Several Denver Public Library branch locations have offered Basic Computer Skills courses to adults ages 18 and up.	
Pittsburgh, PA		The City of Pittsburgh, since 1996, has used a funding source—Operation Weed and Seed, a US Department of Justice initiative—to fuel their community technology initiatives. To date, the City of Pittsburgh has used the "Seed" monies for CTCs and networks in 33 sites that cover a range of community facilities, including public schools, housing facilities, local churches, or YMCAs.	
Albuquerque, NM		The City manages and provides to the citizens of Albuquerque 24 community centers. Each center provides an assortment of programs and activities, including access to computers and the Internet.	
Cleveland, OH			In 2000, the Time Warner-Cleveland City Council Neighborhood Technology Fund was established to promote the use of telecommunications and computer equipment and services for the residents of the City of Cleveland. A competitive process is conducted once a year. There is a fund-match requirement for all the participating organizations. Applicants must provide a 50% cash or in-kind match of the grant amount. Projects should also have strong sustainable plans, which are usually enhanced by multiple partnerships or collaborations with other organizations.

Table 1-1. Examples of three approaches to local community technology initiatives (continued)

	Home-computer Purchase/Acquisition Programs	City-sponsored Computer Labs/Centers	City/Region-wide Technology Fund
Austin, TX		Austin Free-Net provides technology training and access for the community, fostering skills that enable people to succeed in a digital age. Free-Net computer labs and classes open to all Austin residents; particularly focused on underserved communities.	The Office of Telecommunications & Regulatory Affairs (TARA) of the City of Austin administers the Grant for Technology Opportunities Programs (GTOPs) to provide matching grant funds to Austin organizations for projects that create digital opportunities and foster digital inclusion. Since 2001, GTOPs have enabled local organizations to build computer labs, place free computer/Internet workstations in low-income neighborhoods and housing projects, and bring computers and Internet connectivity, training and support into the homes of working poor families.
Multnomah County, OR			The Mt. Hood Cable Regulatory Commission (MHCRC) is the grant-making body for the Community Access Capital Grant program which provides funds for technology projects to community organizations, libraries, educational institutions and local government agencies throughout Multnomah County in the state of Oregon. This program assists local entities in using information and multi-medium technology for enhance communications, including video, data and voice applications. The Grants provide a financial means to address concrete local needs, such as improving learning resources in public schools and community colleges; removing barriers to receiving an education, information or social services by disadvantaged or challenged people; and increasing access to media tools for local discourse and communications.

Table 1-1. Examples of three approaches to local community technology initiatives (continued)

	Home-computer Purchase/Acquisition Programs	City-sponsored Computer Labs/Centers	City/Region-wide Technology Fund
Seattle, WA		Seattle's Technology Matching Fund has been helping local organizations to undertake community technology projects, which are usually designed and operated as CTCs.	In 1997, the City of Seattle launched the Technology Matching Fund program. The Fund is administered by the Community Technology Program in the Department of Information Technology and is funded with cable franchise fees. The Program's mission is to ensure public access to the Internet, computers and information technology, and to help support the community's efforts to close the information technology literacy gap. The fund also supports the use of these tools to address community issues and to increase access to government. The fund provides money on a reimbursement basis to Seattle neighborhood groups and organizations for resident-driven projects. Since the inception of the program, more then 140 community-based projects have been funded.

1-4. Seattle Experience – The Technology Matching Fund

1-4-1. Digital Divide in Seattle

Seattle's digital divide issue broadly resembles the issue as it plays out nationally. According to the Information Technology Indicators Residential Survey conducted in 2004 by the City of Seattle Department of Information Technology, Seattle still has a significant digital divide, although the level of home computer access has grown about 10% from 2000 (City of Seattle, 2004).

The top two reasons for not having a computer at home are cost and lack of interest. Older Seattleites or those with less income or education are less likely to be current or comfortable technology users. Lower levels of connectivity and comfort with technology are also evident among African American respondents—African Americans were about one-third less likely than respondents of other ethnicities to have home Internet access—but the gap is not as pervasive as with seniors and those with less income or education. Residents with disabilities were also much less likely to have computer access at home (58% vs. 83%). Of the dimensions of the digital divide examined in the 2004 survey, the age divide seems the most consistent, pervasive and unchanging (City of Seattle, 2004).

1-4-2. Seattle's Context for the Community Technology Movement

Seattle has responded to the new socioeconomic structure of the information era by working to become a technology literate city since the late 90s. The City of Seattle has institutionalized its promise to technology literacy, coordinated its information technology planning efforts with other public goals, and integrated ICTs into its mission and into the broader functions of city government. Many of Seattle's pioneering ICT-related planning initiatives have attracted attention from other cities in the country. For example, the City of Austin, Texas, and the City of Cleveland, Ohio, both developed

a grant program that modeled after Seattle's Technology Matching Fund program (Keyes, 2008), which will be introduced in this chapter and discussed in greater detail throughout this dissertation.

The unique aspects of Seattle's context, such as its high-tech economy, have pushed the city to deal with its technology inequality earlier than have most cities in the U.S. People in Seattle tend to believe that ICTs can play an important role in addressing social concerns and connecting residents with resources offered by the city departments. Given the presence of Microsoft, Boeing, and other high-tech companies in the region, it would seem to come as little surprise that Seattle is also a breeding ground of many community technology activities and home to some of the most innovative and far-reaching planning initiatives to narrow the technology gap. The industry presence has also provided a vast pool of skilled volunteers and has helped place technology access issues on the agenda of public officials and citizens (Servon & Nelson, 2001).

Many community technology activists however believe that the high level of community technology activities and government commitment to universal access to ICTs is attributed to more than merely the presence of technology-based industries. They also point to the strong tradition of neighborhood-based planning and service delivery as well as to the commitment on the part of community technology actors and community leaders to represent the needs of those residents that have been left behind in the city's recent economic growth and success (Servon & Nelson, 2001). Seattle is an extremely community-oriented city (Martz, 1995; Diers, 2004). This, along with the fact that Seattle has had a high volume of community technology activities, together make Seattle the best place to study CTCs, in particular, the linkage between CTCs and community development/community building.

1-4-3. Brief History of Seattle's Community Technology Initiatives

In 1995, the City of Seattle created the Citizens' Telecommunications and Technology

Advisory Board (CTTAB), a de facto planning body, expanding the scope of the previous Citizens Cable Communications Advisory Board. CTTAB is charged with making recommendations to the Mayor and city council on issues of community-wide interest relating to telecommunications and technology (Servon & Nelson, 2001; City of Seattle, 2008a).

CTTAB's mission includes (City of Seattle, 2008a):

1. Encourage and promote affordable access to and use of telecommunications and technology,
2. Advocate, solicit, and facilitate citizen participation in telecommunications and technology decision making,
3. Measure and evaluate the effectiveness of telecommunications and technology policies and programs.

In 1996, the City of Seattle established the Citizens' Literacy and Access Fund (CLAF), thereby boosting Seattle's commitment to narrowing the digital divide. CTTAB used the fund, which was capitalized by a share of the city's cable franchise revenue, to develop projects aimed at improving technology literacy and building public awareness around information-age issues and planning (Servon & Nelson, 2001; City of Seattle, 2008a).

1-4-4. Community Technology Planner

To implement the projects, CTTAB used a portion of the CLAF money to create an information technology planning position within the Executive Services Department Technology Division (now the Department of Information Technology), which is responsible for citywide ICT planning. In October 1997, David Keyes was hired to fill the position, making Seattle the first city in the nation to have a community technology planner (Servon & Nelson, 2001).

The first CLAF project was to develop a Technology Resource Map, a directory of

technology initiatives across the city. The Technology Resource Map publicized existing sites and facilitated coordination between technology initiatives (Servon & Nelson, 2001). The community technology planner has also coordinated other community-level planning efforts to bring the awareness of community technology to local communities.

1-4-5. Technology Matching Fund

Most of the CLAF money was utilized to establish the Technology Matching Fund (TMF) in 1997, which provides resources to Seattle's community-based and citywide organizations for citizen-led computer literacy and access projects. Organizations must match the cash contribution from TMF with volunteer labor, materials, professional services, or cash. In order to receive TMF support, projects must:

1. Increase points of access to computers and ICTs,
2. Support ICT literacy education and training,
3. And/or encourage ICT applications that support neighborhood planning and action (City of Seattle, 2008b).

Projects must also involve community members in the identification, planning, and implementation of the project. Furthermore, those projects that address the needs of technology underserved populations are given higher priority. TMF is a competitive grant program. CTTAB members review proposals submitted by the local groups, share suggestions and resources ideas with applicants, and make recommendations on projects to approve.

Seattle modeled its Technology Matching Fund program after a well-established and successful Neighborhood Matching Fund program established and managed by the City of Seattle's Department of Neighborhoods.

Many of the projects supported by TMF have in fact been neighborhood-based,

facilitating a collaborative relationship between CTTAB, the Department of Information Technology, and the Department of Neighborhoods and allowing neighborhood organizations that undertake community technology initiatives to tap into two funding mechanisms (Servon & Nelson, 2001).

1-4-6. Neighborhood Matching Fund

The Neighborhood Matching Fund, established in 1989, provides money to Seattle neighborhood groups and organizations for a broad array of neighborhood-initiated improvement, organizing or planning projects. The program was started in response to calls from neighborhood leaders to assist them with neighborhood self-help projects (Uchida, 2004).

A required component of the program is its match provision. For most projects, the community is required to donate cash, volunteer labor or donated services or materials at least equal in value to the cash provided by the City. Once a project is approved, the community's contribution of volunteer labor, materials, professional services, or cash will be "matched" by cash from the Neighborhood Matching Fund. The program has been used to build new playgrounds and parks, plant street trees, restore open space and wetlands, create public art, build traffic circles, develop plans for business districts, and much more (Uchida, 2004).

The Neighborhood Matching Fund not only changed the citizen involvement system in the City of Seattle, but also influenced other cities in North America. Since the Neighborhood Matching Fund was chosen as the nation's most innovative government program by the Ford Foundation in 1991, a number of cities have established similar funding program (Uchida, 2004).

This type of matching fund has a very distinctive community building/social development aspect. The Neighborhood Matching Fund's ultimate purpose is to build

communities. As the former Seattle Mayor Norman Rice said, “building community is what the Neighborhood Matching Fund is about.” Giving communities a sense of “helping yourself” is one of the many goals of the Fund and is important to community-building efforts (Uchida, 2004; Diers, 2004).

1-4-7. TMF-sponsored Community Technology Projects

The Technology Matching Fund also integrates the fund-matching provision and expects that, by identifying resources and implementing projects, participating organizations can not only bring ICTs into their community, but also link the activities of ICTs with community building/development efforts.

TMF encourages projects that apply information technology to solving community problems, encouraging civic engagement and supporting community building. Since its inception in 1997, more than 140 community technology projects have been sponsored by TMF. These projects provide a variety of services or programs, including education, employment opportunity consulting and training, civic participation, and essential online services, to a wide range of technologically-under served residents, including youth, seniors, disabled residents, immigrants and refugees (City of Seattle, 2008b).

In general, these TMF-sponsored projects can be categorized into four types:

1. Youth education – including basic computer skill training classes, after-school tutoring, reading/math classes, and more specific computer classes that incorporate arts, multi-media, graphics programs.
2. Adult computer skill learning – including basic computer skill training classes, and classes focused on job and resource searching.
3. Immigrant/refugee assistances – including training in English as a Second Language (ESL), classes about civic issues, community participation.

4. Other services for seniors or disabled populations – including basic computer skill training classes, programs focused on upgrading hardware and software specifically for the disabled.

1-4-8. The impacts of TMF on CTCs

TMF is not meant to provide ongoing support to CTCs. However, in addition to providing hardware and software, city funds can be used to support staff, obtain technical assistance, or to increase outreach. However, securing funding for staffing, technical support, and operating costs remains one of the biggest challenges facing Seattle's CTCs (Servon & Nelson, 2001; City of Seattle, 2008b).

1-5. Structure of Seattle's Technology Matching Fund

This program has been administered since its inception by the Community Technology Program of the City of Seattle Department of Information Technology and is funded with cable franchise fees. The program provides grants where the community's contribution of volunteer labor, materials, professional services, or cash will be matched by cash from the Technology Matching Fund. Funds are provided on a reimbursement basis. The fund has one application cycle per year. Grants are awarded for distinct (neighborhood scale or community-based) projects that can be completed within one year. The City recently awarded grants between $4,690 and $15,000 to 15 organizations for community technology projects from a total fund of $175,000 in 2008 (City of Seattle, 2008b).

1-5-1. Eligibility Requirements

The City has set a number of eligibility requirements for participating in the program. The following groups are eligible to apply for TMF:

- 501(c)3 non-profit organizations located in Seattle serving Seattle residents,

- Non-profits who are not 501(c)3 designated, but who have a fiscal agent,,
- Ad hoc groups of residents who form organizations to work on a specific projects,
- Community councils, neighborhood associations, or groups of businesses that draw their memberships from a commonly recognized geographic neighborhood in Seattle,
- Community-based organizations with a majority of its members residing or operating in Seattle and who seek to improve the quality of life for a particular community in Seattle.

Applicant groups must have a non-discrimination membership policy and actively seek the involvement of community members and/or business proprietors (City of Seattle, 2008b).

1-5-2. Application Review Process

A committee made up of Seattle residents from CTTAB reviews all applications. They rate all the proposals using a set of selection criteria. The committee then selects finalists to be invited to an interview. This interview step helps the review committee learn more about the projects and clarify any questions they may have. After all the interviews, award decisions are made. Table 1-2 shows the overall review process for the 2008 application cycle along with the important corresponding dates (City of Seattle, 2008b).

Table 1-2. TMF 2008 grant cycle review process

Review Steps	Dates
Pre-application proposal review	February 25th, 2008
Application submission deadline	March 10th, 2008
Finalists selected by review committee	Late March 2008
Interviews with finalists	Mid April 2008
Award notification	Late April 2008
City Council approval	June 2008
Contracting. Successful applicants will sign a contract with the City to receive funds for their project. The City will reimburse grantees for budget expenses after the contract is signed.	July - August 2008
Project implementation. Projects must be completed within one year by June 2009.	July 2008 - June 2009

1-5-3. Application Scoring Criteria

In the review process, specific scoring criteria are used in order to make recommendations. These criteria are used to evaluate all project proposals. All the applications are given points for how well they meet each of these criteria. The scoring criteria consist of six categories: 1) Meets Program Goals—20 points; 2) Budget—20 points; 3) Project Clarity—20 points; 4) Community Participation—15 points; 5) Community Benefit—15 points; 6) Evaluation—10 points (City of Seattle, 2008b). Table 1-3 details all these scoring criteria.

Table 1-3. TMF application scoring criteria

Technology Match Fund Scoring Criteria	
Meets Program Goals The fund supports projects that reach technology underserved communities, thereby increasing "digital inclusion." The city's goals are to:	(20 points)
Increase technology literacy	
Increase access to computers, the Internet and other information technology	
Increase residents' use of technology for community problem solving, civic engagement and community building	
Budget	(20 points)
The proposed budget is realistic and well planned	
The numbers add up correctly	
Your cost estimates are researched and reflect market prices	
The budget narrative clearly explains your proposed expenses	
You identify how you will meet the minimum match requirement	
You show that you have the resources to implement the project successfully	
You use the Excel spreadsheet budget template	
Project Clarity	(20 points)
You list no more than 3-5 well defined project goals	
You show that project activities are well planned and ready to implement	
You are clear about what technology will be used for this project and that it is appropriate to the goal(s) of the project	
You have a clear plan for technology support, recruiting participants, marketing products and/or services, and increasing community support	
You include a detailed project timeline	
If your project will continue beyond the length of the grant, you demonstrate that you have the capacity to ensure its long term success	
Community Participation	(15 points)
Your proposed activities use partnerships to leverage community resources, increase the project impact and effectiveness, and provide necessary expertise	
You document community support for the project and involve the target community in planning the project	
The project provides opportunities for community involvement	
Community Benefit	(15 points)
Your project addresses a recognized community need with a viable, creative solution	
Your project will result in a product, service or benefit that has lasting positive community impact	
Your project expands and/or strengthens your organization's program capacities beyond the term of the grant	
Evaluation	(10 points)
You have a well defined evaluation plan to document the implementation and impact of this project	

1-6. Ideas behind Community Technology

Three distinct areas of research literature inform the current study and will be briefly discussed below and elaborated upon in the next chapter: 1) those concerning the digital divide; 2) the multi-dimensional concept of access to digital technologies; and 3) the interconnection between community technology and community development.

1-6-1. Re-conceptualize the Digital Divide

The notion of the digital divide is complex and multidimensional. Efforts to bridge the digital divide, such as those in the community technology movement, must be primarily about people, not technology. Several scholars argue that we should go beyond the rather shallow demographics of income, education, age, sex, race and ethnicity and look for the deeper social, cultural and psychological causes behind the lack of access of particular populations.

Many researchers try to re-conceptualize the complex nature of the digital divide, as they regard closing the divide as the primary goal of any community technology initiative. For instance, Dimaggio et al. (2004) identify five dimensions of digital inequality: 1) inequality in the technical means; 2) inequality in the extent to which people exercise autonomy in their use of the technology; 3) inequality in the skill that people bring to their use of the technology; 4) inequality in the social support on which Internet users can draw; 5) inequality in the purposes for which people use the technology.

Different conceptualizations are proposed by many other digital-divide scholars. An in-depth full review of literature on this subject is presented in Chapter 2.

1-6-2. Multifaceted Concept of Access

The digital divide, as discussed earlier, is a large structural impediment to equal access. Because access is so essential to properly conceptualize the digital divide and further bridge the technology gap, researchers and policy makers have been trying to unpack and redefine the concept of access to ICTs.

Most community technology initiatives focus their efforts on providing equitable access to advanced technologies, communication and information resources, and the learning experience. However, researchers in the field of CTC have started to recognize that the community technology movement is not just about offering (physical) access. The real focus, some argue, should be on applying technology to achieve meaningful outcomes in economic opportunities, community development, education, and employment of underserved populations (Morino Institute, 2001).

Many scholars argue that the term "access" is used freely in everyday discussions without an acknowledgement of the fact that there are many divergent meanings in play. The meaning of simply having a computer and a network connection is the most common one in use today. However, according to Van Dijk (1999), this meaning only refers to the second of four successive kinds of access. He distinguishes four kinds of barriers to access and the type of access they restrict:

1. Lack of elementary digital experience caused by lack of interest, computer anxiety, and unattractiveness of the new technology—mental access.
2. No possession of computers and network connections—material access.
3. Lack of digital skills caused by insufficient user-friendliness and inadequate education or social support—skills access.
4. Lack of significant usage opportunities—usage access.

Like in the case of the digital divide, various ways of de-constructing the meaning(s) of access are also presented in many different research studies. A full review of literature on

this subject is also presented in Chapter 2.

1-6-3. The Interconnection between Community Technology and Community Development – the Asset-based Approach

As discussed before, the community technology movement focuses primarily on individual empowerment with the hope that it leads to community development. It is understandable that, with its primary mission being to close the digital divide, a typical CTC may put most of its efforts mainly on providing access, offering skill training classes or computer literacy programs.

However, many scholars believe that the intersection between the community technology movement and the well-developed domain of community development holds tremendous possibilities, as both efforts seek to empower individuals and families and to improve their overall community. There are two ways to justify this stream of thought. First of all, many scholars stress the importance of community partnerships in running an effective community technology project. They believe that CTCs should see themselves as an integrated part of the community. Recent scholarship in community development sees community members as active agents of change. Similarly, recent scholarship of community technology sees community members as active producers of community information and content (Pinkett, 2003). Secondly, many authors point out that CTCs should reach out to the local community that they intend to serve and try to seek out resources critical to their effectiveness from the community. Many emphasize the importance of establishing partnerships from within the community, as a *means* of leveraging available community assets (resources) (O'Neil & Baker, 2003).

As community technology and community development initiatives move toward greater synergy, there is a great deal to be learned regarding how community technology and community development can be mutually supportive, rather than mutually exclusive (Pinkett, 2003).

1-7. Research Questions

In this section, I first organize my assumptions and unknowns into a rational argument. I then discuss the real-world questions that this study examines. Then this section summarizes the formally constructed research questions.

1-7-1. Assumptions and the Real-world Questions

This study assumes that ICTs have a role in combating poverty and social/economic exclusion and in improving the welfare of individuals and communities within a society. Bridging the digital divide or offering digital opportunities for all has not only been a policy objective at all levels of government, it has also stimulated a significant amount of research in the U.S. and around the global. The reasoning is that in a digital society and a knowledge economy, access to and use of ICTs contribute to social inclusion, educational achievement, employment skills and job hunting advantages, and so on. In a society that is networked via ICTs, individuals and groups derive value from being connected to the network.

The community technology movement, based exactly on this reasoning, has played a significant role in providing public access to ICTs and fighting the digital inequalities. The underpinning to the reasoning is clear, however, in the real world, *How does it actually work?* More precisely, *How does the community technology movement help close the digital divide—the technology gap?*

As mentioned before, many scholars have been trying to re-conceptualize the digital divide or to deconstruct the meaning(s) of access to ICTs. In digital divide research, people first focus on individual empowerment and direct their investigations at pinpointing what *barriers* prevent an individual from gaining whole access to the information society. Most research studies suggest that citizens in the digital age need

more than just “technical access”. Other *resources*, such as skills, knowledge, and social support, have to be set in place in order for them to migrate to “the other side” of the divide. This type of argument is very much echoed by the people in the research field of ICT access, who further provide insights into the multi-faceted meanings of access to ICTs. However, the question then becomes: *How can these two fields of research studies on the digital divide and ICT access inform the research and practice of the community technology movement?*

As for the community technology movement, to fulfill its role in closing the digital divide, a CTC—the practical vehicle of the community technology movement—also needs its own resources; and it will need these resources to operate and sustain itself effectively. Researchers in this field of CTC research identify a variety of resources that support CTC’s sustainability. Some researchers further argue that these resources can be located and sought in a local community. However, *what are these needed resources for CTC’s sustainability? How and where can a CTC find these needed resources? How important is it for a CTC to build partnership(s) within the community it serves in order for the CTC to obtain these needed resources?*

As discussed earlier, public agencies at various levels of government are trying to provide resources for the community technology movement with different approaches. The current study is mostly concerned with the efforts made by the very bottom level of government: the local municipal government, as I believe that the essence of the community technology movement is its grassroots nature. Local governments should find themselves very much involved in promoting the community technology movement. However, *how can a local government help? What roles can a local government play in helping CTCs obtain their needed resources?*

The community technology movement has a distinctive community building aspect. It has been seen as a new tool to help with community development, which has been practiced by social workers, city planners, community organizers, or even local residents

for decades. Many community activists and researchers have been concerned with *how exactly community technology initiatives can work together with those already well-practiced community development efforts and how to truly make community technology a part of the whole system for achieving community goals?* However, on the other hand, there is another way to build the linkage between community technology and community development. As discussed before in the previous section, the idea of "resource-seeking" is central to CTC's sustainability. Many researchers and CTC practitioners have pointed out the importance of building community partnerships as a means of identifying and securing needed resources for a CTC's effective operation. Community partnerships not only extend the functioning of CTCs from merely a public access point to a true public place for all residents, but also bring available operating resources from the community back into CTCs. In the community development field, a rich array of knowledge has already been learned and well documented on building community partnerships, which have been utilized for a variety of purposes, such as to increase residents' awareness of community issues; to deliver public services; to identify community assets for self-help type of community development efforts. The question now turns to *how these rich experiences and knowledge learned in the community development field can inform the community technology movement?*

1-7-2. Research Questions for the Current Study

After exploring a number of real-world questions regarding the community technology movement, I now present my formally constructed research questions.

The current study is concerned with *the factors that are attributed to CTC implementation.* In other words, the current study attempts to unfold *what operational issues have an effect on the health and the ability of a CTC to continually offer its planned services/programs to its targeted clients.* A healthy working CTC project is interpreted as both providing ICT access to underserved populations and contributing to social wellness of the community to which the CTC project is related, as well as being sustainable, both

institutionally and financially. The current study is also concerned with *the role(s) city officials can play in CTC implementation.*

Seattle, with her rich history of community technology activities and some of the most innovative technology planning initiatives carried out by Seattle's Community Technology Program, together provide the current study with valuable data for exploring these research questions. Since its inception in 1997, Seattle's Technology Matching Fund has been helping community organizations undertake community technology projects. The current study intends to understand how community organizations operate their community technology initiatives (in the form of CTCs) and sustain their efforts by managing various resources, which are made available both from the City and from the local communities.

The current study also attempts to link the CTC field with the rich body of knowledge regarding community partnerships from the community development domain. This linkage will be specifically made by answering the following questions: *How important are community partnerships to CTCs' sustainability? What kind of knowledge of community partnerships developed in the field of community development can inform CTC project implementation? How can this knowledge be applied to CTC initiatives?* Community partnerships, in this research, are defined as the mutual relationships and productive collaborations among community members toward mutually-defined public goals.

The fund-matching mechanism utilized by Seattle's Technology Matching Fund, which requires all participating organizations to seek community partnerships and further identify and locate their operating resources from within the communities, allows the current study to explore the relationship(s) between community partnerships and CTC projects' long-term sustainability.

1-7-3. Research Approach – Model Building and Testing

To carry out this research study, I first attempt to understand what personal resources are necessary for an individual to become capable of gaining effective access to ICTs. This is done by summarizing and synthesizing all the conceptual frameworks of both the digital divide and ICT access found in the literature. A synthesized model of the digital divide (framework of personal resources) is constructed drawn from this part of literature review.

I then attempt to explore key operational factors significant to running a CTC. Again drawing from the literature, a number of operating resources for a CTC's sustainability can be identified. Connected with the first layer model of the digital divide, a two-layered model of CTC is established.

Finally and the most importantly, the last component of the model—the community—is added into the equation. For this part of literature review, the well-developed field of asset-based community development (ABCD) plays an important role in informing this part of framework building. A holistic model of CTC operation focusing on community partnerships—the mutual relations between CTCs and the communities—is then articulated.

These theoretical models are then applied and tested using the empirical findings observed from the real-world cases in the field of CTC practice. An in-depth discussion of the applicability of these theoretical models is then presented in the final chapter of this dissertation.

Chapter 2 - Review of Literature

The current study relies on three threads of scholarship: 1) research on the digital divide and ICT access; 2) research on community technology centers (CTCs); and 3) asset-based community development. This chapter summarizes these three schools of literature. A series of three models formulated from these three literatures are then presented. In this way a path will be traced to the next chapter—Research Design. This research is aimed to contribute to these three threads of literature by connecting key concepts together and generating a new theoretical synthesis for investigating the community technology movement.

2-1. The Digital Divide

It is usually assumed that information and communication technologies (ICTs), such as personal computers and the Internet, are transforming our economic, political, social and cultural lives (Castells 2001; Bell 1973). The significance of ICTs as a key player in the current information era is well established. The Internet and other related digital technologies provide access to unlimited information to the members of the public. In an information-based society such as ours, information is essential to communications and commerce. Access to and use of ICTs, therefore, is critical to the existence of an individual in the information age (Carvin, 2000; Hindman, 2000; NTIA, 1995, 1998, 2000; Cullen, 2001). ICTs are conceptualized as enablers that catalyze and contribute to economic, professional, and social success of individuals and communities (NTIA, 1999).

Since these new “key technologies” are regarded as major engines of change, much

attention has been devoted to their diffusion, especially to inequalities in the access to these technologies (OECD 2000, 2001; NTIA 1999, 2000, 2002). The term "digital divide" came into regular usage in the mid-1990s and refers to the gap between those people with effective access to ICTs and those without access to them (Wikipedia, n.d.).

2-1-1. Data, Studies, Reports on the Digital Divide

The existing body of research on computer and Internet access provides plentiful evidence documenting gaps between the information rich and the information poor. Many studies indicate the existence of the digital divide from various perspectives (NTIA, 1995, 1998, 1999, 2000, 2002).

NTIA

In 1995, the National Telecommunications and Information Administration (NTIA) within the Department of Commerce conducted their first survey to address the *have and have-not* issues based on the U.S. Census Bureau's Current Population Survey (CPS) (NTIA 1995). This study later became the first study in the series entitled *Falling Through The Net*, now including four more studies (NTIA 1998, 1999, 2000, 2002). The series focuses on the disparities between *haves* and *have-nots* based on socio-economic factors such as age, race and ethnicity, geographical location, income and household type. The reports also document the increasing number of Internet users. The studies evolved from studying hardware ownership to looking at Internet access, and eventually to the characteristics of Internet use. The study in 2000, found an increase in numbers of Internet using individuals, from 32.7% in 1999 to 44.4% in 2000. However, while the total gap between households had significantly narrowed, the divide still remains or has slightly expanded "between those with different levels of income and education, different racial and ethnic groups, old and young, single and dual-parent families, and those with and without disabilities" (NTIA 2000).

The latest study in 2002, A *Nation Online*, addresses the persistent digital divide based on

demographics as well as disability. The study, however, did find the disappearance of differences between urban and rural area groups (NTIA 2002).

Foundation and Academic Studies

Pew Internet & American Life Project conducted their own studies focusing on various aspects of Internet access and usage. There are also numerous studies addressing Internet use by different demographic groups, such as age (Fox 2001; Madden & Rainie 2004; Lenhart, Rainie & Lewis 2001; Lenhart 2000), race (Spooner & Rainie, 2001; Spooner & Rainey, 2000; Rainie & Packel, 2001), and location (Harwood & Rainie 2004; Bell, Reddy & Rainie 2004; Spooner 2003). These studies also show the existence of the digital divide in the United States. The study by Lenhart et al. (2003) monitors the movement of non-Internet users. The study also re-confirms the existence of the digital divide based on demographic disparities. Hoffman, Novak and Schlosser (2000) conduct a research study measuring the factors of disparities in access. They reemphasize the impact of demographic factors, including race, income and education, in expanding gaps in Internet access. The study conducted by Mossberger, Tolbert and Stansbury (2003) expands the scope of the digital divide focusing on four aspects instead of only the issue of access. In terms of the access divide, the study re-asserts the existence of access gaps in relation to demographic, in particular low-income, geographical, and political factors. Summarizing the research on the digital divide, Choemprayong (2006) and Barzilai-Nahon (2006) articulated that "disparities exist in levels of access between rich and poor and between suburban and inner city residents."

2-1-2. Debate about the Digital Divide

Aspects of what came to be called the digital divide have been profiled in numerous surveys, reports, and academic literatures. Across the 1990s considerable gaps in computer ownership and Internet access and use were strongly associated with income, education, and age. Significant differences in technology access by race, ethnicity, and geography were also found in surveys in the mid to late 1990s.

However, a sharp debate concerning the digital divide emerged between two camps right around the turn of the new Millennium (Jarboe, 2001; Riccardini & Fazio, 2002; James, 2008). The first group of scholars (Compaine, 2001; Fink & Kenny, 2003) mounted a serious critique of the whole concept of the digital divide and sought to change the interventionist policy stance that is usually adopted toward the problem, namely, of making serious efforts to assist populations that are most excluded from the benefits of information and communication technology (ICT). Some of the criticisms go so far as to suggest that the digital divide, as we know it, may not even exist and that even if it does, there is no more reason for concern about it than the divide between the rich and the poor in terms of air conditioner usage (Fink & Kenny, 2003) or ownership of Mercedes automobiles (Compaine, 2001).

In the United States, a group of digital divide optimists emerged after the publication of a government document entitled *A Nation Online: How Americans Are Expanding Their Use of the Internet* (NTIA, 2002). One of the main findings of the report was that between 1998 and 2001, poorer families were adopting the Internet more rapidly than richer families. “The findings were emphatic and reassuring: computer and Internet use are increasing most rapidly among the poor and other disadvantaged groups, and the digital divide is closing quickly” (Martin, 2003). The results were also presented as evidence in support of the view that the digital divide is basically the same as other types of historical divides, rather than something special, requiring separate attention on the part of the public sectors (after all, these other divides were closed solely on the basis of market forces). This view was certainly mirrored in the policy stance adopted by the members of the George W. Bush administration. For them, the digital divide was over (Compaine, 2001; Cooper, 2002). This broad position was being used to justify reductions in government support for technology deployment and training and to limit demands on financially pressed telecommunications companies to expand universal service.

On the other side of the debate are those contending that the discourse on the digital

divide had been grossly delimited and rooted in a series of profound misconceptions about the relationships between ICTs and social and economic development. Fundamentally, they argued that the proposition of a rapidly closing the digital divide wa based on a limited and misleading rendering of the problem to one of simple access to two technologies: personal computers and the Internet. Newer conceptualizations of the digital divide recognize that access is a necessary condition. However, a number of these scholars and practitioners strongly critique the notion that the digital divide equates to a simple issue of technology access. They emphasize that access barriers must be considered in terms of a larger set of technologies and applications and measured alongside proficiency and frequency of use. They further stress that gaps in knowledge and ability to *effectively* use ICTs to improve individual capacities or socioeconomic outcomes. For them, the digital divide problem should explore the social and cultural dynamics that determine what is learned, where that learning occurs and the process by which it is achieved.

2-1-3. ICTs – Inter-operative Technologies

Contemporary ICTs are not a single technology or set of devices, but an ensemble of inter-operative technologies. Gauging the effects of ICTs on an individual's capacity to improve their social economic and cultural position requires recognition of a complex and evolving set of distinct technologies and applications beyond simple computer and Internet access. Translating ICT proficiency into skills and uses that expand personal opportunities involves an understanding and some mastery of four major components layers (Hargittai, 1999; Choi & Whinston, 2000; Kling & Lamb, 2000; Lievrouw, 2000; DiMaggio et al., 2001; Hanseth & Lyytinen, 2004):

1. End-user computer hardware and applications that store, process, receive, and transmit information;
2. Software applications that allow the hardware to operate and perform myriad operations and common applications;

3. Network hardware and applications that manage efficient data, graphic and video transfer and support content on networks;
4. Telecommunications equipment networks and services.

People should also recognize that ICTs themselves are not fixed objects, but rather a variable family of technologies and services being rapidly reshaped through the interacting efforts of profit-seeking corporations, government agencies and non-governmental organizations. Patterns of inequality will reflect not just differences in individual resources, but also the way in which economic and political factors make such differences matter.

2-1-4. From Digital Divide to Digital Inequality

If the effects of the new and rapidly evolving information and communication technologies (ICTs) on economic, social and cultural opportunities are considerably more complex than simple access to hardware and connectivity, what are the additional dimensions that allow for a more meaningful understanding of the problem?

We should shift our attention from the digital divide—inequality between *haves* and *have-nots* differentiated by dichotomous measures of ownership to or use of the new technologies—to ***digital inequality***, by which some scholars refer not just to differences in access, but also to social and cultural inequalities among persons with formal access to the technologies (DiMaggio & Hargittai, 2001; Hargittai, 2002; Steyaert, 2002; Gurstein, 2003; Hassani, 2006; Selwyn, 2004; 2006). DiMaggio and Hargittai (2001) suggest that the term "digital inequality" better encompasses the various dimensions along which differences will exist even after access to the medium is nearly universal. Through the concept of digital inequality, they integrate social and cultural considerations into the prevailing digital divide discourse that narrowly focuses on technology access and market forces. DiMaggio et al. (2004) further offer a specific framework for understanding digital inequality. They argue that patterns of "digital inequality," are

shaped by five conditions: (1) variation in the technical means by which individuals connect to the technology; (2) the degree of autonomy users enjoy (time, freedom); (3) level of skill; (4) nature, type, and amount of social support (someone to go to for help); and (5) the purposes to which people apply their technology use (activities).

Individuals are differently enabled to extract benefits from ICTs based on a constellation of factors that affect the conditions of their use. These factors can be shaped by *resources* such as income, education, the quality of equipment, skill of the user, as well as aspects of the social context of use.

A refined understanding of the digital divide (or rather digital inequality) implies the need for a more comprehensive term for understanding inequalities in the digital age.

Although different terms have been used or even invented by several scholars to better capture the multidimensional nature of the digital divide, such as the term "digital inequality" just discussed, "information inequality", "digital exclusion", or "technological gap", I will still use the term "digital divide" throughout this study. It is the multi-faceted notion of the digital divide that demands further investigation; and the next section is devoted to this purpose.

2-1-5. Conceptualizing the Digital Divide

The notion of the digital divide is complex and multidimensional. Efforts to bridge the digital divide must be primarily about people, not technology. We should go beyond the rather shallow demographics of income, education, age, sex, race and ethnicity and look for the deeper social, cultural and psychological causes behind the lack of access of particular people. Many scholars have attempted to conceptualize the notion of the digital divide by deconstructing it into multiple dimensions. This section first summarizes available literature published by these scholars. A synthesis of all these literatures is provided later in Section 2-3 in this chapter. An annotated literature review of these

published studies is also provided in Appendix A.

The inequality in the ***technical means*** (hardware and connections), without a doubt, is one of the many critical dimensions of the digital divide. Two factors further contribute to the inequality in the technical means: 1) quality of the technology (DiMaggio et al., 2001, 2004; Kvasny, 2002; Hargittai, 2003; Mossberger et al., 2003; Oden, 2004) and 2) the extent to which people exercise *autonomy* in their use of the technology—for example whether they access it from work or home, whether their use is monitored or unmonitored, whether they must compete with other users for time (DiMaggio et al., 2001, 2004; Kvasny, 2002), or whether they have freedom to use the technology for their preferred activities (Hargittai, 2003).

Skills and knowledge to actually operate these technical means are another critical dimension of the digital divide. Several scholars argue that having access to a computer is insufficient if individuals lack the ***skills*** they need to take advantage of the technology. Access is undeniably important, but the real policy question is how well society will be able to take advantage of the opportunities offered by technology. Certain skills are necessary to exploit the potential of computers (DiMaggio et al., 2001, 2004; Mossberger et al., 2003; Hargittai, 2003; Oden, 2004).

The inequality in the ***purposes*** for which people ***use*** the technology is also one critical dimension of the digital divide (DiMaggio et al., 2001, 2004; Mossberger et al., 2003; Oden, 2004). Mossberger, Tolbert and Stanbury (2003) further point out that for a condition to qualify as a policy issue rather than a personal concern, there must be something at stake for the larger society. What defines the access divide and skills divide as appropriate issues for public policy are the ***uses*** of information technology.

Several scholars also point to the inequality in the ***social support*** on which computer users can draw, including formal technical assistance from persons employed to provide it and technical assistance from friends and family members to whom the user can turn

when he or she encounters problems; and emotional reinforcement from friends and family (DiMaggio et al., 2001, 2004; Kvasny, 2002; Hargittai, 2003). Kvasny argues that social capital is an important variable affecting ICT. Gaining access to new social resources at a computer center is as critical as gaining access to hardware (Kvasny & Truex, 2000; 2001; Kvasny, 2002).

A number of scholars argue that efforts to increase computer literacy in underserved communities must go beyond physical access and connectivity and consider the role of ***psychological and cultural factors***. Stanley (2003) argues that beyond the costs associated with access and a lack of proximity to computers, several social and psychological obstacles interfere with individual motivation to engage with and thus potentially benefit from this new technology. He points out three non-cost-related psychosocial obstacles that significantly undermine motivation for acquiring computer skills: 1) relevance; 2) comfort zone; 3) self-concept. Oden uses another term—mental barrier—to make a similar argument, which refers to the lack of knowledge about the potential value of the technology, anxiety, the lack of interest, and fear of new technologies (Oden, 2004).

Other factors considered in the conceptual frameworks for examining the digital divide include: 1) ***Cultural capital***: which refers to the accumulated stock of knowledge of prestigious forms of cultural expression which is learned primarily through socialization in the family and in educational institutions (Kvasny, 2002); and 2) ***Institutional reform***: which is the nature of the institutions that people belong to, the relations of power that exist in those institutions, and the types of institutional reform that occur. All these factors seriously affect whether people can make meaningful use of ICT (Kvasny 2002; Mossberger et al., 2003; Oden, 2004).

2-2. Access – Closing the Digital Divide

One of the most puzzling aspects of the information revolution is its differential impact

on the rich and the poor due to inequalities in access, distribution, and use of information and communication technologies. The digital divide, as discussed earlier, is a large structural impediment to equal access. Because access is so central for properly conceptualizing the digital divide, researchers and policy makers have been trying to unpack and redefine the concept of access to ICTs.

As discussed in the previous section, digital divide scholars tackle the issue of inequalities in the diffusion of ICTs by (re)conceptualizing the digital divide from a broader and more holistic perspective. They confront the issue of the digital divide in a way that these inequalities are seen as gaps, barriers, obstacles, or simply put, as ***problems***. On the other hand, scholars, who have dedicated themselves to (re)conceptualizing the meaning of access, look at the very same issue of inequalities through a different lens, which sees ICT access as the ***solution*** to the problems.

Both sets of scholars believe that access to ICTs requires a number of distinct elements to be present to ensure effective. Access is not an end in itself. Access only enables further activities that can only partially be specified beforehand (Lentz, et al., 2000). What access scholars have been trying to do is to develop more comprehensive and meaningful measures of relationships between: 1) access and utilization of contemporary ICTs and 2) capacities to improve socioeconomic outcomes and political/cultural participation by individuals.

2-2-1. Multi-faceted Meanings of Access

As in the digital divide research, several scholars studying ICT access have also attempted to understand the notion of ICT access by deconstructing it into multiple dimensions. This section summarizes all available literature published by these ICT access scholars. A synthesis of all these literatures, along with literatures on the digital divide, is presented later in Section 2-3 in this chapter. An annotated literature review of these studies regarding ICT access is provided in Appendix B.

The first dimension of access to ICTs is ***technological access***, which refers to the physical availability of suitable equipment, including computers of adequate speed and equipped with appropriate software for a given activity (Kling, 1998; Bridges.org, 2002; Warschauer, 2003; Wilson, 2004; Czerniewicz & Brown, 2004; Van Damme et al., 2005). Clement and other researchers (1998) further identiy three technical aspects of this first dimension: 1) carriage facilities that store, serve or carry information; 2) physical devices that people operate; 3) software tools that run the devices and makes connections to services. Warschauer (2003) adds another technical aspect into this first dimension of ICT access: 4) conduit, which necessitates connection to a supply line that provides something on a regular basis. Van Dijk (1999) uses another term—material access—to refer to this same conceptualization of ICT access. Czerniewicz, L and Brown, C. (2004) believe that the notion of technological access has to be expanded to incorporate *practical* considerations such as time and autonomy.

The next critical dimension of ICT access is ***skill access***, which refers to the extent to which potential users are able to handle ICTs (Van Dijk, 1999; De Haan, 2004). Bridges.org uses another term—*capacity*—and argues that people have to understand how to use computer technology and its potential uses (Bridges.org, 2002). Warschauer refers to this critical dimension of ICT access as *literacy* and points out that ICT access necessitates a skill level sufficient to process and make use of that information (Warschauer, 2003). Maike van Damme et al. (2005) argue that changes in society demand new competences and skills. Because of the growing amount of information on the Internet and people's increasing dependence on information, the importance of digital skills or information competence has also increased.

Ernest J. Wilson (2004) also points out that potential computer users need intellectual capacity to find the information they need, to process that information, and to evaluate and employ it to meet their personal needs. This argument brings out the next important dimension of ICT access: ***content/services access***, which refers to the actual information

that people find useful and communications services stored by or delivered through ICTs (Clement et al., 1998; Warschauer, 2003; Wilson, 2004; Czerniewicz & Brown, 2004). Bridges.org argues that locally relevant digital content must be available and appropriate to local needs and conditions (Bridges.org, 2002; 2005). Warschauer, in discussing the notion of digital literacy, argues that ICT access necessitates a connection to sources of information that get expressed as content within or via the physical artifact of ICTs (Warschauer, 2003). Wilson also argues that access to relevant programming, stories, and reports has to be made available in the user's own language (Wilson, 2004).

Kling (1998) argues that many ***social factors*** may influence the adoption, uses and usability of advanced information and communication technologies. These include skills training, facilitation, and social support that computer learners can receive via personal networks, service agents, or community-based organizations (Clement et. al., 1998). Mark Warschauer points out two resources that are critical to gaining full access to ICT: 1) ***human resources***, which refer to literacy and education necessary to revolve issues about ICT uses; 2) ***social resources***, which refer to the community, institutional, and societal structures that support access to ICT. Warschauer further argues that it is the social resources that help build human and other resources important for individual computer users to access ICTs (Warschauer, 2003). Czerniewicz and Brown (2004) use a different term and make a similar statement that ***contextual resources***, which include human institutions, groups and organizations, need to be accessed in order to successfully utilize ICTs. At a broader scale, these social factors contributing to full access to ICTs also include ***institutional access***. According to Ernest J. Wilson (2004), institutional access, which refers to the variety of organizational forms and regulations, plays an important role in shaping and controlling access to digital content. Wilson further argues that gaining political access to the decision making for design and distribution ensures a greater chance of getting sustained reliable access to ICTs (Clement et. al., 1998; Wilson, 2004).

Several scholars also point out the importance of ***motivation*** as one critical dimension of

ICT access. Jos De Haan (2004) defines motivation as attitudes towards ICT, the interest in it, the will to use it, and the lack of fear of new technology. Maike van Damme et. al. (2005) argue that a positive attitude towards digital technology is becoming increasingly relevant to properly function in an information and network society. Mental barriers may restrict people from adopting new technology. The degree to which people are willing to adopt new technology has also been called "mental accessibility". Van Dijk (1999) also argues that the lack of elementary digital experience caused by lack of interest, computer anxiety and unattractiveness of the new technology is one of the main issues facing the ICT access.

2-3. Synthesis – A Comprehensive Model for Understanding the Digital Divide

As discussed in the previous sections, several scholars have been trying to conceptualize the issue of the digital divide by providing different insights into either the multi-dimensional nature of the issue itself or the multi-faceted meaning of access to information and communication technologies, through which the issue of the digital divide is expected to be solved.

There appear to be two distinct schools of thinkers who are concerned with the very same issue of the digital divide. On one hand, the "digital-divide camp" takes what I call the "problem-view" approach towards unpacking the nature of the digital divide. Scholars in this school use the terms "divides", "gaps", "barriers", or "obstacles" to label the problems or the concerns of the issue itself. On the other hand, scholars who focus on "access" take what I call the "solution-view" approach to look at the possible ways in which we can "bridge the divides", "close the gaps", or "overcome the barriers/obstacles" by providing sufficient and effective access to not just the technologies per se but also to the broader knowledge bases that support the utilizations of the digital technologies. To me, these two different views are two sides of a coin. They each look at complementary sides of the digital divide. In this study, I attempt to combine their views by providing a

more synthesized and integrated model.

In the following section, I first summarize all the different thoughts from each of the two camps and put them into two separate tables, one for the digital-divide approach; and another for the access approach. I then synthesize these frameworks together into what I believe is a more comprehensive model of the digital divide.

2-3-1. Individual Focused – Individual Empowerment

Before proceeding, let me stress one point. As discussed earlier in this chapter, the assumption is that ICTs are transforming our lives. In an information-based society such as ours, information plays a central role, economically, socially and individually.

Access to and use of ICTs, therefore, is essential to the existence of an *individual* in the information society. ICTs are conceptualized as an enabler that contributes to the economic, professional, and social success of an individual. They function as a portal, a gateway, leading to the information society.

To me, the purpose in understanding the issue of the digital divide, either from the problem-view or from the solution-view, is to explore two questions: 1) the question of "how"—how we can bring people (individuals) into the information society by guiding them to walk through the door of ICTs; 2) the question of "what"—what people (individuals) need in order for them to become capable of being a citizen of an information society.

2-3-2. Summary of Studies

In the Table 2-1, I summarize all the digital-divide models (frameworks) found in six articles. As expected, the ***technical-means***/***access*** dimension appears in almost all the frameworks (five out of six). The ***skill***/***knowledge*** dimension also appears in most of the

models (four out of six). Half the scholars (three out of six) also stress the importance of having ***social support***/***social capital*** and ***economic capital***/***cost*** in dealing with the issue of the digital divide. ***Autonomy*** (of use), ***use*** (purpose), and ***psychological***/***mental barriers*** are also listed as one of the many dimensions of the digital divide by some authors (two out of six). Other factors, mentioned only once by two authors in two separate articles, include ***cultural capital***, ***institutional reform***, ***democratic divides***, and ***experience***.

In the Table 2-2, I summarize all the access models (frameworks) found in nine articles. Again, not surprisingly, ***technological access***/***physical access*** dimension is listed in all of the nine access models. ***Skills*** (literacy, knowledge) dimension appears in almost all the models (eight out of nine). ***Content/services*** is listed in seven articles (seven out of nine). ***Governance/institutional access*** appear in five studies (five out of nine). ***Mental access/motivation*** appears in four models (four out of nine), followed by ***financial access*** (three out of nine), and finally ***socio-cultural access*** (two out of nine).

Table 2-1. A summary of all the digital-divide models found in six articles

	DiMaggio et al. (2001)	Kvasny. L. (2002)	Mossberger, Tolbert and Stanbury (2003)	Hargittai, Estzer, (2003)	Stanley L.D. (2003)	Oden, Michael, (2004)
Technical Means	x	x	x **Access**	x		x **Technology Knowledge Barrier**
Skills	x		x	x **Level of Skill**		x **Mental Barrier** (Knowledge) **Skill Acquisition Barrier**
Social Support	x	x **Social Capital**		x		
Economic Capital		x	x **Economic Opportunity**			x **Material Access Barrier** (Cost)
Autonomy	x			x		
Use	x					x **Effective Use Barrier**
Psychosocial Obstacles					x (Relevance, Fear, and Self-concept)	x **Mental Barrier** (Anxiety, Lack of Interest, Fear)
Cultural Capital		x				
Institutional Reform		x				
Democratic Divides			x			
Experience			x			

Table 2-2. A summary of all the access models found in nine articles

	Rob Kling, (1998)	Clement, Andrew, and Leslie Shade. (1998)	Van Dijk, (1999)	Bridges.org (2002)	Warschauer, Mark, (2003)	Wilson, E. J., (2004)	De Haan, J. (2004)	Czerniewicz, L and Brown, C. (2004)	Maike van Damme, Jos de Haan & Jurjen Iedema (2005)
Technological Access	x	x **Carriage Facilities, Devices, Software Tools, Service Providers**	x **Material Access**	x **Physical Access**	x **Physical Resources**	x **Physical Access, Design Access**	x **Possession**	x **Technology Resources**	x **Facilities**
Skills	x **Social Access**	x **Literacy, Social Facilitation**	x **Skills Access**		x **Human Resources**	x **Cognitive Access**	x **Digital Skills**	x **Resources of Personal Agency**	x **Computer Skills**
Economic Resources	x **Social Access**			x **Affordability**		x **Financial Access**			
Content, Services		x	x **Usage Access**	x **Relevant Content, Integration, Appropriateness**	x **Digital Resources**	x **Content Access, Production Access**		x **Content Resources**	x **Use of ICTs**
Governance		x		x **Legal Environment, Local Economics, Macroeconomics, Political Will**	x **Social Resources, Institutional, Community**	x **Institutional Access, Political Access**		x **Contextual Resources**	
Mental Access			x	x **Trust**			x **Motivation**		x **Motivation**
Socio-cultural Inequality				x	x **Social Resources, Societal Structures**				

A few things require some attention:

In the access camp

1. The seven-layered model developed by Clement, et. al. (1998) contains what they identify as three *conventional technical* aspects: carriage facilities, devices, and software tools. I combine them together, as they all are needed for getting on to the information superhighway, and put them into one category: ***technological access***.
2. Bridges.org (2002) has a fairly detailed framework for assessing the digital divide. To synthesize their 12 factors and fit them into a more compact (but yet comprehensive) model, I combine the four factors—legal environment, local economics, macroeconomics, and political will—together and link them to the ***institutional access*** category. The two factors—integration and appropriateness—are both associated with the ***relevant content*** dimension.
3. The framework developed by Wilson, E. J. (2004) also contains many dimensions that can be further re-organized. The design access, as he explains, is related to the human-computer interface; I therefore put it in the ***technological access*** category. The production access is associated with the ***content access***. The institutional access and political access are both a part of the governance (***institutional access***) dimension.

In the digital-divide camp

4. In the model developed by Odem, Michael (2004), the mental barriers (knowledge) and skill acquisition barriers (skills) can be combined together in the ***skills*** category.

2-3-3. A Synthesized Model of the Digital Divide

As I stated before, I see these two schools of thinking as two sides of a coin. They all aim at deconstructing the notion of the digital divide. As summarized just before, many scholars have conceptualized the digital divide or developed models of ICT access.

Van Dijk (1999) developed what he calls a cumulative model of access, whereby different kinds of access are experienced as successive stages and are conditional on each other. Mental access (motivation) is required first. Once this has been achieved a person can mobilize to material access (hardware). This will lead to skills access (which incorporates strategic, instrumental and informational skills) and only then is access to full usage obtained. De Haan (2004), Oden (2004), and later Maike van Damme et al. (2005) all follow Van Dijk's step in various degrees to develop similar models.

Several authors use the terms "capital" or "resources" (Kvasny, 2002; Warschauer, 2003; Czerniewicz & Brown, 2004) to emphasize that there are certain conditional aspects to access that are needed to be set in place for individuals to become capable of taking full advantage of ICTs, with technical access being, in my view, a primary condition.

I found the notion of accessing different kinds of ***resources*** a powerful way to describe what people use, need, and draw on in order to gain or acquire access to specific ICT uses and practices. Based on the summary of all the available frameworks, I propose a what I call synthesized model of the digital divide, which contain the following five dimensions:

Technology resources (physical access, facilities, affordability, autonomy, control):

> Refer to the physical availability of suitable equipment, including computers with appropriate software for a given activity and necessary network connection with sufficient band-width carriage. These resources are also expanded to incorporate *practical* considerations such as, affordability, time and autonomy of use.

Knowledge resources (skills, literacy):

> Refer to capacities that people need in order for them to understand how to use technology and potential uses, including new digital skills, information competence, knowledge, experience, and training.

Content resources (usage, purpose of use):

> Refer to the availability of suitable digital material online/offline, focused on relevance (to individual learners' needs), local production and language.

Social resources (institutions, social network, contextual resources):

Include human institutions, groups and organizations that need to be accessed in order to successfully utilize ICTs. Social networks provide both practical support and emotional support.

Psychological resources (mental access, motivation, appropriateness):

Refer to attitudes towards ICTs; the interest in them, the will to use them and the lack of fear of new technologies.

These five personal resources together support an individual CTC user and enable him/her to gain access to ICTs and move to the other side of the digital divide, and further become a citizen of the information society, as illustrated in Figure 2-1 and Figure 2-2.

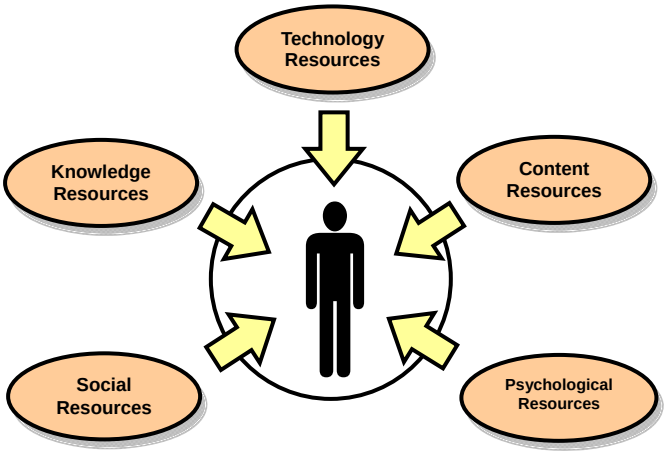

Figure 2-1. Model for closing the Digital Divide

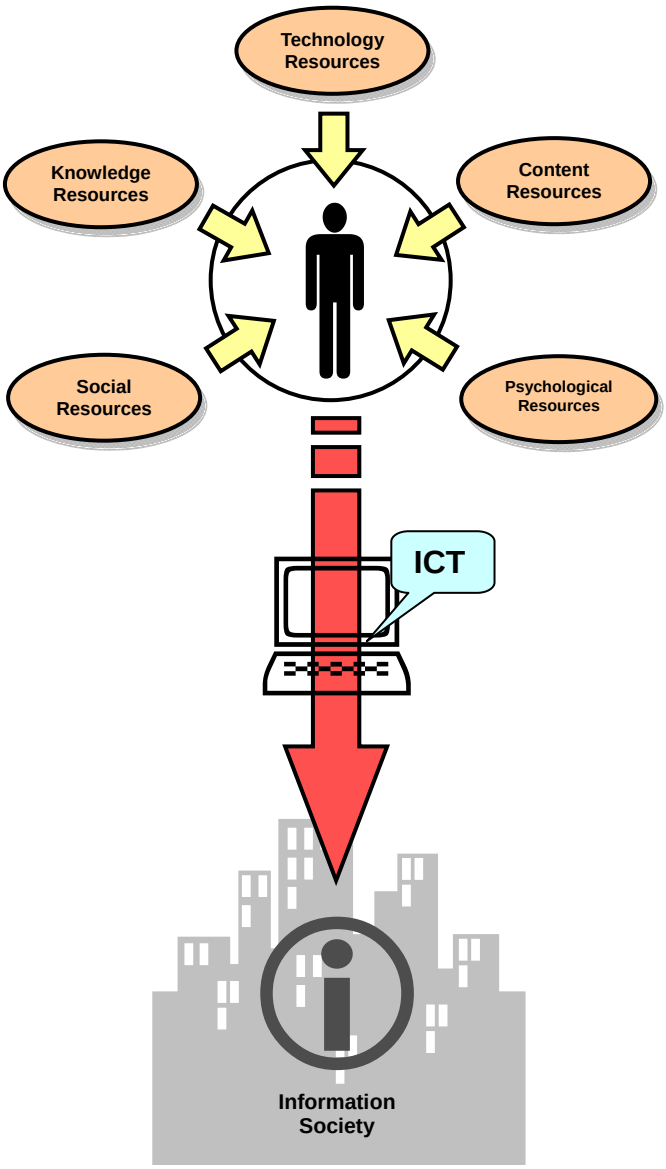

Figure 2-2. ICT – the Gateway to the Information Society

2-4. Community Technology

Since ICTs are the gateway to boundless information and since information is pivotal to the success of an individual in the information age, community access to ICTs can provide the key to reducing the existing socioeconomic gaps caused by the digital divide

(Dutta-Bergman, 2005). “To profit from the potentials opened up by ICTs, we must participate in them” (Sanyal & Schon, 1999). This is particularly true for the poor, who are already excluded from the economic, social, and cultural mainstream. Community technology initiatives have emerged as key efforts to help low-income communities and the urban poor gain access to and use ICTs (Servon & Nelson 2001).

The community technology movement began as a grassroots, community response to provide access to technology resources where inequities (due to the digital divide) existed. It is believed that those able to harness and apply the power of ICTs will have access to a wide variety of opportunities that span education, employment, arts, media, and communications. Community technology helps ensure that people are not deprived of such opportunities due to a lack of personal resources while at the same time fostering community development and connectedness.

Community technology centers (CTCs), one of the actual practices of the community technology movement, allow low-cost or free access to all sorts of computer technologies in an environment supportive of learning and close to homes.

2-4-1. Bridging the Digital Divide with CTCs

There appears to be a clear disconnection between the digital divide research and the practice of CTC. Most of researchers, introduced earlier in this chapter, who are dedicated to conceptualizing either the digital divide or the multifaceted meaning of access to ICTs, do not extend their investigations into the field of CTCs. Only a few attempts have been made by the following scholars to apply their conceptual frameworks (either of the digital divide or ICT access) to the CTC research.

Kvasny, L. (2002) presents a conceptual framework for a holistic approach for analyzing digital inequality going beyond common conceptualizations of the digital divide that narrowly focus on technology access and interface usability. This framework provides

concepts that can be used to explore the role of institutional, cultural, social, economic and technical forces in perpetuating inequality under the aegis of free public access. Using empirical examples from an ethnographic study of a community technology initiative, the author contends that unequal access is rooted in historical, institutional, economic, cultural and social conditions that underlie technology use and distribution as well as capital development. The author argues that while the technology is crucially important, we must also take into account environments and histories, as well as the local conditions of ICT access (Kvasny, 2002).

Stanley, L.D. (2003), by conducting an 8-month qualitative and comparative study at six community technology centers in San Diego county, California, identifies three non-cost-related psychosocial obstacles that significantly undermine motivation for acquiring computer skills: *relevance*, *fear*, and *self-concept*. The results suggest that, beyond the costs associated with access and a lack of proximity to computers, several social and psychological obstacles interfere with individual motivation to engage with and thus potentially benefit from this new technology. In short, the divide's topography is defined by psychosocial factors as well as by (physical) access. The author argues that non-computer users would be more willing to engage with this new technology if their assumptions, fears, and preconceived ideas about computers were preemptively addressed. The learning environment unique to community technology centers (CTCs) should play a pivotal role in helping them overcome their resistances (Stanley, 2003).

Trying to go the other way around this problem of disconnection between the digital divide research and the CTC research, I identify some of the CTC literature that, from various perspectives, base their investigations about CTC operation on the discussions of either the digital divide or ICT access.

O'Neil, D. and P.M.A. Baker (2003) emphasize the multifaceted aspects of access. They argue that any community technology initiative should operationalize access (to ICTs) as a complex issue of awareness and recognition of the utility of these technologies beyond

the question of "wires" (the physical aspects of ICTs). Providing ICT access must take into account the motivations and environmental factors that affect the development of a community technology outreach initiative. They study The Family Technology Resource Centers (FTRC) Program, which consists of 14 community technology centers in the Atlanta metropolitan area, Georgia. These authors conduct a program evaluation case study to understand how the program began, its most significant barriers to implementation, success stories, and future challenges. They conclude that the FTRC's successful efforts are tied to a combination of an environment suitable for change, the participation of key stakeholders with a shared set of objectives, and the ability of key change agents both internally and externally to draw upon resources to leverage a digital divide policy initiative (O'Neil & Baker, 2003).

To understand the digital divide, Kvasny and Keil (2006) contend that attention must also be given to the *social* aspect of the problem. Following Kling's (1998) definition of social access—the abilities of diverse organizations and people to actually use the services offered by ICTs, the authors argue that social access will be critical if computers are to be utilized to improve the life chances of disadvantaged people. The authors examine two community technology initiatives undertaken by two cities—Atlanta and LaGrange, Georgia. Atlanta's initiative has taken the form of community technology centers. Their findings suggest that isolated initiatives like those in the two cities, which are focused exclusively on technology access and training, may only have limited success unless some prerequisite requirements are met. These prerequisite requirements include those mechanisms that can generate cultural capital, social capital, and economic capital (Kvasny & Keil, 2006).

Kvasny (2006) further argues that community technology initiatives should see the digital divide more broadly as an unequal ability to achieve life chances that include, but are not limited to, access to ICT. The divide is not with technology per se; the divide is one of longstanding inequities in access to basic life chances such as education, safety, housing and healthcare. Therefore, programs should assume a holistic approach by

providing technical skills as well as strong linkages to existing social services such as workforce development programs, adult education programs, child and elder care programs, and transportation services. The author conducts an ethnographic study at a CTC in a low-income neighborhood in an undisclosed major U.S. city. The findings indicate that there are broader social, economic, technical, cultural and historical factors that both enable and constrain people's ability to engage with ICT. Differential benefits are attributable to characteristics such as social life circumstances, attitudes towards learning, fear of public failure and basic literacy skills, as well as the desire to maintain cultural practices that cannot be replicated in an online context (Kvasny, 2006).

Clark (2003) conducts an ethnographic study at the U.S. West Technology Center in Denver, Colorado. This study, based primarily on observation and analysis of public documents, aims to understand how community technology agencies define and attempt to address the needs of underserved populations with regard to new media technologies. One of the problems the author identifies is that the emphasis on closing the digital divide by solely technological solutions leaves at the margins any other considerations, including those that would influence how the technology might actually be used to meet social goals and translate them into economic or political benefits to prospective users. The author argues that if we really envision community technology centers where the technology is made accessible as locations for social change, we must provide both encouragement and financial support to those who work in these places to enable them to operate less as technological educators and more as advocates and activists, people who can act as conduits, bringing their resources and hence social capital into the realm of resources available for people (Clark, 2003).

Hayden (2007) conducts a qualitative study, which consists of 28 on-site interviews with the directors or managers of CTCs located in diverse residential areas in the Los Angeles area. The author argues that any notion of a "divide" that a CTC might alleviate must consider the *social context* within which such a divide emerges (Jung et al., 2001). For this reason, research acknowledges that *contextual* (cultural) and *environmental* (social)

considerations are important not only in evaluating the performance of CTCs in addressing the digital divide, but also in developing programmatic guidelines for future CTC policy intervention (Hayden, 2007). The author concludes that consideration of the broader implications of "social divides" (Morino Institute, 2001) on the efficacy of community technology programs involves providing meaningful access that connects with the specific needs and communication profile of a given geographic community. Such a philosophy is espoused by CTC organizations such as the Los Angeles CTCNet affiliate, the Community Technology Organizing Consortium, which advocates a digital divide strategy aiming for digital inclusion (Hayden, 2007).

2-4-2. Strategies for Running a CTC

Some of the academic research studies we discussed in sections above also offer some insights into how to operate a CTC in an effective way. In addition, several federal agencies offer technical support and guidance, through manuals or reports, on how to successfully start up and sustain a CTC. Community Technology Centers' Network—CTCNet also provides their affiliated member centers with their "Center Start-Up Manual", which details many important steps and needed resources for establishing and running an effective CTC (Stone, 2000). Other CTC start-up manuals or operation tips can also be found online from several foundation or regional CTC association (consortium) websites (U.S. Department of Education, 2003).

Most of these materials outline in fairly good detail both fundamental conceptual knowledge (such as knowledge about why a CTC is needed, what the digital divide means to an individual and to a local community) and procedural knowledge (such as steps of conducting community need assessments, running a fundraising event).

Since this study is concerned with the operational aspects of CTC management (managerial aspects of CTC operation, CTC sustainability), This part of literature review will focus on the procedural knowledge that these manuals, guidelines, or online tool kits

present. Especially, I am interested to find out the following two things:

1. Resources needed for running and sustaining a CTC;
2. Community partnerships.

What CTCs Need in Terms of Resources?

Several researchers and CTC operation manuals or reports point out the importance of ***sustainable funding*** to the health of a CTC (Servon & Nelson, 2001; U.S. Department of Education, 2003; Stone, 2000; Strover et al., 2004). Simpson, Daws, and Pini (2004) focus their discussions on CTC's self-sufficiency and sustainability. While discussing the relationship of CTC's sustainability to being a public access point, these authors argue that public/private funding for a CTC provided on an ongoing basis through state/local government grants or private donors is crucial to sustaining a CTC (Simpson et al., 2004).

Personnel/human resources are another key factor contributing to CTC sustainability. The personnel of a CTC includes: 1) instructional and technical personnel; 2) training facilitators, tutors, and volunteers (O'Neil & Baker, 2003); 3) coalition members; 4) formal/informal community leaders (U.S. Department of Education, 2003); 5) other people with expertise that the CTC is likely to need (accounting, equipment maintenance, evaluation, etc. (Stone, 2000).

One other component of CTC sustainability is being able to ensure ongoing maintenance of the service; including effective management, maintaining equipment in serviceable condition and periodic upgrading (both hardware and software) to reflect developments in the technology. This requires access both to suitably qualified personnel and to ongoing funding (Simpson, Daws, & Pini, 2004). Servon and Nelson (2001) identify this factor as ***supporting technical assistance*** (Servon & Nelson, 2001).

Operational capacities of meeting the demand of services, such as 1) connectivity requirements (Strover, Chapman, & Waters, 2004); 2) space/facilities where the CTC can be located; 3) rehabilitation of CTC space including wiring; 4) equipment, hardware,

furniture & furnishings, copiers, etc. (Stone, 2000), are also critical to CTC sustainability.

Another important component of CTC's sustainability is being able to ensure ongoing ***support from local communities***. As Strover et al. suggest (2004), this can be done by fostering community sponsorship and partnership; collaborating with local non-profit organizations; and working with government programs that serve similar populations (U.S. Department of Education, 2003; Strover et al., 2004).

Other key factors mentioned in literature relating to CTC's sustainability are briefly listed below: 1) donations in kind (services or equipment instead of money) (U.S. Department of Education, 2003); 2) complementary programs (e.g., adult literacy, after-school, job training and/ or placement, recreational, elder services); 3) jobs for participants who acquire new skills at a CTC; 4) publicity and ways to promote a CTC (Stone, 2000).

CTC as a Community-based Practice

Servon and Nelson (2001) point out that CTCs cannot be expected to solve the problem on their own. CTCs must be viewed as one component of a comprehensive solution to bridge the digital divide. CTCs must work in tandem with other local institutions, such as schools and government agencies, in confronting the problem of digital inequality (Servon & Nelson, 2001).

Simpson, Lyn, Leonie Daws, Barbara Pini, (2004) argue that these public access points (CTCs) should be re-conceptualized as essential community infrastructure like schools and libraries, rather than potential economic enterprises. While trying to identify issues affecting the economic sustainability of public access points in rural Australia, the authors argue that resolving these issues (of sustainability) requires a re-conceptualization of how public access points are funded and of how judgments are made regarding their effectiveness. This would mean re-defining the sustainability of a public access point in terms of the outcomes it produces relating to social and community

betterment rather than just economic gain (Simpson et al., 2004).

CTC success will be determined by whether or not the public access point serves its intended purpose. This depends on the degree to which it is able to engage the community, although which sectors of the community need to be engaged may vary according to the perceived purpose of the service. The provision of public access points needs to be re-conceptualized as an essential community infrastructure rather than as an economic development strategy. If this is accepted, then sustainability should be measured in terms of effectiveness of community engagement with the service rather than just in terms of the economic self-sufficiency of individual public access points (Policy Research Project, 2002; Simpson et al., 2004).

O'Neil and Baker (2003) emphasize the importance of establishing partnerships from within the community, as a means of leveraging available community resources. Community partners support CTCs in unique ways by contributing resources such as hardware, courseware, educational materials, cash contributions, job counseling and placement services, college credit, mentoring, legal services, expanded community-based services, and educational services (O'Neil & Baker, 2003). Kvasny (2006) provides one example: she urges managers of CTC initiatives to establish strong partnerships with community colleges and computer certification programs so that participants can more easily gain entry to advanced training and employment, or programs that promote the communicative and entertaining functions of ICT (Kvasny, 2006).

Several scholars point out that community technology centers have the potential to fulfill an important social role as a "public place" in a geographically-defined community.

Clark (2003) argues that one of the most promising forms of social good to emerge from CTCs (the U.S. West Technology Center) is the fact that they themselves can serve as a "third place", or a "core setting of informal public life", where local people from an impoverished neighborhood could gather informally outside of home, school, work, or

commercial settings (Clark, 2003). Hayden (2007) also makes the claim that the ability of a CTC to function as a public space can contribute to the growth and sustainability of the community at large, because, as a public space, a CTC can "encourage a range of social actions" and "increase participants in a civil society" (Hayden, 2007). The author further argues that there appears to be a disconnection between the efforts of CTCs and those of the community-building movement. The apparent "organizational divide" (Kirschenbaum & Kunamneni, 2001) between the CTC and the community-building movement has previously hampered the ability of CTCs to function as a community-building or sustaining intervention. The author suggests that CTCs should look to embrace other community organizations to reach their own goals or contribute to a broader community-building mission; at the same time, those in the community development movement will be embracing hesitatingly the role that technology might play in their efforts (Davies et al., 2003; Kirschenbaum & Kunamneni, 2001; Hayden, 2007).

2-4-3. Operating Model of CTC – Digital Divide Model Expansion

In the previous section, I developed a model of the digital divide and identified five types of resources that an individual has to draw from in order for him/her to gain or acquire access to specific ICT uses and practices. This model focuses on an individual level of computer use and is based on the assumption that citizens of an information society will benefit from gaining ICT access and uses.

However, not everyone has access to ICTs for various reasons, especially low-income disadvantaged populations. As discussed earlier in this section, community technology centers provide access to technology resources where inequities exist. Community access to ICTs, in the form of CTCs, provides the key to reducing the existing socioeconomic gaps caused by the digital divide.

Now my attention turns to the following questions:

How can a CTC operate effectively to better fulfill its role in closing the gap caused by the digital divide? More precisely, based on the model of the digital divide developed above and that five basic personal resources for gaining effective access to ICTs have been identified, *how can a CTC help its users in terms of these five basic resources? What operational resources does a CTC need in order to be able to offer the five personal resources to its users?*

To better answer these questions, an operating model of CTC has to be developed first. I propose a two-way approach to this effort:

1. Based on individuals' needs (the five resources), we can expand the model of the digital divide outwards into the CTC domain and see what "resources" a CTC requires to operate.
2. Based on the review of literature on the CTC operation discussed earlier in this section, additional "resources" that a CTC has to rely on can also be identified.

The five resources identified in the model of the digital divide can be translated, for CTC operation, into "operating resources" that a CTC needs in order for itself to be able to fulfill its role as an effective public access point.

Technology resources:

- Factors related to physical access, facilities, and affordability can be translated into three operating resources: 1) ***technological resources*** (actual hardware equipment and software programs that a CTC needs for its programming and services); 2) ***funding resources*** (moneys, funds, grants that a CTC needs to purchase equipment and software packages); and 3) ***personnel resources*** (staff members that a CTC needs for the hardware/software maintenance purpose)
- Factors related to autonomy and control can be translated into ***facility resources*** (space with proper furnishing to which a CTC maintains full access)

Knowledge resources:

- Factors related to skills and literacy can be translated into ***personnel resources*** (staff members that a CTC needs for the training/curriculum design/course development/teaching purpose)

Content resources:

- Factors related to usage and purpose of use can be translated into two operating resources: 1) ***personnel resources*** (staff members needed for the content production/programming purpose), and 2) ***social/cultural resources*** (social networks, community-based groups, or social service agents, which can provide a CTC with assistance in content production and curriculum development)

Social resources:

- Factors related to institutions can be translated into ***institutional resources*** (educational institutions, such as schools or libraries, or city departments, public service agents, with which a CTC can collaborate to seek assistance in funding, programming, or curriculum development)
- Factors related to social network and contextual resources can be translated into ***social/cultural resources*** (social networks, partnerships with community-based organizations, collaborations with social service agents serving similar populations, from which a CTC can leverage resources for operating and sustaining its programs/services)

Psychological resources:

- Factors related to mental access, motivation, and appropriateness can be translated into ***social/cultural resources*** (personal networking established and maintained among CTC users, tutors, and staff members for the purpose of creating a supportive learning environment within a CTC)

2-4-4. Summary of Studies

Table 2-3 summarizes all the resources needed for running a CTC found in six articles.

Table 2-3. Resources needed for running a CTC

	Servon, & Nelson, (2001)	O'Neil, & Baker (2003)	Strover, Chapman, Waters, (2004)	Simpson, Daws, Pini, (2004)	U.S. Department of Education (1999)	CTCNet, (1997; 2000)
Funding	x		x	x	x	
Personnel	x **technical assistance**	x **Instructional and technical, Maintenance, Training**		x **maintenance**	x	
Programming	x **services**					x **programs**
Technological		x **software support**	x **Connectivity**			x
Community, Social /Cultural Resources, Institutional Resources			x **Partnership, Community sponsorship**		x **Government programs, Non-profit organizations**	x **publicity**
Facilities						x **space, equipment, furniture**

The ***programming resources*** are associated with ***personnel*** (for the reason that content production/programming is done by technical personnel) and ***social/cultural resources*** (for the reason that content/programs are highly related to social status and cultural orientation of CTC users). Therefore, this ***programming*** category splits and merges with ***personnel*** and ***social/cultural*** categories.

Briefly, six categories of operating resources for running an effective CTC are identified:

Technological resources

Refers to the physical availability of suitable equipment, including computers with appropriate software for given activities in a CTC and necessary network connection with sufficient band-width carriage, also include other hardware devices such as scanners, digital cameras, printers, projectors, copiers, and so on.

Facility resources

Refers to space and location requirements, furniture and furnishings for a CTC.

Funding resources

Refers to public/private funds, cash contributions, donations for personnel cost, equipment purchases, monthly payment for network connection, electricity, and so on.

Personnel resources

Refers to staff, including: 1) paid staff – typically required to support the on-going operations of the CTC; 2) volunteer staff – offering non-mission critical skills, such as class teaching, mentoring, equipment maintenances; 3) professional services – specialized skills required for periodic functions such as legal, accounting and technology.

Social/cultural resources

Refers to formal and informal social networks/coalitions/partnerships, including community-based organizations that can help build social capital and further develop community competence; personal networks of all CTC users that offer mental/psychosocial supports or substantial computer assistances.

Institutional resources

Refers to CTC national/regional consortium, such as CTCNet, which works through the CTC Network to provide resources and advocacy to improve the quality and sustainability of CTCs. Public agencies, department of commerce, community development, economic development, information technology, which either directly support CTCs through established community technology initiatives, or offer technical supports on relevant services related to CTC operation, such as employment, education, community affairs.

These six operating resources, identified in the literature, together enable a CTC to create a supportive learning environment for its users—the individual learners—to gain access to the five personal resources, which are identified in the model of the digital divide, as illustrated in Figure 2-1. As discussed above, these six operating resources have a direct relationship to the five personal resources, as those personal resources represent what individual learners *need* to cross the digital divide, while the six CTC operating resources represent what a CTC can *offer* to those learners based on their needs. For example, the *technology resource* in the model of the digital divide represents computer hardware and software that an individual actually uses, while the *technological resource* in the resource-based model of CTC indicates that a CTC must make these computer hardware and software available and accessible to its users. A CTC can achieve this goal by either using its *funding resource* to make purchases or donations by other organizations (*social resources*) or institutions (*institutional resource*).

Figure 2-3 illustrates this two-layered resource-based model of CTC, with the five personal resources constituting the inner layer and the six CTC operating resources forming the outer layer.

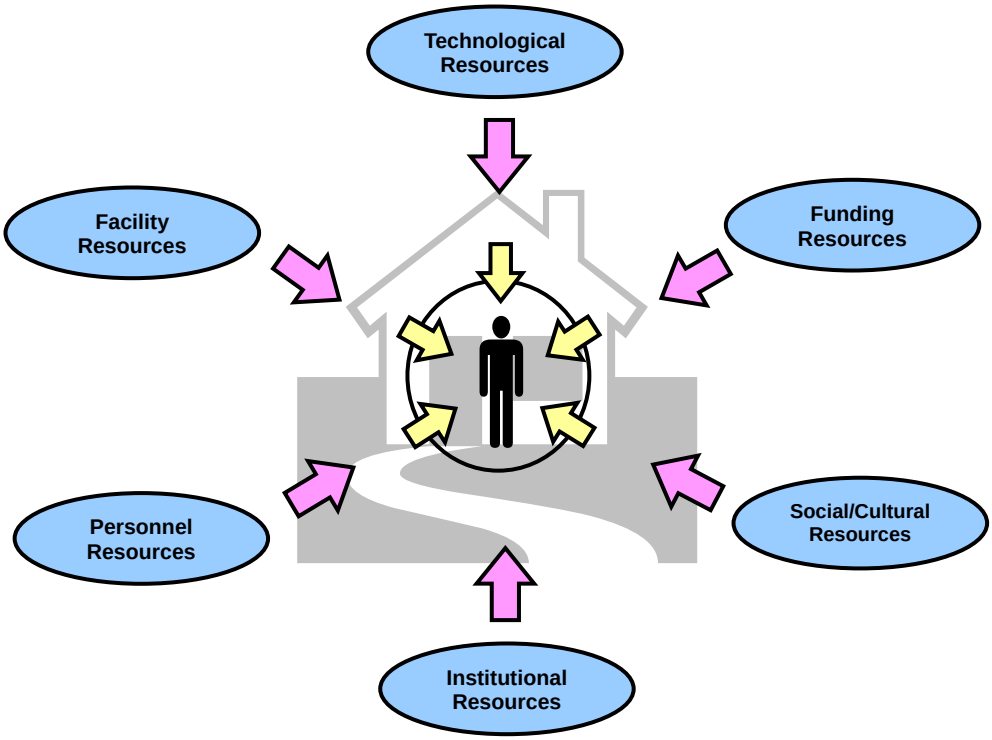

Figure 2-3. Resource-based Model of CTC

2-5. CTC – An Essential Community Infrastructure

Being Part of Community

As discussed in the previous section, several scholars stress the importance of community partnerships in running an effective community technology project. Servon and Nelson, (2001) point out that CTCs cannot be expected to solve the problem on their own. CTCs must work together with other local institutions, such as libraries, schools and government agencies, in confronting the problem of the digital inequality (Servon & Nelson, 2001).

Simpson, Daws, and Pini, (2004) argue that these public access points (CTCs) should be re-conceptualized as essential community infrastructure like schools and libraries. They further argue that any CTC's success will be determined by whether or not these public

access points serve their intended purpose. This depends on the degree to which the CTCs are able to engage the communities in which they serve. George Gundrey, in his online manual titled "Keys to Sustaining Your Community Technology Center" on TechSoup.com (2003), states that community support and partnerships are critical to the success of a CTC. When the wider community feels a real sense of ownership, a CTC will be much more sustainable (Gundrey, 2003). In a technical report titled "An Ideal CTC", prepared by "Evaluating Community Technology Centers, Policy Research Project" at LBJ School of Public Affairs at the University of Texas at Austin (2002), the authors argue that CTCs should see themselves as an integrated part of the community. CTCs must foster a sense of ownership in participants and other community members by making them active players in constructing the identity of the center; simply put, making participants believe the organization is their own (Policy Research Project, 2002). In an online manual titled "Tool Kit for Bridging the Digital Divide in Your Community" (U.S. Department of Education, 2003), one of the basic tips for building a strong CTC is to "identify the key players needed to build a strong coalition (in the community that the CTC serves). A coalition is vital to the success of any community technology project. The broader the coalition, the stronger it is.

2-5-1. Theories of Community - Place-based vs. Interest-based

Community partnerships—the mutual relationships and collaborations among community members toward community goals—are important to the success of a CTC, as discussed before. In this regard, a community is seen as both the "purpose" of a CTC project and the "source" of resources that power up a CTC. Before we can link these two aspects together, a basic understanding on how the term—*community*—is defined is crucial to the investigation.

As a term, community is at once both clear and complex. Its principal characteristics have been formulated (reformulated), summarized, and debated within sociology, psychology, geography, and a host of other social and professional sciences. It is also a term now used

very often in both public policy, public land management, and planning practices.

The concept of "community" may be defined in very different ways. Historically speaking, it has been used to characterize participants in aboriginal villages, tight-knit urban neighborhoods, or members of a specific profession (Katz, el at., 2004). Despite the overabundance of uses, with careful attention, two distinctive definitions can be identified: *Community of Place* and *Community of Interest*, as discussed below:

Community of Place

A "place-based community" refers to a geographically limited population who share a common local environment, often with a common set of values and characteristics. Place-based communities support physical lives. Homes, roads, schools, water supplies, police services, phone lines, recreational spaces, hospitals, and places of worship are some of the many needs met by local communities. Other various terms may be used, such as geography-based community, geographic community, physical community, or proximate community.

Communities of Interest

In contrast, a "community of interest" refers to a kind of human association, whose members do not necessarily know one another or meet in person on any sort of regular basis. Rather they are bound together by an identification with a common issue or interest. As a result, communities of interest do not reflect traditional notions of "common union" often identified with community as a place-based entity. This conceptualization of community is based not on reciprocal relationships that grow out of geographic proximity, but on the social bonds of shared ethnicity, culture, or common interest (Katz, et al., 2004; Wellman 1999; 2001).

Communities of interest have existed for centuries but are widely acknowledged to have become more significant as industrialization and urbanization began disrupting agrarian lifestyles. The industrial revolution reduced people's dependence on their neighbors,

increased their mobility, and expanded their social contacts. All of these factors contributed to new patterns of social (community) networks built on something other than a shared place.

2-5-2. Leveraging Available Resources from a Community

As shown in the CTC operational model I develop in the previous section, CTCs rely on a number of key resources to function effectively as public access points and further provide their users with personal resources needed for crossing the digital divide.

A number of scholars point out that CTCs should reach out to the local community that they intend to serve and try to seek those needed resources from the community. O'Neil and Baker (2003) emphasize the importance of establishing partnerships from within the community, as a *means* of leveraging available community resources. Gundrey (2003) stresses the importatnce of creating a systematic community mapping process to identify available resources (assets). Building and maintaining a list of institutions, organizations, businesses, and other influential people in the community is crucial to the health of a CTC. CTCNet's "Center Start-Up Manual" (2000) emphasizes the importance of engaging in a process of community mapping to identify interests and needs of prospective participants from a community. This process should also identify assets and strengths available through community enterprises and community members themselves. Asset-based community development (ABCD), well established in the field of community development and community building practice, provides a workable framework and applicable methodology for the CTC movement to follow.

2-5-3. Community development

Before proceeding to introduce the concept of asset-based community development, a basic understanding of its broader background—community development—may help establish a foundation for linking the two fields together with community technology on

one end and community development (ABCD in particular) on the other end.

Community development is defined as a planned effort to produce assets that increase the capacity of residents to improve their quality of life; in particular, efforts are focused on low- and moderate-income communities (Green & Haines, 2002). Community development has its roots in several academic disciplines, including social work, economics, urban and regional planning, with a diverse set of objectives (Rubin and Rubin, 1992; Green & Haines, 2002). As a result, community development has been practiced in a variety of ways, including local economic development, housing programs (especially affordable housing for low- and moderate-income people), social service provision (such as job-training), political empowerment, and city planning (Chaskin, 1999; 2001; Green & Haines, 2002).

Community development involves local empowerment through *organized* groups of people *acting collectively* to control decisions, projects, programs and policies that affect them as a community (Rubin & Rubin, 1992; Chaskin, 2001).

Key ingredients of community development are community-based organizations, which provide the means through which people work together to increase their control over decisions that affect them (Rubin & Rubin, 1992). Community development involves the creation of local organizations to help build assets. Community-based organizations (CBOs) are rooted in place and have extensive information about the community, and they are usually controlled by local residents (Green & Haines, 2002).

One of the principal vehicles to carry out community development activities in the US today is the community development corporations (CDCs). However, several different types of CBOs are found today and contribute to community development, too, (Green & Haines, 2002), including: *Local development corporations*—responsible for coordinating economic development activities; *Neighborhood associations, such as block associations*; *Community foundations*—non-profit organizations that provide long-term funds for other

CBOs; *Religious organizations*; and other *nonprofit* organizations—homeless shelters, tenant associations, block clubs, or recreational clubs (Green & Haines, 2002).

2-5-4. Asset-Based Community Development

ABCD is a process for "mapping" a community's assets and mobilizing these assets to address community-defined issues and solve community-defined problems. As an alternative to the more commonly practiced needs-based approach, ABCD shifts the focus of community development from "problem solving" to "asset building". ABCD takes a "grassroots" approach to community development, drawing upon the best of what a neighborhood has to offer (Arefi, 2004; Cuthill & Fien, 2005).

Kretzmann and McKnight (1993) identify three characteristics of asset-based community development:

1. *Asset-based* – Community development begins with what is present in the community, as opposed to what is absent or problematic in the community. It is focused on indigenous assets as opposed to perceived needs. These assets represent resources that can, and must be utilized in order to achieve positive and sustainable change.
2. *Internally focused* – Community development calls upon community members to identify their interests and build upon their capacity to solve problems. One of the distinguishing characteristics of community development is its heavy emphasis on leveraging that which is in the community first, before looking to outside entities and/or resources.
3. *Relationship driven* – Community development has also been defined as "any identifiable set of activities pursued by a community in order to increase the social capacity of its members" (Mattesich & Monsey, 1997). This requires the ongoing establishment of community partnerships—the productive relationships among community members—as well as the associated trust and norms necessary to maintain and strengthen these partnerships.

Asset-based community development can be an appropriate methodology for harnessing the individual and collective talents of the members of a community.

Asset building following the ABCD approach involves identifying and tapping all of the potential assets in a neighborhood. Neighborhood assets include the talents and skills of individuals, organizational capacities, political connections, buildings and facilities, and financial resources. (Page-Adams and Sherraden 1997) According to Mathie and Cunningham (2005), Kretzmann and McKnight's ABCD approach operates under the premise that neighborhoods can drive the development process themselves by identifying and mobilizing existing (but often unrecognized) assets, thereby responding to and creating local opportunity for positive changes. Such unrealized assets include not only personal attributes and skills, but also the relationships among people that fuel local associations and informal networks.

Asset-based community development contributes not only to the dignity of the individual but also to the vitality of a neighborhood. For individuals, it offers genuine care; for neighborhoods, it creates a strong sense of community. It takes a holistic, community-directed approach to development, and builds on sustainable and formerly underutilized resources (Diers, 2004).

2-5-5. Asset-Based Community Development and Community Technology

As discussed before, there appears to be a disconnection between the community technology movement and community development efforts. Adapting the concept of asset-based community development to the CTC practice is a little explored territory. Only a few academic studies have attempted to connect these two fields together.

Pinkett (2000) argues that the asset-based nature can ensure broad participation including residents, associations, businesses, and institutions when designing strategies to deploy a

community technology initiative.

Kretzmann and McKnight (1993) identify five steps toward whole community mobilization:

1. *Asset-mapping* – Mapping completely the capacities and assets of individuals, citizens' associations and local institutions,
2. *Building internal relationships* – Building relationships among local assets—community partnerships—for mutually beneficial problem solving within the community,
3. *Asset-mobilization* – Mobilizing the community's assets fully for economic development and information sharing purposes,
4. *Building a vision* – Convening as broadly representative a group as possible for the purposes of building a community vision and plan, and
5. *Establishing external connections* – Leveraging activities, investments and resources from outside the community to support asset-based, locally defined development.

Pinkett (2000) points out that these steps can also be applied to community engagement with technology.

1. Asset-mapping can identify the community resources that are relevant to the community technology initiative, such as the skills and abilities of residents, the products and services of neighborhood businesses, the social services and programs offered by local associations, and the resources found in local institutions such as schools and libraries.
2. Fostering internal connections by building community partnerships among members can increase the community's capacity to work together effectively to coordinate the initiative.
3. Asset mobilization can be partially mediated through ICTs, particularly given how well the Internet and the World Wide Web are suited to information sharing purposes.

4. Building a vision can help leaders in understanding how the various community constituencies can benefit from the initiative.
5. Establishing external connections can involve institutions in the initiative that lie outside the community, such as universities (i.e. research and evaluation) and philanthropic groups (i.e. funding). Links to these and other entities can greatly contribute to the initiative's long-term sustainability.

The author asserts that an asset-based approach to community technology and community development can be equally effective in achieving a social and cultural resonance that truly taps into the interests of residents and their community (Pinkett, 2000).

ABCD is an asset-based approach to community development that sees community members as active change agents rather than passive beneficiaries or clients. The best practices of community technology see community members as the active producers of community information, content, and services.

2-5-6. An Asset-based Model of CTC

This study tries to fill the vacuum and connect the two fields of research together: the CTC research and the asset-based community development research.

I presented the two-layered model of CTC in the previous section. The model illustrates that in order for a CTC to offer individual users five personal resources needed to cross the digital divide, the CTC itself needs to draw on six operating resources to ensure effectiveness. Furthermore, as discussed in this section, the CTC must establish partnerships from within the community in the hope that it can leverage available ***resources*** from the community.

Therefore, I now add the third layer (the community) into the model and develop what I

call a three-layered community-based model of CTCs, as shown in Figure 2-4.

This model simply illustrates that a CTC should look for ways to seek help for its operating resources (identified in the resource-based model of CTC, Figure 2-3) from its community. However, before a CTC can accomplish this goal, it has to step into the community and devote itself as ***an asset to the community*** for broader public good. In other words, a CTC has to build what I call a mutual two-way relationship—in the form of partnerships—with the community which it intends to serve and from which it plans to draw resources. An asset-based model of CTCs therefore is finally presented, as illustrated in Figure 2-5.

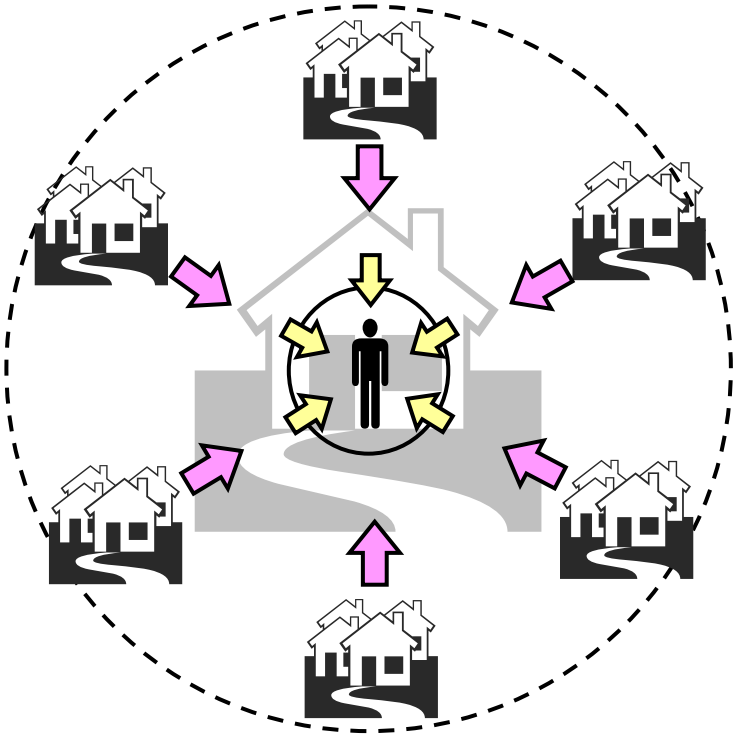

Figure 2-4. Community-based Model of CTC

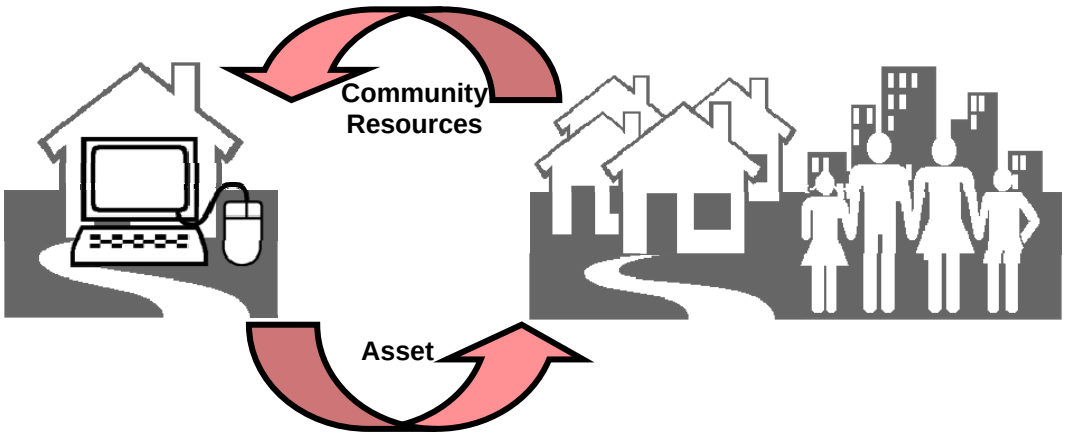

Figure 2-5. Asset-based Model of CTC

Chapter 3 - Research Design

This chapter first explains the theoretical framework that emerges from the literature review and forms the scaffolding for the research design. The chapter then describes the study's empirical framework: the methodology and the scope of the study. The subsequent section summarizes the study's approaches to data collection and analysis. The choice of Seattle as a study locale is also described in this chapter.

3-1. Theoretical Framework

How does a city-sponsored community technology center (CTC) in a dense urban area operate and sustain its services/programs? What resources must a CTC draw in order to continue its operation as a public access point for the community? How and where does a CTC locate and obtain these resources? How important are community partnerships to ensure CTC sustainability? How can the rich body of knowledge regarding community development help build CTC sustainability? This study asks these questions from within a particular theoretical framework, in which the conceptualizations of the digital divide, the multi-faceted meanings of ICT access, and the experiences and knowledge emerged from the field of asset-based community development together lead to potential answers.

Many scholars have tried to re-conceptualize the digital divide or to deconstruct the meaning(s) of access to ICTs. In the field of the digital divide research, by focusing their investigations on barriers that prevent an individual from gaining full access to the information society, researchers claim that citizens in the digital age need not just technical access, but also skills, knowledge, and social support. This argument is fully supported by the multi-faceted concept of ICT access identified by the scholars in the

research field of ICT access.

The synthesized model of the digital divide (Figure 2-1), developed in Chapter 2, identifies five personal resources that are needed for an individual to be able to cross the technology gap and move to the other side of the digital divide. This model further functions as the first layer of the overall theoretical framework for the current study. The model of the digital divide also builds the foundation for investigating the issue of CTC's sustainability in that closing the gap and further empowering individuals to gain full access to the information society is regarded as the primary mission of the community technology movement.

Researchers and practitioners in the field of CTC identify six operating resources that support CTC's sustainability. Combined with the five personal resources identified before in the model of the digital divide, a two-layered model of CTC was also developed in Chapter 2 (Figure 2-3) with the second layer consisting of these six CTC operating resources. This two-layered model also establishes a direct linkage between this set of CTC operating resources and the five personal resources for closing the digital divide, as the inner layer represents the *needs* from a CTC user and the outer layer represents the *supplies* that a CTC must acquire in order to meet the needs of its user.

CTC researchers, practitioners, and community activists further argue that these operating resources must be located and obtained in the local community as illustrated in the three-layered community-based model of CTC, also developed in Chapter 2 (Figure 2-4). Built on top of this community-based model of CTC, an asset-based operating model of CTC stresses the importance for any CTC to have a mutual two-way relationship with the community, which it intends to serve and from which it plans to draw resources (Figure 2-5). If a CTC wants its neighbors to help with locating operating resources in the community, it then has to be a good neighbor first by situating itself in the community development system within the community. In other words, if a CTC wants to be able to enjoy and utilize the *assets* available within the community, it has to first prove

itself as an asset to the broader community and share its own resources with its neighbors. Finally, these two operating models of CTC (community- and asset-based) together function as the third layer of the theoretical framework for the study.

3-1-1. Research Criteria & Indicators

Based on the theoretical framework discussed in the previous section, a number of *factors* associated with CTC implementation and sustainability can be identified. These factors can be categorized into three groups: 1) individual empowerment; 2) CTC sustainability; 3) community partnerships. These factors further function as research criteria and indicators for the empirical research design utilized in the current study. The empirical framework of the study is described later in this chapter.

The notion of "gaining access to resources" is the central theme to the first two layers of the theoretical framework. A user of a CTC needs access to personal resources in order to take full advantage of what ICTs can offer to him/her. In order to provide its users with these resources at the individual level, a CTC itself needs to be able to access operating resources, which are critical for a CTC to become effective and sustainable.

The first layer of the theoretical framework, derived from the research of the digital divide and ICT access, informs the first category of these factors—individual empowerment. Five factors associated with personal resources necessary for an individual to gain full access to ICTs are identified in this category: 1) technology resources; 2) knowledge resources; 3) content resources; 4) social resources; 5) psychological resources.

The second layer of the theoretical framework, derived from the CTC research and practice, leads to the second category of the factors—CTC sustainability. Six factors concerning the operating resources critical to CTC implementation and sustainability fall into this category: 1) technological resources; 2) facility resources; 3) funding resources;

4) personnel resources; 5) social/cultural resources; 6) institutional resources.

The third layer of the theoretical framework, informed by the knowledge of asset-based community development, results in the third category of the factors—community partnerships. Four factors are related to this category: 1) asset-based approach; 2) internally focused effort; 3) relationship driven; 4) external connection. Furthermore, community partnerships are regarded as a *means* for a CTC to secure critical operating resources, which are identified in the first two layers of the model.

Table 3-1 provides a summary of all the factors with their brief descriptions.

Table 3-1. Factors derived from the theoretical framework

Concepts	Factors	Descriptions
Individual empowerment	Technology resources	Refer to the physical availability of suitable equipment and appropriate software; also expanded to incorporate practical considerations, such as affordability, time, and autonomy of use.
	Knowledge resources	Refer to capabilities that people need to use technology, including skills, competence, knowledge, experience, and training.
	Content resources	Refer to the availability of suitable digital material online/offline, focused on relevance, local production, and language.
	Social resources	Include human institutions, groups and organizations that provide both practical support and emotional support.
	Psychological resources	Refer to attitudes towards ICTs; the interest in them, the will to use them and the lack of fear of new technologies.
CTC sustainability	Technologocal resources	Refer to the physical availability of suitable equipment, including computers with appropriate software for given activities in a CTC and necessary network connection with sufficient band-width carriage, also include other hardware devices such as scanners, digital cameras, printers, projectors, copiers, and so on.
	Facility resources	Refer to space and location requirements, furniture and furnishings for a CTC.
	Funding resources	Refer to public/private funds, cash contributions, donations for personnel cost, equipment purchases, monthly payment for network connection, electricity, and so on.
	Personnel resources	Refer to staffing, including paid staff, volunteer staff , and professional services personnel.
	Social/cultural resources	Refer to formal and informal social networks/coalitions/partnerships, including community-based organizations and personal networks.
	Institutional resources	Refer to CTC national/regional consortium, such as CTCNet; public agencies, which either directly support CTCs through established community technology initiatives, or offer technical supports on relevant services related to CTC operation.
Community partnerships	Asset-based approach	A CTC project begins with what is present in the community. It relies on local assets as opposed to perceived needs. These assets represent resources that can be utilized in order to achieve CTC sustainability.
	Internally focused effort	A CTC initiative calls upon community members to identify their interests and build upon their capacity to solve problems. A successful CTC project puts a special emphasis on leveraging what is in the community first, before looking to outside entities and/or resources.
	Relationship driven	An effective CTC project requires the ongoing establishment of productive relationships among community members, as well as the associated trust and norms necessary to maintain and strengthen these relationships.
	External connection	CTC sustainability depends heavily on activities, investments, and resources from outside the community to support asset-based, locally defined community technology projects.

3-2. Empirical Framework

3-2-1. Research Questions

The current study takes a qualitative research approach to answer the following questions:

- What factors can contribute to CTC project implementation and sustainability?
- What role(s) can city officials play in CTC project implementation and sustainability?
- How important are community partnerships to CTC sustainability?
- What kind of knowledge of community partnerships developed in the field of community development can inform CTC project implementation and sustainability? How can this knowledge be applied to CTC initiatives?

3-2-2. Research Methodology

The current study falls into the qualitative inquiry category. The phrase "qualitative inquiry" refers in the broadest sense to research that produces descriptive data, including people's own written or spoken words or observable behavior (Strauss & Corbin, 1998). Qualitative research strives to understand individuals in their natural setting and how they interpret their world (Denzin and Lincoln, 2003). Qualitative researchers tend to look at the context of study and the participants as a whole. It is an inductive process in that researchers gain insight and a deeper understanding through patterns in the data (Strauss & Corbin, 1998).

This study is carried out by the comparative case study research method, which is one of several ways of doing case study research. Comparative case studies make use of multiple cases for the purpose of comparison. It is widely recognized that carefully constructed comparative case studies are valuable for the study of complex

socio-economic systems, particularly in unraveling causal links and underlying mechanisms.

Robert K. Yin defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context (Yin, 2003). Rather than using large samples and following a rigid protocol to examine a phenomenon, case study research method involves an in-depth examination of a limited number of cases of a single instance or event. Case study research can extend experience or add strength to what is already known through previous research. Case studies emphasize detailed contextual analysis of a limited number of events or conditions and their relationships. Social scientists have made wide use of this qualitative research method to examine contemporary real-life situations and provide the basis for the application of ideas and extension of methods. A key strength of the case study method involves using multiple sources and techniques in the data gathering process. Many well-known case study researchers such as Robert E. Stake, Helen Simons, and Robert K. Yin have written about case study research and suggested techniques for organizing and conducting the research successfully (Yin, 2003).

Critics of the case study method believe that the study of a small number of cases can offer no grounds for establishing reliability or generality of findings. Others feel that the intense exposure to study of the case biases the findings. Some dismiss case study research as useful only as an exploratory tool. However, as Yin points out that, by selecting cases purposefully, designing research procedures systematically and comprehensively, and verifying data accuracy carefully with participants, both the transferability and credibility of the research outcome can be achieved (Yin, 2003). Nowadays, researchers continue to use the case study research method with success in carefully planned and crafted studies of real-life situations, issues, and problems. Reports on case studies from many disciplines are widely available in the literature.

3-2-3. Research Locale: Seattle's Technology Matching Fund

Seattle was chosen as the locale for the study on account of the particular characteristics of the city.

First of all, Seattle is a community-oriented city and has had a strong tradition of neighborhood-based planning and service delivery. Its innovative neighborhood planning process has been broadly recognized as one of the pioneers in the American planning field (Martz, 1995; Diers, 2004).

Secondly, Seattle's high-tech economies, such as Microsoft, Boeing, and other bio-tech companies in the region, have together added to a techno-savvy atmosphere that makes Seattle residents believe that computers can play a valuable role in addressing social concerns and connecting citizens with resources offered by the public sectors (Servon & Nelson, 2001).

Thirdly, Seattle has in fact had a long history of promoting the concept of community technology and has incorporated neighborhood-level planning model into the establishment of its Community Technology Program. Seattle's Technology Matching Fund (TMF) Grant Program, modeled after its successful Neighborhood Matching Fund program, has helped more than 140 community-based groups establish their community technology projects since its inception. This rich pool of available cases makes Seattle an ideal laboratory for studying community-based computer learning initiatives. Furthermore, TMF's application review process, with its scoring criteria (Table 1-3), emphasizes three important areas: 1) Meets Program Goals—providing access to ICT and increasing computer literacy for Seattle residents; 2) Budget and Project Clarity—creating a workable business plan for CTC implementation; 3) Community Participation and Benefit—building community partnerships and focusing on community needs. These three key areas directly correspond to the three layers of the community-based CTC operating model, which forms the theoretical foundation for the

current study. Seattle's TMF program therefore makes a perfect case for testing the applicability of the theoretical model(s) developed in this study. A brief description of Seattle's TMF program is provided below:

Seattle's Technology Matching Fund (TMF) Grant Program was established in 1997 to support the community's efforts to close the digital divide and encourage "a technology-healthy city". The program provides grants for community-driven projects by matching in cash the community's contribution of volunteer labor, materials, professional services, or cash. TMF supports projects that reach technology underserved communities, thereby increasing "digital inclusion." The city's goals are to: 1) increase technology literacy; 2) increase access to computers, the Internet and other information technology; 3) increase residents' use of technology for community problem solving, civic engagement and community building.

Since its beginning in 1997, more than 140 community technology projects have been sponsored by TMF, ranging from after-school programs, adult education, employment opportunity consulting/training, to civic participation and community involvement. For this study, these TMF projects are categorized into four basic types: 1) Youth education; 2) Adult computer skill learning; 3) Immigrant/refugee assistance; 4) Other services for seniors or disabled populations.

3-2-4. Case Selection

The cases were selected through an information-oriented sampling technique, as opposed to random sampling. The basic idea behind information-oriented sampling is that critical or paradigmatic cases reveal more information because they activate more basic mechanisms and more actors in the situation studied.

The cases, TMF-sponsored community technology centers in Seattle, for this study were chosen using the following selection criteria:

1. The selected centers had to be currently active and still in operation.
2. The selected centers had to follow the TMF guidelines issued by the Seattle Community Technology Program and conform to all the requirements of center status documenting and reporting. In other words, a center's program application materials, annual performance and financial (matching fund) reports had to be available for review.

Based on the above selection criteria, one representative community technology center was selected for each of the four basic types of CTC in Seattle. Namely, a total of four CTCs were selected for the study. A fifth case was included as a pilot case. I applied the data collecting techniques (discussed later in the next section) to the pilot case to determine whether or not the interview and survey questions were appropriate and effective, and whether the planned timeline was feasible.

3-2-5. Data Collection

Four data collection techniques were employed in this study: 1) documentation review; 2) surveys; 3) interviews; and 4) on-site observations and informal conversations with center users.

1. Documentation review: a review of grant applications and program status reports of the selected cases was conducted; other documents were also included in the review process, including organization's mission statements, or any other written materials describing the organizations and their purposes.
2. Surveys: a survey was distributed to the program directors (managers) of the selected cases to collect basic information about the program operation in terms of resource management and community partnerships. All surveys were conducted prior to the interviews (described below).
3. Interviews: a semi-structured interview with the program director (manager) of the selected cases was conducted on the site. The primary goal of the interview was to gather information regarding community partnerships that each selected

case had engaged in the past. Another semi-structured interview with one representative from one of the community partners or sponsors of each selected center following the same interview protocol was also conducted as well. This supplementary interview was meant to collect views from "the other side" of the community partnerships to avoid any possible bias(es) on the issues. The representative for this interview were volunteers or managers of any organizations that support the selected CTCs.

4. On-site observations and informal conversations with center users: on-site observations were conducted during the regular center hours in order to understand each selected center's daily operation. Informal conversations with center users were carried out to collect viewpoints about center services and resources from users' perspectives.

3-2-6. Surveys

Survey questionnaires were prepared and posted online using the UW Catalyst QuickPoll web tool (UW Learning & Scholarly Technologies). A request for conducting the survey was sent via an email to all the partcipating center directors (managers) about two weeks prior to conducting the interviews with them. They had approximately a week to complete the survey. The survey results were used as references for the semi-structured interviews conducted afterwards (described below).

As mentioned above, the primary purpose of surveys was to collect data on selected centers' operation in terms of their resource management and community partnerships. The directors (managers) of these centers therefore serve as the primary participants for these surveys, since they are directly involved in these tasks relating to the centers' daily operation and long-term sustainability. The survey questionnaires were designed based on the theoretical framework of the study and cover the following three areas: 1) services and resources that CTCs *offer* to users; 2) resources that CTCs *need* to operate and sustain themeslves; and 3) resource-matching by community partners or sponsors. These three

groups of questionnaires were informed by the three categories of factors identified in the theoretical framework: 1) individual empowerment; 2) CTC sustainability; 3) community partnerships. The operationalization of these factors utilized in the surveys is summaried in the Table 3-2 below.

3-2-7. Interviews

Interviews were arranged by telephone and email. They were scheduled at a time and place convenient to the respondent (however, most of the interviews were conducted at the centers). Before an interview began, a consent form following the University of Washington Human Subjects Division guidelines was reviewed and signed by both respondent and researcher. With respondents' permission in advance, occasional questions were posed to the respondents via telephone or email as the data processing and analysis was underway.

The main purpose of these interviews was to further understand: 1) how and where the selected CTCs obtain help with resources for their effective operation, 2) community outreach efforts that the centers have been undertaking; 3) relationships between community partnerships and CTCs' sustainability. The directors (managers) of the selected centers again play the primay role in the interviews and were expected to provide their insights into the above issues. In addition to the center directors, one representative from centers' community sponsors or partners, such as volunteer groups, technicians, or financial donors, also served as the interviewees for the study.

The interview protocol was also designed based on the theoretical framework of the study. In particular, the third layer of the theoretical framework—community partnerships—guides the protocol design. Table 3-3 shows the operationalization of the concept utilized in the interviews.

Table 3-2. Operationalization of concepts as empirically observable factors and as workable questions

Concepts	Factors	Examples of questions
Individual empowerment	Technology resources	Does the center offer non-monitored computer access to the users?
	Knowledge resources	Does the center offer computer courses or skill training services?
	Content resources	Does the center provide the participants with useful and relevant information supplementary to the programs and services?
	Social resources	Is the center collaborating with other organizations to provide information helpful for the participants to gain skills and knowledge on ICTs?
	Psychological resources	Does the center offer programs at different skill levels to provide users with appropriate course content and learning environment?
CTC sustainability	Technologocal resources	Does the center have sufficient computer hardware facilities to support all the programs and services offered by the center?
	Facility resources	Has the center been able to secure the rights to use the space for operation for at least one full year?
	Funding resources	Besides TMF grant, is the center also receiving funding from other sources?
	Personnel resources	Do you have volunteers assisting in the program or service delivery?
	Social/cultural resources	Is the center receiving help from other community groups, community-based organizations with curriculum design for center's programs and services?
	Institutional resources	Besides cash reimbursements, what other forms of support is the center also receiving from Seattle's Community Technology Program?
Community partnerships	Asset-based approach	Do you see your center as an integral part of the community?
	Internally focused effort	Does your center have any forms of community outreach efforts that aim to engage with local residents or engage in any forms of community-oriented activities?
	Relationship driven	Does your center maintian a working relationship with other community-based organizations?
	External connection	Does your center utilize resources and leverage investments from outside the community to support your center's daily operation?

Table 3-3. Operationalization of concepts for the interview

Concept	Factors	Examples of questions
Community partnerships	Asset-based approach	Do you see being part of a community is a very important factor contributing to the health of your center's operation?
	Internally focused effort	How valuable is the support from the local community to the success of your project?
	Relationship driven	Do you think that it is true if a community technology center wants to receive sufficient support from its local community, it then has to be a good and valuable asset to the community first by contributing to the community in any positive ways?
	External connection	Is the center collaborating with other community groups, community-based organizations, or educational institutions (libraries, schools) to provide information or resources that may be helpful for the participants in gaining skills and knowledge on information technology, or to help develop program curriculum or services?

3-2-8. Data Analysis

The data analysis proceeded in four stages: 1) recording, 2) transcribing, 3) text coding; and 4) reporting. Recording of the interviews was done on a digital audio recorder. All the interview audio files were moved to a laptop for transcribing. Interview field notes or other debriefing notes, textural analysis, along with survey data also resulted in large amounts of hand-written notes or transcripts that contained multiple pieces of data to be sorted and analyzed. The main data analysis process was then initiated by coding and categorizing the data.

3-2-9. Coding

There are two approaches to coding data: 1) *a priori* coding and 2) *emergent* coding. When dealing with *a priori* coding, the coding categories are established prior to the analysis based upon some theory. With *emergent* coding, categories are established

following some preliminary examination of the data. This study employed both coding approaches. All the data were analyzed through an iterative process of coding to de-contextualize the data. I developed a list of coding categories (the content codes) *a priori* and amended this list with categories that emerge later from the fieldwork. The complete coding dictionary is presented in Table 3-4 below.

Table 3-4. Basic Coding Dictionary

Code	Concept	Description
R	**Resources**	
RP	**Personal Resources**	**Personal resources needed for an individual to gain effective access to ICT, based on the model of digital divide developed in Chapter 2**
RP_TC	Technology Access Computers	Text describes that a CTC offers its users access to computers and/or other computer-related peripherals that are usually directly connected to a computer, such as printers, scanners, monitors, projectors, tablets. Text describing open computer labs, or drop-in hours allowing users to have access to computers for general uses with or without assistance from CTC personnel. General uses include homework help, games, uses for personal reasons, uses for entertainment purposes.
RP_TO	Technology Access Others	Text describes that a CTC offers its users access to other electronic equipment or devices, which can be connected to a computer, but oftentimes can be used without a computer, such as digital cameras, digital camcorders, audio/video editing devices, or some devices with assistive technology designed for people with disability.
RP_K	Knowledge / Skills	Text describes that a CTC offers computer-related classes, workshops, tutoring, which give structured instructions on how to use computers or computer-related technologies (such as media, graphics, audio/video production) to its users or clients.
RP_C	Content / Uses	Text describes that a CTC provides its users with resources (such as computer tutorials, employment information, immigration laws, health care, child care, education, tax) by either giving out written materials (such as class handouts, brochures), or putting information on web pages, blogs or files in computers.
RP_S	Social Support	Text describes that a CTC is helping its users with learning computers by providing assistance in the forms of: 1) encouraging students working together; 2) offering peer-helpers (such as students from classes in the past); 3) encouraging participation from family members; 4) having social events/gatherings/year-end presentations; 5) making the CTC a public place for everyone.
RP_P	Psychological Comfort	Text describes that a CTC is helping its users with learning computers by 1) designing course curriculum in a way that students can learn at their own paces; 2) employing multiple methods to deliver the course content; 3) relating the course curriculum to users' cultural or religious backgrounds; 4) making help available when needed.

Table 3-4. Basic Coding Dictionary (continued)

Code	Concept	Description
RC	**CTC Operating Resources**	**Operating resources needed for a CTC to operate and sustain effectively, based on the two-layered operating model of CTC**
RC_T	Technology Resource	Text describes that a CTC purchased or acquired (through donations), or have other forms of access (such as sharing with other parties) to computers, other peripherals, electronic devices (such as digital cameras), and/or software, in order to put the center up and running.
RC_Fa	Facilities	Text describes that a CTC is housed in a physical location (such as a classroom space in a community center, an office or retail space, or other locations such as libraries, churches) for its operation. Text describing furnishing, or furniture condition in this location.
RC_Fu	Funding	Text describes activities that a CTC has done or is planning on doing with respect to grant applications or fundraising.
RC_P	Personnel	Text describes a CTC's staffing/personnel status, including numbers of full-time, part-time employees, volunteers, internships, including their respective responsibilities.
RC_SC	Social / Cultural Support	Text describes that a CTC works with other community-based organizations, neighborhood groups, resident associations, cultural groups, or local businesses, or individuals from the organizations described above on getting the CTC up and running.
RC_II	Institutional Support Internal Administrative Support	Text describes that a CTC work "internally" with its *parent organization* on activities related to CTC operation (such as fundraising, donation, curriculum design, equipment acquisition). Usually, this applies to those CTCs that are a part of an already-established organization.
RC_IE	Institutional Support External Institutional Support	Text describes that a CTC work with public officials in a local government or educational institutes (such as schools, or libraries), or other CTC-related organizations on activities related to CTC operation (such as fundraising, donation, curriculum design, equipment acquisition).
C	**Community Partnerships**	
CO	Outward Partnerships (CTC → Community)	CTC being an asset to a community, based on the asset-based model of CTC Text describes that a CTC is reaching out to the community by: 1) offering computer access; 2) offering computer classes; 3) other forms of resources available to the community (such as other classes, adult basic learning, ESL, citizenship workshop).
CI	Inward Partnerships (Community → CTC)	CTC receiving help from a community, based on the community-based model of CTC Text describes that a CTC is collaborating with other organizations or individuals in the community on setting up or conducting its own programs or services. Text describes that a CTC is receiving any forms of help with its own daily operation from other organizations or individuals from within the community.
N	**Narratives**	
NH	Narratives_History	Text of any length providing a characterization of a CTC, especially on its own history or the origin of the program.
NM	Narratives_Mission	Text of any length providing a characterization of a CTC, especially on its own mission or goals of the program.
NG	Narratives_Others	Text of any length providing a characterization of a CTC, for instance, describing its user demography, ethnicity, its context (such as the neighborhood/locale), anything other than its history, the origin, or mission of the program.

Chapter 4 - Data Analysis and Research Findings

Community Technology is a broad category of programs and activities that are undertaken by grassroots and community-based organizations to use the computer technology to support and meet the goals of a community. Community Technology Centers (CTCs), the actual form of the community technology movement in most cases, include a wide range of public and private organizations and institutions. As discussed above, CTCs vary along three dimensions: their organizational structure, their programming focus, and their target clients. This study attempts to investigate multiple cases that represent a broad array of different types of CTCs currently being practiced in the field, and further de-construct their practices and day-to-day operations in a hope that the factors contributing to their implementation and sustainability can be realized. This chapter describes the analysis and findings from the empirical work.

This chapter takes the following steps in analyzing the field work and leading to the findings. First, it introduces the five cases. Without a basic sense of their identity in their locales, their programming orientation, and their organizational structure, the driving forces behind their operations cannot be comprehended. These rather detailed narrative descriptions of all five selected cases cover the following six elements: 1) history and mission of the organization, including their parent organization if applicable; 2) programs/services offered; 3) facility and technological capacity; 4) funding capacity; 5) staffing capacity; and 6) community support and partnerships. This first section also includes a summary table, which provides a quick glimpse of all five cases. For those who want to go directly to the qualitative analysis of the field work, they can quickly examine the summary table, skip the narrative descriptions, and then jump to the second section of the chapter. The second half of the chapter analyzes all five cases according to the three

dimensions that emerged from the literature: 1) resources for individual empowerment; 2) resources for CTC sustainability; and 3) community partnerships. This data analysis section uses the 15 factors identified in the research design chapter and leads to the findings of the study. A detailed summary of the findings concludes this chapter.

4-1. Narrative Descriptions of the Cases

The five organizations, which together consist of a total of 13 Community Technology Centers, are located in the City of Seattle. Except Literacy Source, which is in the Fremont neighborhood, the other 12 CTCs are all located in the southern part of Seattle, including Beacon Hill, Delridge, White Center, South Park, and Rainier Beach. Figure 4-1 shows the locations of these CTCs in the Seattle area. Table 4-1 provides a quick glimpse of these five organizations and is followed by more detailed narrative descriptions of all five cases. These narratives are rather detailed and long. However, readers should bear in mind that the core of the case study, the major research instrument used in this study, is to tell the story of the cases. It is just the essential purpose of these detailed descriptions. The cross-case analysis described in the following section is based on these narrative descriptions of all five cases.

Table 4-2 provides a brief summary of the socio-economic status of the neighborhoods in which the five selected cases are located (City of Seattle, 2008c). The eight RecTech-affiliated CTCs are located in the southern part of Seattle. Most of them are in the three neighborhoods listed in this summary table: Columbia City, Rainier Beach, and South Park. Socio-economic indicators for the city of Seattle are also provided. In comparison, almost all these neighborhoods have relatively lower socio-economic status in such areas as: education, median household income, poverty, and slightly lower employment rates. One clear exception is the Fremont Neighborhood, which houses Literacy Source. However, attention must be paid to one important point, which is that many of these five selected cases serve only those populations who have certain special needs and do not necessarily live within these neighborhoods. For example, STAR Center

serves people with disabilities in the greater Seattle area; Literacy Source offers basic literacy training to all eligible adults in King County. In this type of cases, these CTCs serve populations who share a common interest. They form a so-called “community of interest” as opposed to a “community of place”, which is defined by geographical proximity, rather than interest. A more in-depth discussion of this contrast between these two opposite concepts is in Section 4-2-3 and Table 4-3.

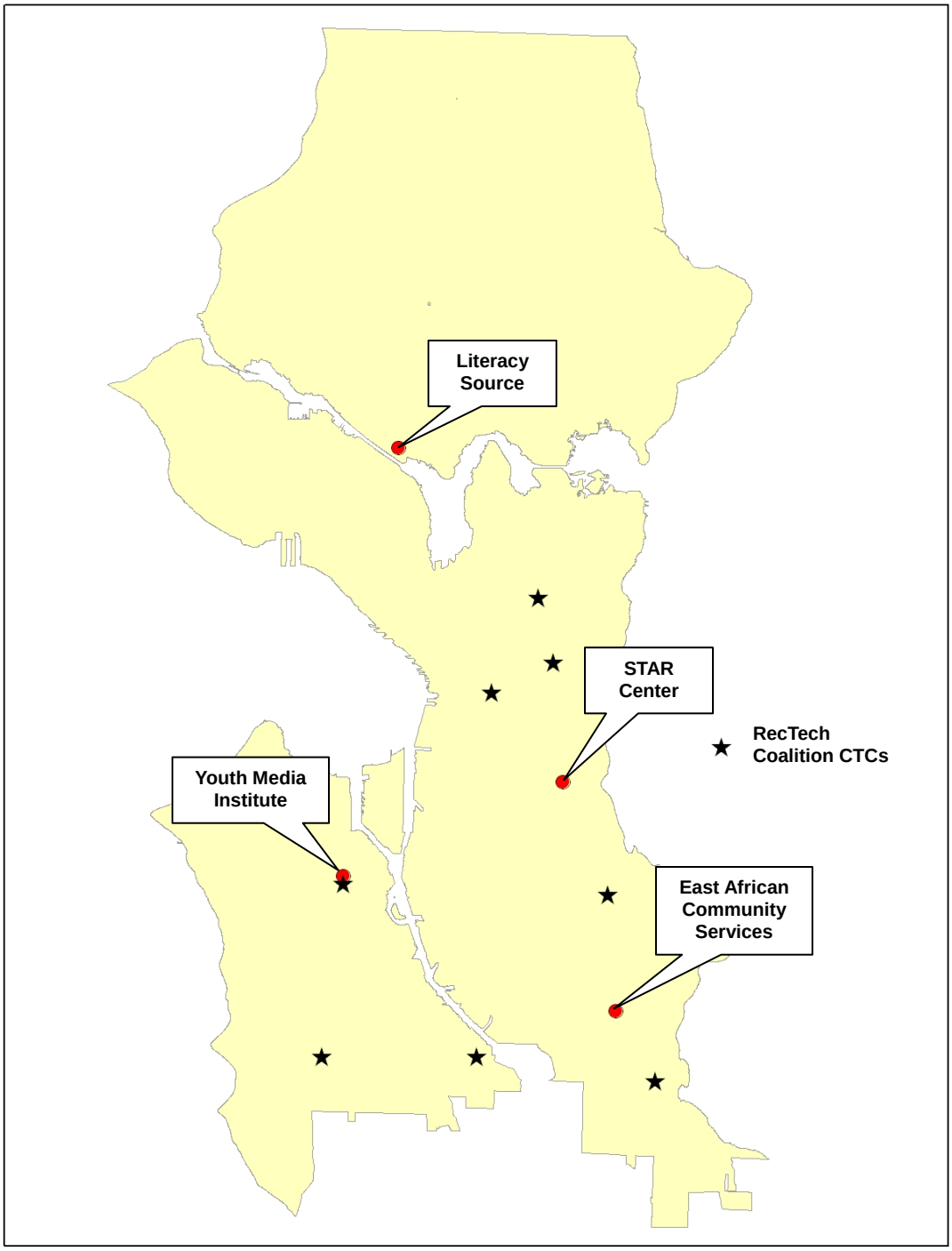

Figure 4-1. The locations of the selected CTCs

Table 4-1. Brief descriptions of five cases

	Youth Media Institute	STAR Center of Seattle	Literacy Source	East African Community Services	RecTech Coalition
Organizational structure	Stand-alone center	Stand-alone center	Embedded in a multi-service agency	Embedded in a multi-service agency	A network of 9 CTCs
Year founded (CTC program)	2004	1999	Around 2003, Literacy Source was founded in 1986	2007, East African Community Services was founded in 2000	2001
Location	Delridge	Mt. Baker / North Rainier Valley	Fremont	Holly Park (NewHolly)	Multiple locations in Southeast Seattle
501(c)3 non-for-profit	Yes	No	Yes	Yes	No
Fiscal sponsor(s)	White Center Community Development Association (prior to 2007)	Digital Promise Center Park Resident Council			Associated Recreational Council
Target population(s)	Youth	Disabled, Senior	Adult	Adult (95%) and Youth	Youth (majority population) and Adult
Target Ethnic group(s)	None	None	None	East African refugees and immigrants	None
Target geographic area(s)	Delridge, White Center	City-wide	King County	King County	South Seattle area
Programming orientation	• Multi-media • Graphics	• Assistive technology for the disabled • Basic computer skills	• Basic computer skills • ESL	Basic computer skills	• Youth: Multi-media, graphics, web design • Adult: Basic computer skills
Programs/Services	• Drop-in hours • Workshops on multi-media or graphics • Workshops on media justice	• Drop-in hours • Workshops on assistive technology or basic computer skills • Individual tutoring	• Drop-in hours • Computer tutoring on ESL • Workshops on basic computer skills	• Drop-in hours • Workshops on basic computer skills	• Drop-in hours (Teen-times and Adult-times) • Workshops on multi-media or graphics • Workshops on basic computer skills
Computers owned	6 Macs, has access to 5 more Macs, and 6 PCs	10 PCs	15 PCs, 2 Laptops	9 PCs	112 PCs (in 9 CTCs) 8 Macs (in 2 CTCs)

Table 4-1. Brief descriptions of five cases (continued)

	Youth Media Institute	STAR Center of Seattle	Literacy Source	East African Community Services	RecTech Coalition
Other digital equipment	• Digital cameras • Camcorders • Digital audio recorders • Has access to video/audio editing equipment	Some assistive devices for the disabled			• Digital cameras • Camcorders • Digital audio recorders • Video/audio editing equipment
Staff	Full-time: 1 Part-time: 1	Full-time: 0 Part-time: 2	Full-time: 5 Part-time: 10	Full-time: 4 Part-time: 3	Full-time: 4 Part-time: 7
Volunteers	None	13	Many	4	None
Paid temporary instructors	Yes	No	Yes	No	Yes
Funds/Grants received in the past years	• Annie E. Casey Foundation • Neighbor-to-Neighbor of Seattle • Technology Matching Fund 2007, 2008	Technology Matching Fund 1998, 2005, 2008	• Technology Matching Fund 2005 • Boeing Employees Community Fund 2007 • Community Technology Opportunity Program Grant 2008 • National Book Scholarship Fund • Seattle's Department of Neighborhoods	Technology Matching Fund 2007, 2008	• Technology Matching Fund 1999, 2001, 2002, 2005, 2007 • Bill & Melinda Gates Foundation 2006 • Allen Foundation 2008
Partner(s) helping with programming	• Third World Majority • Youngstown Cultural Arts Center • The Trusted Advocates • KBCS-FM • SCAN-TV • New Start • Seattle School District • Seattle Housing Authority • White Center Community Development Association	• UW Assistive Technology Clinic • Light House for the Blind • Division of Vocational Rehabilitation (DSHS) • Goodwill	• DSHS • Department of Correction • Refugee Forum of King County • Learning Disability Coalition	• Refugee Federation Service Center • Puget Sound Training Center • Somali Community Services of Seattle • Yesler Community Technology Center	• Seattle School District • Seattle Public Library • Seattle Arts Corps • Red Llama • Adobe Youth Voices • 911 Seattle Media Arts Center • Community Learning Center • Eritrian Community Center

Table 4-2. Socio-economic indicators of neighborhoods

		Youth Media Institute	STAR Center	Literacy Source	East African Community Services	RecTech Coalition		
	Seattle	**North Delridge**	**Mt. Baker/North Rainier**	**Fremont**	**South Beacon Hill / NewHolly**	**Columbia City**	**Rainier Beach**	**South Park**
Total Population	563,374	4,338	5,717	14,091	11,452	16,681	14,658	3,717
With a Disability	16.2%	11.6%	22.5%	11.6%	24.4%	24.4%	21.5%	24.6%
Bachelor's degree *Population 25 years and over*	29.9%	26.9%	24.9%	40.8%	12.2%	17.8%	15.3%	4.3%
Total Civilian employed *Age 16+*	66.3%	79.3%	67.1%	81,2%	62.2%	63.3%	62.3%	61.4%
Median housing value	$259,600	$208,938	$300,000	$273,512	$179,054	$181,560	$167,968	$119,999
Median HH Income	$45,736	$47,525	$53,684	$45,918	$42,341	$41,849	$45,712	$31,683
Percent Speaking only English	79.8%	78.9%	79.2%	92.5%	40.0%	56.6%	65.3%	52.9%
POVERTY STATUS	11.8%	11.1%	13.8%	9.6%	16.8%	15.0%	11.2%	12.5%
Foreign born	16.9%	14.2%	15.9%	6.9%	47.8%	34.6%	25.7%	33.6%

Source: City of Seattle (2008c)

4-1-1. Youth Media Institute (YMI)

History & Mission

The Youth Media Institute (YMI) was founded in 2004 initially as only a summer youth program for the White Center Community Development Association in the White Center community just south of Seattle. YMI was founded by Sharon Maeda, who is a longtime community media and social justice activist. Sharon created YMI as a resource for the youth in the White Center community (YMI, 2008). White Center is primarily a low-income community with one of the highest high school drop-out rates in King County. White Center and other surrounding neighborhoods are homes to many immigrant families from over 40 different countries, speaking 56 different home languages (YMI, 2008).

In 2004, the first summer program was held. YMI collaborated with Third World Majority, a media justice collective from the Bay Area, to create an intensive video workshop for youth. Since then, YMI has continued to offer their summer program in partnership with other community organizations such as New Start, a local alternative high school program. After the 2006 summer program, YMI expanded into a year-round program that allowed youth to build on the skills that they learned from the summer to create media projects for community organizations and events (YMI, 2008).

In 2007, with a number of grants received from City of Seattle's Technology Matching Fund, the Annie E. Casey Foundation, and Neighbor-to-Neighbor of Seattle, YMI moved into their current location in the Youngstown Cultural Arts Center in Delridge neighborhood (just north to White Center) and successfully completed another Youth Out Loud summer program. They have received another TMF grant in 2008 and implemented another run of Youth Out Loud summer program, which was focused primarily on getting youth involved in the 2008 Presidential Election with a special emphasis on media neutrality (Community Technology Program, 2008a).

YMI received their 501(c)3 non-for-profit status in the summer of 2008, prior to 2008, the White Center Community Development Association had been their fiscal sponsor for getting all their grants. They now see themselves an organization that strives to empower youth to become powerful leaders and artists by using media and digital graphic technologies to transform images about their communities, cultures, and themselves (YMI, 2008).

CTC Programming and Capacity

The Youth Media Institute is currently renting a small office for staff use and a media lab for class use from the Youngstown Cultural Arts Center, which is operated by the Delridge Neighborhoods Development Association. YMI owns six laptop Macs along with a number of digital cameras, camcorders, and digital audio recorders. They also possess and maintain another five laptop Macs that belong to the Youngstown Cultural Arts Center and six desktop PCs that belong to the Seattle School District, who is also renting an office there in the Center. YMI also has access to the multi-media recording studio and other facilities there in the Youngstown Cultural Arts Center. Figure 4-2 shows YMI's media lab and the video recording studio in the Youngstown Cultural Arts Center (source of photos: Youth Media Institute web site).

YMI believes that youth can use media and digital arts as a tool for self-expression, empowerment, and social change. They offer various programs that are focused on helping high school students gain a better understanding of how technology can be used as a tool for community media, advocacy and activism. YMI accomplishes their mission by providing training in various technology mediums, including new media technology (online video and audio segments, blogs), basic office software, how to create podcasts, how to use digital cameras, video and audio editing software, digital field recorders, and basic website creation (YMI, 2008).

Figure 4-2. Media Lab and Video Recording Studio in the Youngstown Cultural Arts Center

Other than the Youth Out Loud summer programs, starting from 2007, YMI has also been offering several After School workshops in collaboration with other youth-focused organizations. These time-limited, specific workshops provide the opportunity for YMI peer trainers to conduct trainings with other young people in the community. The topics for these workshops range from video production, graphic design to Media Justice 101 and more (Community Technology Program, 2008a). For this fall 2008 season, YMI is currently conducting five media workshops in collaboration with the Seattle Housing Authority at the High Point Community Center in West Seattle.

During the school year, YMI also offers drop-in Media Lab hours from 2:30 to 6:00pm, Mondays through Thursdays. The Media Lab is open to the youth during all drop-in hours.

Registration is required for all workshops and the summer programs. YMI usually admits around 15 students for each workshop and summer class. Students, who complete the entire session of the summer program, receive $500 scholarship and a certificate of completion (Community Technology Program, 2007a).

Staffing

YMI currently has one full-time director in charge of coordinating all workshops, writing grant proposals, recruiting students, and securing teaching artists and peer trainers for the workshops. YMI also has a part-time instructor, who is mainly responsible for all drop-in hours and the maintenance of all computer equipment and audio/video devices. She also helps in almost all the workshops and provides technical assistance to the students.

For most of the workshops, YMI hires a teaching artist to come in to teach the subject that is planned ahead by a collaboration between YMI and the artist. Oftentimes, those teaching artists offer their services as a volunteer at no cost. YMI also hires previous students as peer trainers to come in to the workshops and provide technical assistance to the participants. This past summer of 2008, through an organization called

Teen-in-Public-Services (TIPS), YMI acquired a summer intern to help out with some administrative work in the office.

YMI does not rely on volunteer help from the local community.

Community Support / Partnerships

Over the years, the Youth Media Institute has relied heavily on the collaborations and partnerships they have formed with professionals in the media and digital arts field. For example, the Trusted Advocates, a multicultural, multi-lingual group of community leaders that represent the South Delridge/White Center neighborhood have advised YMI students on how to produce audio and video segments relevant to the different ethnic communities in 2006. KBCS-FM, a local community radio station, has offered to host several radio production trainings with YMI students since 2006. YMI has been working closely with SCAN-TV, a local community television station, to build a collaboration. In 2007, SCAN-TV offered YMI students video production trainings and later broadcasted video clips on TV produced by the students.

After moving into the Youngstown Cultural Arts Center in 2007, YMI has also worked in partnership with Center's administration and other tenants, most of them are arts-related organizations, to offer more resources to YMI youth members, and also to other youth who participate in other organizations at Youngstown.

YMI has also partnered with New Start, the alternative high school program, and some of the high schools in the area to conduct outreach with their student populations. In addition, at the completion of the summer programs, YMI hosts a community event to showcase the work of the youth. Starting from 2008, they have also started to host a number of smaller community events in Youngstown, such as movie screenings or music showcases, to inform the community about the work YMI has been doing (Community Technology Program, 2008a).

4-1-2. Special Technology Access Resource (STAR) Center

History & Mission

The mission of the Special Technology Access Resource (STAR) Center is to be an all inclusive computer learning center which, through the aid of computer technology and skilled volunteers, provides those with physical disabilities with access to computers and the Internet through the use of Assistive Technology to further enable them to make choices to improve their lives (STAR, 2008).

STAR Center is located at the Center Park public housing high rise community. Center Park, owned and operated by the Seattle Housing Authority (SHA), was one of the nation's first public housing facilities designed for those with physical disabilities. In addition to the 140 residents, STAR Center serves the surrounding community and has established a reputation for providing support to the physically disabled by offering basic computer skills and Assistive Technology training. In addition to being physically disabled and/or elderly, a substantial percentage of the population in the service area of this center are typically low-income (Community Technology Program, 2005a).

With City of Seattle's Technology Matching Fund and the exhaustive work done by many residents of Center Park, SHA, City officials, and individuals from the community, STAR Center first opened its door on November 1, 1999 (STAR, 2008).

Because STAR Center does not have a non-profit status, a fiscal sponsor is always needed for STAR to be eligible for grants or other public funds. The Center Park Residents Council sponsored the first TMF grant in 1998.

In 2005, SHA contracted with Digital Promise to manage STAR Center. Digital Promise is a non-profit organization focusing on supporting community technology centers for low-income, elderly, and disabled housing communities in the state of Washington. Digital Promise successfully received TMF grant in 2005 and was able to upgrade all the

computer equipment/software and hire a subcontractor to be the executive director of the Center to carry out STAR's day-to-day operation.

In 2008, with the Center Park Residents Council being the fiscal sponsor, STAR Center was awarded their third TMF grant from the City of Seattle. STAR Center will use the grant to increase computer access for disabled individuals by delivering basic Assistive Technology training and consulting for seven other community technology centers throughout the Seattle area (Community Technology Program, 2008b).

CTC Programming and Capacity

STAR Center's computer lab is housed in the Center Park public housing complex. SHA granted STAR Center the rights to use the space at no cost. 10 desktop PCs are installed in the lab. Each computer is equipped with a number of Assistive Technology software packages, such as JAWS, ZoomText, and Naturally Speaking. Figure 4-3 shows STAR Center's computer lab in the Center Park public housing complex (source of photos: STAR Center web site).

STAR currently offers five training classes and workshops on various topics, such as Beginning Computing, Beginning JAWS, and Naturally Speaking tutoring. Prior appointments are required for most of the workshops. STAR does offer drop-in classes as well, such as PC continuing education workshop, allowing people to deal with any computer problems they encountered or just to expand their computing skills (web). Although STAR serves primarily the disabled, anyone at least 18 years old is welcome to use the Center as long as no class is in session.

For any new disabled computer learners, the executive director first gives them an assessment to get an idea about their abilities on both computer and basic literacy skills. She then assigns them to a workshop/tutor best fits their needs. Throughout the year of 2005, 67 individuals with physical disabilities received mentoring and training services in STAR Center (Community Technology Program, 2005b).

Figure 4-3. STAR Center Computer lab in Center Park

Staffing

STAR currently has no full-time staff. One part-time staff member acts as the executive director to carry out almost all day-to-day services in STAR Center, ranging from curriculum development, volunteer recruitment, computer tutoring and couching, to equipment maintenance. They also have one part-time staff who acts as the career development coordinator, whose main task is to assist all SHA residents to seek employment opportunities. STAR also heavily relies on volunteer help with daily operation and one-on-one tutoring. A total of 13 volunteers are currently helping STAR Center (Community Technology Program, 2008b).

Community Support / Partnerships

As a focal point for the Center Park community to assist people to achieve self-sufficiency, STAR Center values input from the community. In January 2005, in preparation for the 2005 TMF application, Digital Promise, the fiscal sponsor of STAR, met with the Center Park Resident Council, officials of SHA, and with users of the STAR Center to identify the needs of the community and discuss STAR's future (Community Technology Program, 2005a).

On the other hand, volunteers from the Center Park community, who are all residents with disabilities, have been a crucial driving force for STAR's day-to-day operation. STAR now relies on volunteer helpers to work on many daily routine tasks to keep the Center function, such as answering phone calls on the front desk, cleaning the lab and the office, making and posting schedules, and more importantly helping other disabled with computer tutoring.

Several organizations or institutions have stepped in and helped STAR with volunteer training or life skills workshops for the residents. For example, the Assistive Technology Clinic at the University of Washington offered a training session for STAR's volunteers in August 2008 to familiarize them with a number of Assistive Technology software packages.

STAR Center has also been working with other service providers to reach out to the potential clients and offer their services to a broader community. For example, STAR has accepted referrals from the Light House for the Blind, the Division of Vocational Rehabilitation (DVR) of the Department of Social and Health Services (DSHS), and other community technology programs in the Seattle area.

For the 2008 TMF project, which has been approved, STAR Center will help seven other CTCs in Seattle set up their own Assistive Technology training programs. These training programs will greatly expand the ability of these CTCs to serve disabled populations. The program will facilitate greater access to technology for a broader range of individuals with disabilities throughout the Seattle community (Community Technology Program, 2008b).

4-1-3. Literacy Source

Parent Organization History, Mission, Services

Literacy Source, A Community Learning Center, is a non-profit corporation registered with the state of Washington, and has 501(c)3 tax-exempt status from the U.S. Internal Revenue Service. Begun in 1986 as a project of Washington Literacy, Literacy Source has been providing adult literacy services since then. During their first few years, Literacy Source focused primarily on adult basic literacy instruction in Seattle's north end. Today their services include English as a Second Language (ESL) tutoring and conversation classes, workplace basic skills, citizenship and civics classes, immigrant and refugee beginning ESL, an individualized high school diploma program, and computer literacy (Community Technology Program, 2004). They also provide one-on-one jail tutoring to inmates at the King County Correctional Facility (Community Technology Program, 2005c). Their office, where many of their classes take place, is located in the Fremont neighborhood in Seattle. They also offer some classes in other locations. Their services are available to all adult learners in King County, free of charge.

CTC History & Mission

Literacy Source sees itself as s service provider that makes effective use of their resources to offer adults the tools and support they need to reach their goals. Increasingly important is being able to utilize the computer as a tool. Their Technology Expansion Project, financially sponsored by Seattle's Technology Matching Fund (TMF) in 2005, launched Literacy Source on "the first step to incorporating technology for their daily instructional offerings" (Community Technology Program, 2004).

However, Literacy Source actually started their computer tutoring service many years earlier than 2005. It started as a very small basic-skills-training program with only four computers located in the back of a classroom. Students could sign up for a session to meet with a volunteer tutor. Each week they could sign up with a different tutor or in stand-alone sessions. Over the years, Literacy Source has tried to increase the visibility and the capacity of their computer-based programs by 1) moving computers to a designated computer lab, 2) continually updating and refining hardware/software, 3) developing and improving curriculum for basic usage and online opportunities, and 4) staying current with instructional strategies utilizing computers (Community Technology Program, 2004; Boeing, 2007; State of Washington, 2008).

The TMF-sponsored Technology Expansion Project, launched in 2005, helped Literacy Source develop a computer curriculum that provides "flexible, project-based learning opportunities for students working on reading, writing, match and computer skills." This curriculum includes a new instructional component that allows students and volunteers to access learning materials and communicate through e-mails and the Internet. This computer-based enhancement also complements and increases the effectiveness of the individualized, person-to-person basic English literacy work done by the student-tutor pairs (Community Technology Program, 2004).

Later in 2007, with the grant money supported by the Boeing Employees Community

Fund, Literacy Source launched the Key Connections Project that aimed to "help bridge the digital divide for adults in King County by connecting students with two key resources: 1) access to state-of-the-art technology and 2) individualized instruction and classes" (Boeing application 2007). The Key Connections Project "completely modernized Literacy Source" by 1) more than tripling the number of computers available to students and volunteer tutors and 2) increasing the availability of computer-integrated instruction by 484 hours each week.

The Key Connections Project improved both literacy and computer skills by integrating them. In early 2008, Literacy Source started to offer more organized basic computer skills workshops. "Students can sign up for just the workshops they need, they can sign up for the series, those workshops like using Words, using the Internet to do searches, specifically kind of on their needs, adults learn to do Internet to look for maps, or using trip-planner for Metro or Mapquesting something like that, also internet job searching, how to set up an email account, using Publisher to create cards or flyers, using Excel to create budgets, all these workshops give the first-timers, inexperienced users, the skills needed to get started". Literacy Source believes that "computer skills are best learned when they are used purposefully and basic literacy skills are reinforced with the use of technology" (Boeing, 2007).

More recently in the summer of 2008, Literacy Source received the Community Technology Opportunity Program Grant (CTOP) from the State of Washington to carry out the Literacy Online Project. The purpose of Literacy Online is to provide the computer hardware and software, instructional resources, curricula, and professionally-led instruction so that high needs adult learners can obtain better jobs and better access essential resources in their community. With Literacy Online, Literacy Source will build on its computer program to improve the quality of instruction and increase technology access for high needs adult learners. A paid Technology Instructor will support staff members in achieving the project's principal goals: 1) develop a standardized Computer Tutor training program for all volunteer computer tutors; 2)

design curriculum for two modular, multi-track computer courses; and 3) extend small-group technology instruction to offsite locations where needs are highest (State of Washington, 2008). The Literacy Online Project is currently being implemented.

CTC Programming and Capacity

Literacy Source currently has one computer lab, which is housed in their rented office space in Fremont and equipped with 9 PCs. Their basic computer skills workshops take place in this computer lab. Registration is required for taking any of the workshops being offered in Literacy Source. Students are allowed to use the lab whenever it is open; as long as no any workshop is being conducted in the lab. There are also 6 cubicles in the library next to the lab, each of which is equipped with one PC. These cubicles are meant to be used for one-on-one tutoring by the student-tutor pairs. Figure 4-4 shows a computer skills workshop and an adult basic education class in Literacy Source (source of photos: Literacy Source web site).

Literacy Source, with the CTOP grant, is currently in the process of purchasing 4 new laptop PCs, along with the two they already own, so that a mobile computer lab will be established by the end of 2008 for the planned offsite small technology instruction.

According to the 2005 TMF grant Final Report, on average 15 students per week participated in the computer tutoring programs, and 10 instructional tutors per week used the computer lab and the cubicles for tutoring purposes (including basic literacy and computer skills). In the summer of 2008, a total of 11 computer basic skills workshops were offered over a time span of six weeks. Those one-and-a-half-hour workshops were conducted on Tuesdays from 6:00 to 7:30pm and on Thursday from 10:00 to 11:30am. The workshops covered various topics, including word processing, desktop publishing, communicating with email, and Internet searching.

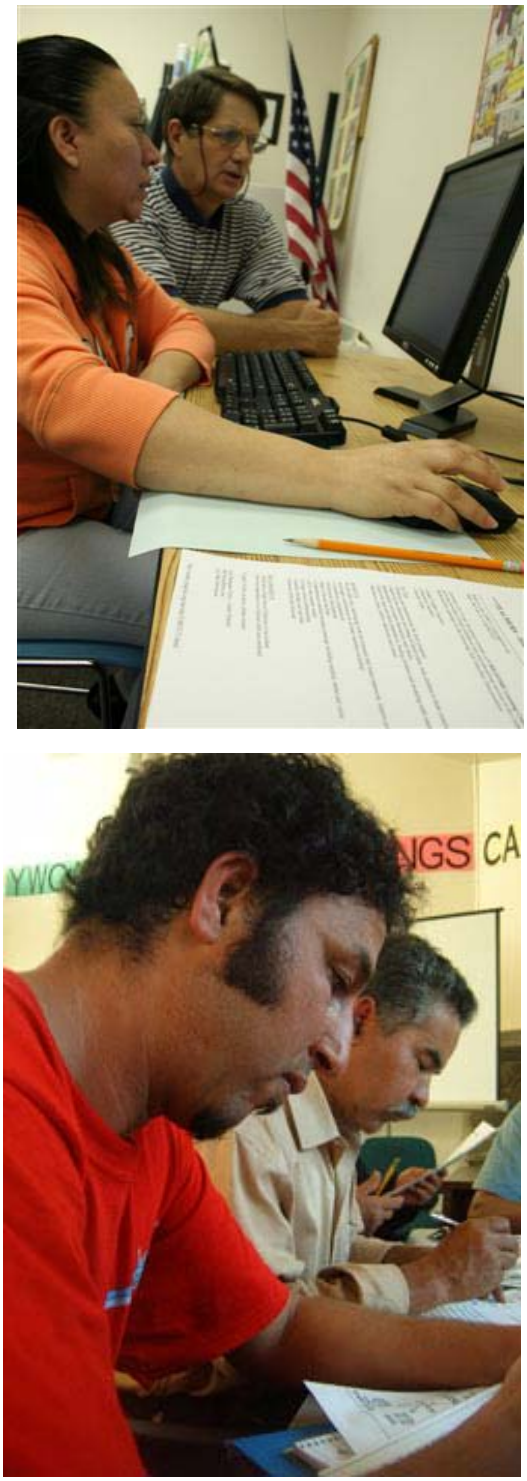

Figure 4-4. Computer skills workshop and adult basic education class in Literacy Source

Staffing

Literacy Source currently has one executive director and 14 staff members (full-time or part-time) responsible for the Center's day-to-day operation. Literacy Source also has 6 instructors/contractors in charge of Life Skills classes, ESL, or some professional services, such as accounting or publications (Literacy Source, 2008).

As far as its technology programming is concerned, Literacy Source currently has one full-time employee who has been managing computer instruction since 2005. However, the same person also manages the Center's Adult Basic Education programs, as well as coordinates offsite tutoring program at the King County Correctional Facility. Literacy Source also has one staff member in charge of the maintenance of all computer equipment and network in the Center. In addition to these two staff members, Literacy Source's technology programming relies heavily on volunteer help (Literacy Source, 2008). They recruit volunteers to help with the curriculum development and one-on-one tutoring programs for basic skills and computer learning. They also had one Literacy AmeriCorps Vista member who coordinated the computer tutoring and taught the basic skills workshops. She developed the curriculum and the materials for these basic computer skills workshops. The AmeriCorps Vista member completed her one-year service in Literacy Source in late August 2008. Literacy Source is currently in the process of hiring a technology instructor, whose main task will be to standardize Computer Tutor training program for volunteer computer tutors and design curriculum for two new modular computer courses (State of Washington, 2008).

Community Support / Partnerships

Literacy Source has been successful in seeking support for their operation from various sources, including foundations, state and local government funds, and historic supporters. These contributions allowed Literacy Source to bolster their core programs and extend their services to a broader community.

Contributions, which were specifically made for technology-related programs over the

past few years, include 1) Technology Matching Fund from Seattle's Department of Information Technology, 2) Boeing Employees Community Fund, 3) Seattle's Department of Neighborhoods, 4) The National Book Scholarship Fund (a ProLiteracy project), and 5) Washington State's Community Technology Opportunity Program (Community Technology Program, 2005c; State of Washington, 2008).

Literacy Source has also actively engaged the community in shaping their computer tutoring program. In the fall of 2003, Literacy Source put together a computer tutoring committee to identify needs within the computer tutoring program. The committee consisted of three community members and three Literacy Source staff. The committee had met monthly and identified curriculum needs within the computer tutoring program (Community Technology Program, 2004).

To accomplish their mission as a Community Learning Center and further deliver their services to a broader community, Literacy Source has been actively working with other organizations to reach out to any potential clients. They have constantly received referrals from different service providers who work with similar populations, such as the Department of Social and Health Services and the Department of Correction on the public-sector side, the Refugee Forum of King County and the Learning Disability Coalition on the community-group side.

They have a communication coordinator responsible for their annual reports and different publications to share information and make other parties aware of their programs and services. They also have an outreach team on their staff. They meet once a month, discuss targeted outreaches to different communities and to different organizations.

4-1-4. East African Community Services (EACS)

Parent Organization History, Mission, Services

East African Community Services (EACS) was established in 2000 to provide advocacy,

information, referral and direct social services to more than 12,000 Somali, Oromo, Ethiopian and other East African refugees living in King County. When civil war erupted in Somalia in 1991, many people fled away from the violence. Today, nearly 30,000 East African refugees have made King County their home. In 2000, four Somali refugees built collaborative relationships with community agencies and government programs throughout King County. They incorporated as a 501(c)3 non-profit organization in 2001. This new organization—the Refugee Social Development Resource Center—later changed its name to East African Community Services (EACS) to reflect its core mission of helping all communities from East Africa (EACS, 2008). EACS has established a strong record of service in King County, easing the cultural shock of refugees throughout the area (EACS, 2008).

EACS is dedicated to improving the well-being and quality of life for African immigrants and refugees in King County. They help provide the tools for men, women, youth, elders and families to succeed in the Pacific Northwest (EACS, 2008).

Programs at EACS include refugee resettlement support, life skills, English as a second language, job skills training classes, family and youth outreach programs, health care access and child protection education, parent involvement in children's education support, crime prevention programs, seniors programs, computer literacy, and assessment and case management services (EACS, 2008).

EACS currently has offices at two different locations in the Holly Park neighborhood in Seattle: 1) one office in a small retail complex along a busy local highway, 2) one larger office space on the New Holly Neighborhood Campus.

CTC History & Mission

EACS believes that everyone deserves the opportunity to pursue a good quality of life. Refugees who had little or no access to computing in Africa prior to arriving in the U.S. experience additional barriers and technological isolation when they struggle to rebuild

their lives in King County (Community Technology Program, 2007b). Through the support from City of Seattle's Technology Matching Fund during the year of 2007, EACS was able to equip a new computer lab, develop Basic Computer Literacy Curriculum, run four consecutive eight-week computer literacy workshops, staff an on-site, open-access learning lab, and provide several one-day workshops for refugee parents using the Seattle Public School's SOURCE program (Community Technology Program, 2007c).

They have recognized the need among their clients for further job search and employment training. The Moving Beyond the Basics Project, sponsored again by the Technology Matching Fund in 2008, is a continuation and expansion upon their Improving Basic Computer Literacy Project conducted last year in 2007. The 2008 project will further their ability to serve the job-seeking community through community-specific, computer-based employment training. EACS believes that providing the tools to access community employment opportunities, job-seeking information, and basic workplace education will increase the independence and self-sufficiency of East African refugees throughout King County (Community Technology Program, 2008c). EACS is currently in the process of implementing this Moving Beyond the Basics Project.

CTC Programming and Capacity

In the late summer of 2008, EACS moved all their computer equipment into their newly rented office space on the New Holly Neighborhood Campus. Their 9 desktop PCs are currently installed in a multi-function learning lab, occupying about half of the space. Figure 4-5 shows EACS's computer lab in the New Holly Neighborhood Campus.

Figure 4-5. EACS computer lab in the New Holly Neighborhood Campus

EACS began their Basic Computer Literacy Program last year in 2007 through City of Seattle's Technology Matching Fund. They developed a curriculum, which includes two computer skills workshops at two different skill levels. Both workshops take eight weeks to complete. The level-one workshop covers basic computer skills for first-time computer learners, such as keyboarding, using mouse, getting to know Windows, files/folders systems. The level-two workshop is designed for those who have already completed the level-one workshop and covers more advanced computer skills, such as using Microsoft Office, using the Internet, and setting up email accounts. The 2007-08 workshops were completed. The workshops ran on Mondays and Thursdays. They offered an afternoon time slot from 3:00 to 5:00pm; and an evening time slot from 5:00 to 7:00pm. They also offered a class on Wednesday mornings for a couple of moms who couldn't come in the evening or afternoon classes.

In addition to their computer literacy services, EACS also provides training for refugee parents to use the SOURCE, the Seattle Public School's on-line parent education resource (2007 TMF final report). EACS also offers drop-in hours and allows people to use computers whenever the lab is available.

EACS is currently in the process of developing a brand new curriculum, which will include a computer-based Employment Access Program (the level-three) into their computer skills workshops (Community Technology Program, 2008c).

Staffing

EACS currently has four full-time staff, one of them is a Literacy AmeriCorps VISTA volunteer who is in charge of managing their computer literacy program. Her tasks include developing curriculum, recruiting volunteer computer tutors, and coordinating student-tutor pairing. However, she is also responsible for other tasks in EACS not directly technology-related.

EACS maintains a group of 4 volunteer computer tutors, who can speak both Somali and

English, to carry out the workshops. They pair one tutor with two students with similar skills level, and then students work with the assigned tutor throughout the course.

EACS also has one staff member in charge of all the regular maintenance/upgrading of center's computer equipment/software.

EACS is planning to hire a paid, part-time Computer Literacy instructor by the end of 2008. This staff will provide tutoring and program supervision, monitor student progress, and implement the curriculum development for the planned level-three workshop, which will be focused on employment access and workplace skills training and integrated with their Basic Computer Literacy program.

Community Support / Partnerships

EACS values inclusiveness and community involvement. EACS maintains strong ties with the members of the East African community with the Board comprised entirely of East African men and women who immigrated to the US. Their Basic Computer Literacy Program was conceived as a direct response to the demand from the East African community (Community Technology Program, 2007b).

EACS has been collaborating with the Refugee Federation Service Center and the Puget Sound Training Center, as well as other technology programs, such as the Somali Community Services of Seattle (SCSS) and Yesler Community Technology Center to develop and refine their computer literacy curriculum. They have also worked to share their new Computer literacy Curriculum with SCSS and will share their experience and the new Employment Access curriculum (still under development) with other community technology programs as well (Community Technology Program, 2008c).

They also actively work on recruiting technologically competent East African tutors and community members to assist with classes and workshops. Their goal for the on-coming 2008-09 workshops is to recruit alumni from their previous Computer Literacy program

to help lead future classes and provide culturally-specific technology access and assistance (Community Technology Program, 2008c).

4-1-5. RecTech Coalition

History & Mission

RecTech Coalition (short for Recreational Technology) represents the computer and technology learning programs provided in nine Community Technology Centers (CTCs) located in nine Community Centers in the City of Seattle. These nine Community Centers are all located in Seattle's lowest-income, least educated and most ethnically diverse neighborhoods, including Delridge, South Park, Rainier Beach, Beacon Hill, and Mount Baker neighborhood. RecTech CTCs provide a wide range of learning opportunities and activities for youth, adults and seniors. They use the tools of computers and multi-media to provide programs, which help develop skills, encourage recreation and health, build community and connect residents to vital services offered by City departments or other institutions (RecTech, 2008).

RecTech was established in 2001 as partnerships between seven CTCs, the Associated Recreational Council, Seattle Parks and Recreation, and local Community Center advisory committees (two other CTCs later joined RecTech after 2003). RecTech identified its mission as "to provide programs that effectively use technology for education, recreation and community services for children, youth, adults and neighborhoods" (RecTech, 2008).

Prior to the establishment of RecTech, two of the nine CTCs had already received grants through the Technology Matching Fund (TMF) administered by the Seattle Department of Information Technology (DoIT). South Park Computer Lab received $5,513 in 1999 and Delridge Computer Access Center received $5,500 in 2001 to upgrade their computer equipment in both two CTCs. On September 25, 2002, RecTech Coalition, represented by the South Park Advisory Council (SPAC) and the Associated Recreation Council (ARC),

received a $30,000 grant through TMF from DoIT. This DoIT grant had helped RecTech to purchase/upgrade equipment, software, and services for the seven CTCs. This also marked the official launch of RecTech Coalition, a unique collaboration between grassroots CTCs and City officials (Williams & Lezu, 2003).

Due to the popularity of these CTCs with youth and the need for out-of-school time programs for middle and high school students, through funding from the Bill & Melinda Gates Foundation and two more TMF grants from DoIT, RecTech launched the TechNet Program in 2006. TechNet is an academic support and technology skill building program for middle and high school students. It builds on existing partnerships and infrastructure that provide community technology programs in nine different Community Centers. In 2007, RecTech received another TMF grant and offered two 5-week creative technology classes to middle and high school students at Garfield Community Technology Center (Community Technology Program, 2007d; 2008d).

RecTech is currently directed by an alliance of staff, managers and community advisory council members and is administered by the non-profit Associated Recreation Council in partnership with the City of Seattle's Department of Parks and Recreation.

CTC Programming and Capacity

RecTech currently shares an office space with the Associated Recreation Council in a facility, which is owned and operated by the Seattle Parks and Recreation, in the South Lake Union neighborhood in Seattle. In fact, only the RecTech coordinator and the Tech Support staff work in this office. The rest of the Coalition staff are stationed in the nine local CTCs in the Community Centers across the southern portion of Seattle. These nine Community Centers are:

- Delridge Community Center
- Garfield Community Center
- Garfield Teen Life Center
- Miller Community Center

- Southwest Community Center
- South Park Community Center
- Yesler Community Center
- Rainier Beach Community Center
- Rainier Community Center.

Each CTC is equipped with 9 to 21 computers. Most of the CTCs own only desktop PCs. Rainier Beach and South Park each also owns 4 desktop Macs. These two CTCs along with Southwest CTC also have video/audio editing equipment and digital cameras for multi-media production. Delridge CTC is also equipped with audio recorders. Southwest and Yesler each also has a projector and a projector screen for class use. Figure 4-6 shows one of the nine RecTech CTCs at the Garfield Community Center.

RecTech, under the TechNet Program, currently provides after-school and out-of-school hours programs for youth in computer labs at nine Community Centers. Youth programming is concentrated from 2:00 to 6:00pm Mondays through Thursdays, and includes tutoring and homework completion and participation in technology skill-building workshops, and leadership development. All youth workshops are free of charge (Community Technology Program, 2008d).

Tutoring and homework completion support is available both online and in-person with the TechNet Lead, the on-site staff stations in each lab. Students access online tutoring from Digital Learning Commons through a partnership with the Seattle School District, and from tutor.com through a partnership with the Seattle Public Library. In-person tutoring takes place during Teen-Times drop-in hours, between 2:00 and 4:00pm.

Figure 4-6. RecTech CTC at the Garfield Community Center

The technology skill-building workshops are varied among different labs, usually offered between 4:00 and 6:00pm. They also depend on the interests that youth identify. To date, the most popular have been digital photography, web design and music production. Others offered on a site-by-site basis include Augmented Reality, 3-D Design, Video Production, and Game Programming. These workshops are provided by partners such as Seattle Arts Corps and Red Llama, and through online workshops offered by Giant Campus (Community Technology Program, 2008d).

Leadership development is currently a focus at three CTCs only during the summer months. In these programs, students participate in intensive summer programming that links the technology skills they are learning with job shadowing, job site visits and other pre-employment experiences (Community Technology Program, 2008d).

RecTech also offers adult classes, including a very basic Computers 101 class currently offered in Garfield and Rainier CTC, an advanced Computer 102 class focused on Windows, Office applications, and the Internet, and a Digital Photography class in Rainier CTC. All adult classes charge a small amount of fee, from $20 to $30 per class. Adult classes are scheduled from 11:00am to 1:00pm and from 6:00 to 7:00pm. Adult learners can also use the computers at no cost during Adult drop-in hours between 7:00 to 8:30pm.

Staffing

RecTech now has one full-time coordinator in charge of grant writings, coordinating with site managers on all programming for workshops/classes offered in all nine CTCs. Institutionally, RecTech is a part of the Associated Recreation Council. RecTech has adopted the Baseline Standards Checklist, which documents the existing roles and responsibilities in the partnership between RecTech, ARC, and Seattle Parks and Recreation (Williams & Lezu, 2003). However, administratively, RecTech goes on its own, in terms of fundraising, personnel management, events planning, student recruitment, and community outreach.

RecTech also employs one full-time Technical Support responsible for the maintenance/upgrade of all computer equipment/software and other digital devices in all nine CTCs. This Tech Support personnel stations in RecTech's main office with the RecTech coordinator.

Each of the nine CTCs has one site manager/coordinator, the TechNet Lead, who is in charge of the day-to-day operation for the respective computer lab. Most of them work as a part-time employee. Their tasks include: 1) curriculum development, 2) recruiting tutors/instructors for the workshops, tutors/instructors are paid through the RecTech coordinator, 3) recruiting students, 4) managing drop-in hours, helping with homework tutoring for youth and basic skills training for adults, 5) reporting lab usage and workshop attendance to the RecTech coordinator, 6) some TechNet Leads also responsible for teaching workshops.

Community Support / Partnerships

In its 2003 Business Plan, RecTech set forth a clear view towards nurturing partnerships with the community and other organizations. It stated that "RecTech realizes that its vision and purpose are large in scope and that much greater success will be achieved in collaboration with other organizations working toward the same goals. RecTech will strive to build meaningful partnerships with other organizations to leverage its results (Williams & Lezu, 2003). They have lived up by this principle ever since then and built partnerships with many organizations and institutions and together conducted many programs/workshops for people in the neighborhoods.

As mentioned, RecTech has collaborated with the Seattle School District, the Seattle Public Library, Seattle Arts Corps, and Red Llama. They have also formed partnerships with the following organizations to conduct various workshops or outreach efforts together:

In the spring of 2008, a digital photography project was implemented in partnership with Adobe Youth Voices at the Rainier TechNet site (Community Technology Program, 2008d).

Since 2007, The TechNet Program has partnered with the Community Learning Center (CLC) programs in several Seattle middle schools, such as Madison K-8 and Meany Middle Schools, to ensure that there is a clear connection between the classes offered in the RecTech CTCs and the academic requirements of the school district. In addition to curriculum alignment, this partnership has allowed for on-going recruitment at school lunches, through the CLC program, and through the school PTSA (Community Technology Program, 2007d).

The Rainier TechNet Lead has also formed partnerships with community-based organizations such as the Eritrian Community Center (at 24th Ave S and Stuart St) to recruit youth who do not otherwise have access to these types of technology programs (Community Technology Program, 2008d).

4-2. Cross-case Analysis

This section describes the cross-case analysis that is the center of this research and eventually leads to the research findings and conclusion. The analysis is based on the 15 *factors* associated with CTCs' implementation and sustainability described in the Research Design chapter. These factors can be categorized into three groups: 1) individual empowerment; 2) CTC sustainability; 3) community partnerships. For their brief descriptions of all the 15 factors, please refer to Table 3-1 in the Research Design chapter.

The notion of "gaining access to resources" is the starting point for the analysis. Its foundational idea is that an individual's struggle towards bettering their lives or an organization's endeavor for effectiveness can be better understood by examining how the

individual or the organization seeks and utilizes available resources for achieving their goal(s).

Furthermore, the context cannot be removed from the analysis. The context, comprehended by the concept of community, either of place or of interest, plays a crucial role in offering critical resources for the individual to not only survive but also succeed, or for the organization to not just operate but the same time be effective. This research locates the context, the community in which the individual or the organization is situated, as an important condition for the resources to be leveraged, exchanged, or shared. The concept of Asset-based Community Development informs this part of analysis.

4-2-1. Findings regarding Individual Empowerment

The fundamental mission of a CTC is to provide access to and the knowledge of ICTs for individuals to be able to enter into the information society. Research on the digital divide and ICT access identifies five personal resources that are needed for individuals to cross the technology gap. These resources are: 1) technology resources; 2) knowledge resources; 3) content resources; 4) social resources; 5) psychological resources.

This section addresses the question of how and what a CTC offers to its clients with respect to these five personal resources in order for the CTC to fulfill its mission as an enabling force to close the digital divide. Evidence from the field is systematically presented in this section.

Understanding these five personal resources for empowering individuals is central to CTC sustainability, which will be discussed in the following section, because a CTC must know what its clients need and develop its resources around this core responsibility.

4-2-1-1. Technology Resources

Technology resources refer to the physical availability of suitable equipment and appropriate software; also expanded to incorporate practical considerations, such as affordability, time, and autonomy of use.

Providing access to ICTs is the most essential function of a CTC. As expected, all five cases offer their clients access to computer equipment or/and other digital devices. In general, two types of usage can be observed in all five cases: 1) classes or workshops offered to use computer equipment or/and other digital devices, such as digital cameras, camcorders, or editing devices; 2) the use of equipment during drop-in hours, known as Teen-Times for the youth or Adult-Times for adult users. In most cases, the access to computer equipment or other digital devices is on a first-come-first-served and non-monitored basis. Sign-in's and Sign-out's are all required in all five cases.

The Youth Media Institute uses all their 6 Macs along with another 5 Macs loaned by the Youngstown Cultural Arts Center for all their workshops. All 11 Macs and another 6 PCs loaned by the Seattle School District are usually all available to the youth during the drop-in hours, which are between 2:30 and 6:00pm Mondays through Thursdays. YMI also provides access to digital cameras, camcorders, and audio recorders to the students in their workshops. Popular image/movie-editing, desktop-publishing, and web-authoring software packages are all available in all 11 Macs to be used in all their media-related classes/workshops.

STAR Center offers their disabled clients 10 PCs, all of which are equipped with Assistive Technology software packages, such as JAWS, a screen reader, which basically reads whatever text on a computer screen; ZoomText, which functions as a magnifier enlarging everything on a computer screen; and Naturally Speaking, a speech recognition software package. Some computers are also equipped with assistive hardware devices, such as trackball mousses, keyboards with enlarged letters. STAR offers open-lab hours

between 1:00 and 5:00pm or 1:00 and 7:00pm Mondays through Fridays.

Literacy Source currently has 9 PCs installed in their computer lab. Students are allowed to use these computers whenever the lab is not occupied. There are 6 more PCs, each of which is put in a cubicle located in their library. Students can reserve these cubicles to meet with their tutors for tutoring sessions or practicing purposes. All 15 PCs are installed with language-learning software, such as Rosetta Stone.

East African Community Services has 9 PCs in their computer lab, which is always open to anyone during Center's daily operating hours, as long as no class/workshop is in session.

RecTech Coalition has a total of 112 PCs and 8 Macs in their 9 community technology centers. All 9 RecTech-affiliated CTCs offer Teen-Times between 2:00 and 4:00pm Mondays through Thursdays for the youth and teens. Computer gaming and other entertainment usage, such as online chatting, are only allowed as if they show the lab managers or coordinators that their school homework is completed. All 9 CTCs also offer Adult-Times between 7:00 and 8:30pm, which are open to the general public at no cost. Three of these RecTech-affiliated CTCs are equipped with video/audio editing devices and digital cameras/camcorders. These devices are for class/workshop use only. Popular image/movie-editing, desktop-publishing, and web-authoring software packages are all available in all computers. A number of labs also have access to some specific 3D modeling software packages sponsored by local media/arts groups or institutions. For example, Garfield CTC has access to 3-D design and game programming software through Red Llama; also has access to an Augmented Reality system developed at the University of Washington.

4-2-1-2. Knowledge Resources

Knowledge resources refer to capabilities that people need to use technology, including

skills, competence, knowledge, experience, and training. In addition to providing physical access to computer equipment, a CTC is also responsible for offering its users training and other learning opportunities for gaining skills and knowledge to operate the computer equipment and software. All five programs offer a variety of computer classes/workshops to different target populations.

The Youth Media Institute, with its mission to use media technologies to empower youth, offers various training programs in technology media, including online video/audio segments, blogs, basic office software, podcasting, using digital cameras, video and audio editing, and basic website creation. They do not offer training in basic computer skills, since they target high school students, who are relatively competent in basic computer operations, such as Windows or other Office products.

STAR Center serves mostly people with disabilities, who are facing physical obstacles to learning and in most cases have little or even no prior exposure to computers. To get their clients into the digital world, STAR offers two types of computer training: 1) Assistive Technology, which helps overcome physical barriers to accessing computer equipment, and 2) basic computer skills, which help operate and use computers. For the Assistive Technology, STAR currently offers tutoring workshops on JAWS and Naturally Speaking. Their basic skills workshops currently cover topics ranging from basic Windows, files/folders management, Office package, to emails and Internet searching.

Literacy Source, as a well-established adult learning institution serving King County for more than 20 years, has been attempting to take advantage of the computer technology and integrate it into their programs, such as ESL and Adult Basic Education. Students can now access course materials stored in their computers in the computer lab or through online sources on the Internet. In the mean time, Literacy Source also offers basic computer skills training workshops for adult beginners. These workshops cover various topics, including word processing, desktop publishing, communicating with email, and Internet searching.

East African Community Services serves mostly refugees and immigrants who have little or no computer knowledge and experience. They offer basic computer skills training and currently follow a curriculum, which is delivered through two workshops at two different skill levels. The level-one workshop covers basic computer skills for first-time computer learners, such as keyboarding, using mouse, getting to know Windows, files/folders systems. The level-two workshop is designed for advanced adult learners and covers some more advances computer skills, ranging from using Microsoft Office, using the Internet, to setting up email accounts.

The nine RecTech-affiliated CTCs serve a wide variety of populations in the south Seattle area, ranging from youth, teens, to adults and seniors. Their TechNet Program, which is focused on the youth and teens, currently provides after-school and out-of-school programs covering topics from tutoring and homework completion, multi-media technology skill-building workshops, to leadership development workshops. For adults and seniors, they offer a Computers 101 class covering basic computer skills and a Computer 102 class focused on more advanced topics, such as Windows, Office applications, and the Internet. A Digital Photography class is also available for adult learners to get exposure to multi-media technologies.

4-2-1-3. Content Resources

Content resources refer to the availability of suitable digital material online/offline, focused on relevance to learners'/users' personal needs, local production based on relevant issues, and languages familiar to learners/users.

Another way to think of this important factor is through the usefulness or applicability of the knowledge and skills learned through community technology to the environment where a learner/user is situated. Individuals may face different struggles and have different needs, such as education access, employment opportunities, health care, or child

care. A CTC, in addition to offering basic computer skills, should provide learners/users with useful resources or guidance that allow them to apply the technical skills learned to the needs that are important to them.

The Youth Media Institute works with the youth to explore how community media can be used as a means of empowerment in their lives. YMI emphasizes not just the technical side of learning, but also social and cultural aspects of the process. YMI encourages their students to use the skills they learned to portrait and tell the stories of their families, cultures and communities.

> "I think technology can be used as a tool, that is really something we try to push here, for media not just being seen as a form of entertainment, not just like TV shows those funny stuff, but you can really use it as a tool, and it is really a tool, a social tool that can affect your community."

YMI also tries to stress the social dimension of the media by discussing relevant issues with students in their workshops.

> "We are not only focused on teaching these technical skills, the technical side of media, but also the issues and education, so we also try to educate young people in media justice issues, that basically concerns with a lot of different things, like net neutrality, media consolidation. We try to teach young people about community media, the importance about community media, because that is an alternative to media consolidation."

In a showcase event, a final presentation took place on August 23, 2008, students shared with an audience their video production work telling the stories of themselves, their families, or their neighborhoods.

Besides helping their disabled clients adopt their abilities to function on the computer with the Assistive Technology software and various hardware, STAR Center also helps their clients connect their learning process with resources they may need in their daily routines.

> "We try to make it as easy as possible for people to assess resources, we have folders on the desktop for the kinds of subjects that may interest them, resources for job search, for medical, for government, how to register to vote, the usual stuff that people need access to, online banking, that is on all the desktops, so people can come here and access that."

STAR Center's career development coordinator also helps people with disabilities improve their job-hunting skills by learning how to access employment information online or how to compose a resume using a computer.

To people in Literacy Source, who have been helping adult learners gain basic literacy and life skills, computer literacy is an integral part of the whole learning package.

> "We teach adults who need basic skills, in order to be successful at their work as parents or as community members, for some of our students, that means they need to learn computer skills, so that is why we teach computer skills."

> "Really computers are just tools, like a means to an end, we are not teaching computers just to teach computers, we teach computers to teach adults to get what they need, to get a job, to create a budget to send an email. So I think it helps to really make it clear to us, why we are in the technology instruction business."

Literacy Source not only offers basic computer skills workshops, but also produces digital materials for their students in their ESL program. These "authentic" materials are carefully chosen to be of relevance to students' needs in their daily lives.

> "We have volunteers to record books or different materials, oftentimes materials got from the community more like a brochure or a health flyer, something that an adult learner might be interested in, like authentic material that they would use."

Literacy Source also provides many resources supplementary to their Adult Basic Education program, which are available through their website and in every desktop PC in the computer lab.

East African Community Services also offers adult learners useful online resources in the hope that computers can be a tool in their daily routines. For example, they offer SOURCE workshops and teach parents how to log in this Seattle Public School Online Database and look at their children's attendance records, their grades, their homework or assignments. They also help their adult students use computers for job-hunting purposes, such as conducting job searching online, creating digital resumes, or filling out job applications.

Like the Youth Media Institute, RecTech Coalition also encourages their students in their media skills workshops to photograph their community or reflect their personal lives.

> "There is another class down there in South Park, called photo-voice which started out a few years ago, a few kids were killed right outside the community center, the community said that we want to do something (about it), we want to help out these kids, they started a class where kids were documenting their lives, that's how that class started."

Students also produced short movies for Public Service Announcements in some of the video production workshops for some of the community centers where the CTCs are housed in. By doing so, they also earned their public service credits from their schools. Students in a web design summer internship workshop learned how to work with real clients, a neighborhood development association and a non-profit in this case, to gain an insight into how the web production industry really works.

RecTech also offers their school-aged users access to online tutoring from Digital Learning Commons and from tutor.com for their homework completion and tutoring support.

For their adult learners, RecTech also offers some short workshops trying to connect their computer learning process with some tangible topics that may interest them, such as how to file taxes with information available on the web.

4-2-1-4. Social Resources

Social resources refer to human institutions, groups and organizations that provide both practical support and emotional support to a computer learner.

A CTC can help a computer learner to gain skills and knowledge more effectively by either referring the learner to an experienced helper or a third party who may have more expertise on the subject. A CTC can also help build learning networks among users and encourage collaborations among computer learners in a hope that they can always turn to one another for assistance.

The Youth Media Institute recruits youth "mostly through words of mouth" among the youth themselves in the surrounding neighborhoods. Many of their students already know one another and oftentimes they work together in classes as teams.

> "We started out just finding some youth, and then the next year, those kids told other kids."

YMI relies heavily on the professionals in the media arts field to offer technical instructions for their workshops. Students learn on the first hand the most up-to-date media technologies from those who currently practice in the real world.

RecTech Coalition also hires outside artists or musicians to come in to the labs and teach workshops on various topics.

YMI also has peer trainers to help out in workshops as well. They are also youth or teens, just like any other students in the lab. More importantly, they are very familiar with YMI's business and day-to-day operation, because they have been there before.

> "These are youths who already completed our summer program, they are familiar with equipment, the software, they have shown a certain level of profession and

> they can come back to work for us, so they become staff for some particular workshops, they help facilitate workshops."

YMI also encourages participation from students' family members.

> "In a lot of our workshops, because we are community focused, we try to get a lot of personal or family stories, history, basically we want them to address issues that are important to them, and that may include, in some ways, examining their own personal history, or how their family got here, also could ended up telling story about larger community, not just themselves, we do encourage students to incorporate their family in their projects, whether to interview them or some other ways that they can be involved."

STAR Center relies on peer-trainers to help out in workshops as well. They are actually previous (or even current) students and frequent users in the center. This is done by so-called "train-the-trainers" strategy that STAR has been adapting for sometime. Because "training happens in this center is almost always one-to-one", peer-trainers can both provide tutoring and meet the demand from the new-comers, as well as build a learner network among students themselves.

Almost all the STAR's volunteer staff are from inside the community. In most cases, students, frequent users, and volunteer helpers are neighbors to each other.

Literacy Source pairs students with tutors. All tutor-student pairs can make up their own learning package and scheduling based on students' needs and tutors' capabilities. Oftentimes, multiple student-tutor pairs do their tutoring or practicing in the lab together at some scheduled time slots.

In addition, like YMI, Literacy Source recruits some of their students through word of mouth. "Word of mouth is really big, we often get new students, because their friends or family members, or from other students who came here." Students who already know each other are more likely to be willing to share their learning experiences with one another.

In East African Community Services, they also pair students with volunteer tutors. However, unlike Literacy Source's one-to-one format, they pair two students with one tutor.

> "We tried to pair students with similar work level, and then they worked with that tutor throughout the course, some tutors only came in on Mondays, some on Thursdays, so they just take teams back and forth with students, but in a class, we could have four different pairings with eight computers."

4-2-1-5. Psychological Resources

Psychological resources refer to attitudes towards ICTs; the interest in them, the will to learn and use them, and the lack of fear of new technologies.

A CTC can help a learner overcome his/her mental resistance to learning or using the computer technology by 1) offering various programs and services on different topics that may interest different people, 2) delivering learning materials by different means at different skill levels, 3) offering rewards or certificates for completing the learning process, and perhaps the most effective way in this regard, 4) providing assistance whenever students need. The bottom line is that the learning environment a CTC is creating for its learners should accommodate the learners' mental comfort zone.

The Youth Media Institute offers workshops on various topics, including photography, printed medium, audio and video production, and digital animation. Students have many choices that may fit their interests. For most of their workshops, YMI employs different teaching strategies to get students involved in the topics being discussed in the classes.

> "For our six-week program, such as Youth Out Loud, we sort of break down the weeks briefly. The first week our staff facilitated the issue, so we talked about what media is, ….. themes that go on with that workshop; and then from there we get into kind of surveying a number of different media forms, ….. then we worked on digital photography and graphic design, ….. after that we started with two

> weeks of video production, ….. for the last week of the training, they can choose, what they want to work on, they have a final project, it can be a video, their own movies, another PSA, or an audio piece, or a magazine, or a zing, can be multi-medium thing."

All the youth taking part in all YMI workshops are paid $500 scholarships at the end of workshops, if they complete the entire workshop. They also get a certificate of completion for their accomplishments. They try to "get the youth committed on taking part in the workshop." YMI also "tried to keep somebody in there (the computer lab) all the time", so that help is always available to the youth.

RecTech Coalition also offers $500 scholarship and a certificate of completion to their participants in their summer internship multi-media workshops. The main reason for doing that is also to get the youth committed on their work.

YMI frequently holds public showcase events, in which students can present their work to their family members, friends, or cohorts in YMI. By doing these showcase events, YMI hopes that their students can feel rewarded and have a sense of accomplishment. YMI also always publicizes these events and invite community members in so that more people can become aware of YMI's programs.

RecTech also tries to have some year-end presentations to showcase students' work, particularly for their summer internship multi-media workshops. The most recent one was on August 21, 2008.

STAR Center's one-on-one/peer-to-peer mentoring and coaching helps a lot of new-comers overcome their early learning obstacles.

> "Because it is rarely two people with the same disabilities, it has been my experience, this is just too much for any trainer to deal with a variety of disabilities around one subject, the subject is the easy one, it is interacting, supporting people with disabilities to get there from here, so that is almost always one-on-one."

STAR Center also tried to match their offerings to clients' real needs. They do so by making an assessment on any new-comers to see what they can and can't do with computers and then meet their needs with resources they have in the center.

> "When someone with disabilities comes in, the first thing we do is make an appointment to do an assessment, which takes half an hour to an hour, and we just work with people on the computer and see what their capabilities are, and then we assign to them various software."

In Literacy Source, one-on-one tutoring is independent but situated in a group environment, since oftentimes multiple student-tutor pairs use the lab or library together at one time.

> "So students are really working on their own stuff, and they work one on one with a volunteer, but there is a group of students doing that at the same time."

This format allows students to work on their own paces with greater comfort, at the same time, get motivated by the competitive atmosphere created by the group-learning structure.

East African Community Services also makes their curriculum very much self-explanatory so that students can follow through on their own and work with their assigned tutor to learn the skills at their own paces

> "The curriculum is pretty self-run, so students all worked on their own speeds."

They also attempt to make their Center a public gathering place for all people in the community. By doing so, help can be always available when needed.

> "People just come in to talk or have coffee, the same time use computers, it is pretty much kind of a community hang-out spot, or at least kind of become that way."

> "It is pretty much a community effort, and we got a lot of traffic coming in the lab."

> "That is something good about our setup, in our site the computer lab is right in the office, so myself and other employees always on hand to help people out."

4-2-2. Findings regarding CTC Sustainability

As discussed in the previous section, a CTC needs to empower individuals by offering them resources necessary to gain access to and knowledge for ICTs. However, the focus now turns to the CTC itself. In order for this CTC to accomplish this fundamental mission, it needs to be able to secure its own resources to function effectively as an enabling force to bridge the technology gap.

Research on CTC practice identifies six factors that concern the operating resources critical to CTC effectiveness and sustainability. These resources are: 1) technological resources; 2) facility resources; 3) personnel resources; 4) funding resources; 5) social/cultural resources; 6) institutional resources.

This section addresses the question of how a CTC leverages these six operating resources and sustains its operation (and further fulfills its promise to its clients and to the society in a broader sense). Findings from the case studies are summarized in this section.

Also please bear in mind that these six CTC operating resources have a direct connection to the five personal resources for individual empowerment that we discussed just before in the previous section. How a CTC operates in terms of securing its own operating resources should be based on what its clients need in order to be truly empowered.

4-2-2-1. Technological Resources

Technological resources refer to the physical availability of suitable equipment, including computers with appropriate software for given activities in a CTC and necessary network connection with sufficient band-width carriage, also include other hardware devices such as scanners, digital cameras, printers, projectors, copiers, and so on.

As a technology center, a CTC must be equipped with suitable equipment, software, and other peripherals for its clients. It is considered the basics of CTC business. In order to do so, it must find ways to acquire these hardware/software resources for itself to operate properly. Generally speaking, there are two major ways in which a CTC can acquire these technological resources: 1) through purchasing by grants or funds; 2) through donations or any re-use/refurbishment programs.

The Youth Media Institute purchased all their equipment and software through grants. YMI also has access to other computers that are owned by other organizations in the Youngstown Cultural Arts Center. This particular collaboration on sharing resources is unique among the five cases in this research. YMI also has access to an audio/video recording studio and a multi-media auditorium in the Youngstown Cultural Arts Center.

STAR Center acquired their earlier computer equipment through both purchasing and donations. Their current equipment was all purchased through grants. In terms of software, they purchased all their Assistive Technology software packages via grants.

Literacy Source, like STAR, acquired their earlier computer equipment through both purchasing and donations. However, their current computer equipment and some of their software packages were all purchased through grants. They also recently received some software donations from Microsoft.

East African Community Services purchased all the equipment for their computer lab

through a grant received in 2007. However, they have worked with Seattle Department of Information Technology and some Somali-owned local businesses to obtain refurbished computers and give them to some of their low-income students. They acquired Microsoft Office software packages through donations by Microsoft.

RecTech Coalition acquired their earlier computer equipment from donations through both city departments and local private corporations. Their current computer equipment and all of their software packages were purchased through grants. However, Garfield CTC did receive Augmented Reality software licenses at no cost from the University of Washington in early 2008.

All CTCs in the five cases have broadband Internet connections for all their computers.

4-2-2-2. Facility Resources

Facility resources refer to space and location requirements, furniture and furnishings that a CTC needs to function effectively. Equally important is the ambiance of the environment that makes a CTC an inviting place for people to come. All five study cases are able to secure their spaces and facilities in different ways.

The Youth Media Institute is currently renting an office space for administrative use and a media lab for instructions and open labs from the Youngstown Cultural Arts Center. Youngstown was used as a school building in the early 20th century. Its overall architectural structure remains intact to date. Currently with all their artist tenants and arts-related businesses, the entire Arts Center has a heavy institution-like feel.

Administratively, STAR Center is a part of the Seattle Housing Authority, even though SHA does not directly fund STAR's operation. SHA does provides an office space and pays the utilities for STAR. STAR Center's computer lab is located on the first floor in one of the high-rise buildings at the Center Park public housing complex. It is not very

visible from outside of the complex. However, since there is a big information board and a sign that says “STAR Center of Seattle” hanging up right outside of the computer lab and very much visible from the entrance of the building, people should have no trouble to spot the lab as soon as they enter into the high-rise.

Literacy Source is currently occupying an office space on the first floor of a two-story retail building in the Fremont neighborhood in Seattle, just across the Fremont Public Library. A designated computer lab is inside the center in the back, right between their classroom and a small library, which is also equipped with 6 desktop PCs in 6 cubicles apiece. The space for staff use is in the front of the entire retail office. The first thing a person sees when entering into the center is this staff-use area, which may give people an impression of being a regular small business.

East African Community Services is currently renting an office space in the New Holly Community Center on the New Holly Neighborhood Campus. All their desktop PCs are currently installed in a multi-function learning lab, occupying about half of the space. The lab space is semi-enclosed with no doors separating it from other spaces in their office suite.

The central administration of RecTech is currently in an office space shared with the Associated Recreation Council (ARC) in a facility owned and operated by the Seattle Parks and Recreation. Only the RecTech coordinator and the Tech Support staff work in this office along with some ARC staff. Their nine RecTech-affiliated CTCs are all housed in city-owned Community Centers throughout the south Seattle area.

4-2-2-3. Personnel Resources

Personnel resources refer to staffing, including paid staff, volunteer staff, and professional services personnel. Due to the fundamental differences in their organizational structure, all these five cases have very different staffing structures as well.

Main Administration Personnel

Generally speaking, each CTC in this study relies on a core of staff in charge of the center's main administrative tasks, ranging from fundraising, student recruitment, volunteer recruitment, community outreach, to programming and curriculum development.

The Youth Media Institute currently has one full-time director in charge of center's day-to-day management. The YMI director also deals with grant writing, student recruitment, and hiring teaching artists and peer trainers for workshops.

STAR Center currently has one part-time executive director responsible for almost all daily services in the Center, including curriculum development, volunteer recruitment, computer tutoring and couching, and equipment maintenance.

The entire staff in Literacy Source consists of 15 full- or part-time members. Specific for their technology programming, Literacy Source currently has one full-time employee in charge of this part of service delivery. However, this employee also manages and coordinates other programs in Literacy Source. One thing unique to Literacy Source is that, although one person is given the task to manage the technology program, other staff members oftentimes step in and provide assistance. For example, they have a community outreach team dealing with student recruitment or general outreach to locals. The technology program is always one of the main focuses that this outreach team promotes. As for grant writing, oftentimes this task is assigned to someone else who may has more expertise and experience in this area.

East African Community Services currently has four full-time staff, one of them is a Literacy AmeriCorps VISTA volunteer who is in charge of managing their computer literacy program and dealing with various tasks, including curriculum development, volunteer recruitment, student registration, and grants/funds acquisition. However, she is

also responsible for other tasks in EACS not directly related to their technology program.

RecTech Coalition now has one full-time coordinator in charge of grant writing, coordinating with site managers on all programming for workshops/classes offered in all nine computer labs. Although institutionally, RecTech is a part of the Associated Recreation Council, administratively, RecTech goes independently to handle their own business. Each of the nine RecTech CTCs has one site manager/coordinator in charge of day-to-day operation for their respective computer lab. Most of them work as part-time employees.

Teaching/Tutoring Personnel

As an educational/learning center focused in particular on technology, a steady source of experienced instructors who are capable of teaching computer courses or offering technical assistance is particularly important for a CTC to function as it should. All five study cases, due to their different programming orientations, find their tutors or instructors through different paths.

YMI relies on hiring outside teaching artists to teach the subjects. Some teaching artists volunteer their services free of charge. YMI also hires previous students as peer trainers to provide technical assistance to students in workshops. YMI does not rely on general volunteer help from the local community for their workshops.

STAR heavily relies on volunteer help with day-to-day operation and one-on-one tutoring. A total of 13 volunteers are currently helping STAR Center. As mentioned before, the "train-the-trainers" strategy is the way STAR maintains their tutoring capacity.

Literacy Source's technology programming also relies heavily on volunteer help. They recruit volunteers through the Internet to help with curriculum development and one-on-one tutoring for basic skills and computer learning programs.

EACS also has a group of 4 volunteer computer tutors recruited through the Internet. Each of them pairs up with two students who are at similar skills level. Students work with the assigned tutor throughout the course.

The nine TechNet Leads, the site managers/coordinators, in addition to dealing with CTCs' daily routines, are also responsible for offering technical assistance to the users during drop-in hours. However, for their workshops or classes, RecTech CTCs rely on outside tutors/instructors from the locals. These tutors/instructors are usually paid through the RecTech coordinator in the main office.

Tech Personnel

Most of the study cases also employ one staff person to be the so-called "tech personnel" to handle the maintenance of computer equipment or other relevant devices.

YMI has a part-time staff member in charge of the maintenance of all computers and their audio/video devices. This person is also responsible for drop-in hours and instructions for some of their workshops. Literacy Source and EACS also have one staff member in charge of the maintenance of all computer equipment and network in their CTCs. RecTech has one full-time Technical Support staff in the main office, who is responsible for the maintenance/upgrade of all computer equipment/software and other digital devices for all nine RecTech CTCs.

4-2-2-4. Funding Resources

Funding resources refer to public/private funds, cash contributions, donations for personnel cost, equipment purchases, monthly payment for network connection, electricity, and so on. Perhaps, the most important operating resources for CTCs, funding resources play a crucial role in many aspects of CTC success and sustainability. Steady funding resources allow a CTC to constantly update/upgrade hardware/software, hire

qualified instructors, develop new programs, even be able to reward students' accomplishment with stipends or scholarships and encourage their commitment to their work.

All five cases in the study have been successful (although to varying degrees) to secure their funding resources. In general, they utilize two major funding mechanisms to seek out money: 1) public funds from State or local governments; 2) private grants from foundations or corporations.

Public Funds

On the public funds side, Seattle's Technology Matching Fund, managed by the Department of Information Technology, has been a very important funding source for not just these five cases in the study but also more than 120 other community-led technology projects across Seattle for the past 10 years.

The Youth Media Institute has received TMF grants twice over the past two years. In both 2007 and 2008, with the TMF grants, they were able to purchase new audio/video recording devices, hire instructors, pay staff salaries, and provide scholarships to their students.

TMF has been playing a crucial role in founding and stabilizing STAR Center. 1998 TMF grant helped STAR get started with equipment and software purchasing. 2005 grant cycle helped STAR again with equipment/software upgrade. Most recently, the 2008 grant cycle helped STAR extend their knowledge and experience into seven other CTCs in the Seattle area.

Literacy Source has been very successful in getting public funds. They received a TMF grant in 2004 to develop a computer curriculum that fits into their overall mission and integrates with other services offered in the center.

East African Community Services also received TMF grants twice in the last two years. The 2007 grant helped EACS launch their computer literacy program. They used the money to purchase computer equipment and other peripherals. For the 2008 grant cycle, they will use part of the money to hire a part-time computer instructor to be responsible for the program, also develop a new curriculum that will be focused on linking computer skills with employment opportunities.

The birth of RecTech Coalition (founded in 2001), to some degree, was also attributed to TMF. The 2002 grant cycle helped upgrade computer equipment for seven RecTech-affiliated CTCs. Prior to that time, two other RecTech CTCs already received grants from TMF in 1999. RecTech later received two more TMF grants in 2006 and one more in 2007. They were able to develop new programs and hire outside instructors to lead the workshops with the moneys they received through TMF.

Besides TMF grants by the City of Seattle, the State of Washington recently launched its Community Technology Opportunity Program in early 2008 "to support and advance Community Technology Programs that provide digital inclusion activities for Washington's under-served and low-income residents" (web). CTOP, like TMF, grants moneys to local community groups for their community-led technology projects.

Literacy Source is one of the first ten CTOP grantees funded by this new program. Literacy Source is planning to launch their new computer program—Literacy Online—to improve the quality of instruction and increase technology access for high needs adult learners.

Other examples on the public funds side include: the Youth Media Institute received money from the Seattle Housing Authority, a public corporation, to offer programs to the youth in the High Point neighborhood starting in 2008.

Private Grants

On the private side, some of the five cases have been more successful than the others in receiving grants from private foundations.

The Youth Media Institute received grants from the Annie E. Casey Foundation and Neighbor-to-Neighbor of Seattle in the past years. Literacy Source received a grant from the Boeing Employees Community Fund to upgrade their entire computer lab in 2007. They also received grants from other sources, such as The National Book Scholarship Fund. RecTech Coalition received money from the Bill & Melinda Gates Foundation to launch their TechNet Program in 2006. They are currently in the process of getting a grant from the Allen Foundation.

4-2-2-5. Social/cultural Resources

Social/cultural resources refer to formal and informal social networks/coalitions/partnerships, including community-based organizations and personal networks, from which a CTC can receive tangible assistance to function and sustain itself effectively. The forms of assistance can usually range from cash contribution, equipment/software donation, volunteer help, knowledge exchange, curriculum sharing, to student referral/recruitment.

All five cases in the study attempt to work closely with other organizations in various ways.

The Youth Media Institute relies heavily on local artists in the field of media and digital arts to offer instructions for their workshops. They also work with local radio and TV stations to offer audio and/or video production workshops for youth. A lot of collaborations are built through personal connections.

> "I happen to have a number of friends who study arts and digital media, or something, a couple of my friends ended up to sign in to teach classes, sometimes, friends of friends who happen to be professionals in that field, ….. We find them wherever we can."

The Youngstown Cultural Arts Center, where YMI is housed, also is a convenient source for YMI to find teaching artists they need, given the fact that many local artists live right above them on the second floor of the Center.

> "We work with many other teaching artists, some of them are actually living here in Youngstown that we work with, so that is how we find a lot of our teaching artists, who provide the technical training, we work with them directly, before the actual classes begin, on the curriculum, know what they are going to teach, so we have some consistence throughout the workshops."

For STAR Center, volunteer helpers from the Center Park community have been crucial to its day-to-day functioning. STAR relies on volunteers to help with many areas of Center's operation, from the front desk reception, office space cleaning, flyers making and posting, to computer tutoring.

> "I have been very fortunate, we could use some more volunteers in each place, but I have not been doing a lot of recruiting, they just walked in the door, I have been very luck."

> "That is one of the sustainability elements that the people who are committed to the environment can pick up and run some of the basic needs of the center. Especially they are willing to do it on the volunteer basis, that is a big contribution to the success of the center, and given that, neither these centers would be functioning if I were that only one there."

STAR also works with other organizations who serve the same disabled population through client referrals, such as the Light House for the Blind.

Literacy Source also actively works with other organizations on student referrals, such as the Refugee Forum of King County, and the Learning Disability Coalition.

East African Community Services receives strong supports from the refugee/immigrant community across King County.

> "EACS is pretty community-based, very much grounded within the community. ….. We had a couple of businesses, Somali-run businesses, they totally shake their hands in the CTC. They stepped in and provided a lot of donations. ….. I don't think we can set up this CTC without the community around us, it is pretty much a community effort."

EACS also collaborates with other organizations on curriculum development, such as the Refugee Federation Service Center, the Puget Sound Training Center, the Somali Community Services of Seattle, and Yesler Community Technology Center. They share and exchange experiences and course materials with one another.

RecTech-affiliated CTCs rely on local professionals in the design and media fields to offer instructions for their workshops. They have worked with Seattle Arts Corps, Red Llama, Adobe Youth Voices, and 911 Seattle Media Arts Center on many workshops over the past few years.

4-2-2-6. Institutional Resources

There are two kinds of institutional resources that a CTC can leverage: 1) external institutional resources; 2) internal institutional resources.

External institutional resources refer to CTC national/regional consortium, such as CTCNet; public agencies, educational institutions, or service providers, which either directly support CTCs through established community technology initiatives and funding mechanisms, or offer technical supports on relevant services related to CTC operation.

On the other hand, for a larger multi-service organization, internal institutional resources refer to already-existing administrative systems inside the organization that can assist its CTC programming with personnel help, technical support, or other forms of assistance.

External Institutional Resources

As for the external institutional resources, the five study cases work with the following three types of agents: 1) public schools, including universities; 2) public libraries; 3) city departments or social service agencies.

YMI is currently contracted with the Seattle Housing authority to provide media-skills training programs to High Point youths in the High Point community. They also plan to work with the Seattle Public Library in High Point to bring in some of their workshops there in the library.

> "They would like us to utilize the High Point facility, so we were doing most of our workshops in the High Point community center, but we are going to do one in the library, so that we can draw some of youths into that facility in High Point."

The Assistive Technology Clinic at the University of Washington held a series of training in July 2008 for all the volunteer trainers in STAR Center on a variety of Assistive Technology software primarily focusing on what they already have there in the computer center.

STAR Center also has been working with the Division of Vocational Rehabilitation (DVR) of the Department of Social and Health Services (DSHS) on client referrals.

> "If somebody calls us in DVR says someone needs to learn Naturally Speaking, we do an intake, so we just take the responsibility and say OK, bring him/her in and we will do an assessment."

Literacy Source also actively works with other organizations on student referrals, such as DSHS, the Department of Correction. They also work with the Literacy Network of Washington, where they send their volunteer tutors for training. Literacy Source also partnered with the Seattle Public library to access their curriculum for the Wire for Learning Program.

EACS also acquired access to some of the computer learning materials that were created by the Seattle Public Library. They were able to refine their own curriculum for their computer literacy program based on the information they received from the Downtown Main library. EACS also partnered with the Seattle Public Schools to set up a series of workshops teaching parents how to use the SOURCE database.

The Educator for Social Justice Group at the University of Washington has helped Rainier Beach CTC (affiliated with RecTech Coalition) with a photography workshop in the summer of 2007. Southwest CTC (also affiliated with RecTech) collaborates with Denny Community Learning Center (CLC) in the Denny Middle School on student referrals and tutoring. Denny CLC has been sending their tutors in to help out students there with homework completion in Southwest CTC.

Internal Institutional Resources

As for the internal institutional resources, the computer training programs in Literacy Source, EACS, and RecTech CTCs all benefit from the resources that they have inside their organizations.

Literacy Source started their computer literacy program with their years-long experiences on providing Adult Basic Education and ESL tutoring. Over the years, they have built efficient protocols of doing most of their businesses, ranging from curriculum development, community outreach, student/tutor recruitment, to fundraising.

> "We have a very thorough process for students and volunteers to get started, volunteers have to attend our monthly volunteer orientation session, and that gives them an overview of Literacy Source Center and all of our programs. ….. They (volunteer instructors) can pull out the resources we have available."

> "I do think we kind of model the computer instructions and the workshops tutoring on our experiences with other kinds of workshops and tutoring that we were doing before and wasn't technology based."

> "I think the strength of that, we have a lot of materials a lot of techniques, strategies for working with adult learners, which can then translated to teaching adults learners how to use computers."

Staff in Literacy Source constantly use their blog and an internal wiki system to exchange information and help one another.

> "We do have a blog it is more focused on volunteers, to share lessons findings, resources and strategies, and experiences. ….. We keep a wiki, it is an internal wiki for staff board members, to share the policies and procedures, how to's. Part of our work is documenting what we do and how we do it, so when there is turn over, somebody else can continue that work, don't have to re-invent the wheels, start fresh."

EACS's computer literacy program also enjoys the resources that already exist in their organization. These include some tangible things, such as office supplies, maintenance help; and some resources that may not be notable immediately but do have a significant impact on CTC program's success, such as personal contacts, and social networks built around refugees and immigrants in the East African community.

> "Having a CTC located in an already established service provider I think that works great."

> "CTC benefits from those already exist social network and personal relationships, because EACS has been around since 2001, but CTC just started in 2007, there are already many strong personal ties, or social network within the community, when the lab established, a lot of resources just flow in."

RecTech has organized all their technological resources they have in all their local CTCs in a way that these CTCs can share efficiently their resources with other CTCs that are close by.

> "Originally, eight labs have come together and come up with what they wanted to do, that led to our first big grant, so we have kind of gone from there. Our idea to do was each center focuses on different multi-media area, we are trying to do

> more than one multi-media area, it is kind of silly to repeat it so close by each other, it takes a lot of money for getting all these video equipment, or photography/music equipment, so our plan is having clusters of three centers, these three centers close by doing this multi-media area, and other clusters doing other areas, so this is kind of how our grants look like right now. Building up on what we have already done, and what we kind of like to build next in the future."
>
> "….. that is also what we tried to build from having centers clustered together, so for example, this fall, we have a brochure that rough drafted that Rainier Beach and Rainier they are close by, will working together, working to build volunteers, and get the youth in together."

As mentioned before, RecTech is institutionally a part of ARC. Although administratively it goes on its own, RecTech shares many resources that already exist in ARC, ranging from office spaces and facilities in nine local Community Centers, personnel help, to contact database and personal connections for fundraising.

4-2-3. Findings regarding Community Partnerships

As discussed before in Chapter One, the meaning of the word "community" in the term "community technology" is two-fold: 1) it indicates the beneficiary of the action—a community can benefit from the action of conducting a community technology project; 2) it also suggests the "means" by which the action is actually taken—a community technology project can benefit from people working together as a team; more specifically, working together to leverage resources from a community to make a community technology project work. From this second viewpoint, a community is the "unit" of the action and also the vessel that a community technology project can be carried out.

A CTC needs resources to operate and sustain effectively, as discussed in the previous sections. Some of the resources, such as social/cultural and institutional resources, are acquired through networking and collaborating with other parties. The ideas presented in the following sections, informed by the notion of asset-based community development, claim that these networking and collaborative activities can take place in the community

where a CTC is situated in. These activities can be generally labeled as *community partnerships*—a means by which a CTC can rely to secure these critical operating resources. Research on asset-based community development identifies four factors relating to this category: 1) asset-based approach; 2) internally focused effort; 3) relationship driven; 4) external connection.

This section addresses the question of how a CTC can take an asset-based approach to locating its operating resources from inside the community, which this CTC is intended to serve. Again, findings from the case studies regarding community partnerships are summarized in the following sections.

One important point is that the term "community" does not necessarily mean a geographically-defined place. As discussed in Chapter Two, there are also communities of interest, which refer to human associations, whose members are bound together by an identification with a common issue or interest, as opposed to by a common local environment. For example, Literacy Source serves almost the entire King County. Their students are from all areas in the county with a common interest, which is to receive basic education and skills training.

4-2-3-1. Asset-based Approach

The notion of asset-based approach emphasizes that a CTC project begins with what is present in the community. It relies on local assets as opposed to perceived needs. These assets represent resources that can be utilized in order to achieve CTC sustainability.

The Youth Media Institute maintains their teaching/tutoring capacity by relying on teaching artists in the Youngstown Cultural Arts Center—a place-based community where they are housed in, and from the media/arts field—an interest-based community formed by artists in the field. In terms of getting access to technological and facility resources, YMI also benefits from being in Youngstown.

> "One thing we were trying to do is we have this space here that is nice for workshops to take place in Youngstown, we have a recording studio, a media lab, an auditorium, it is a nice facility, ….. We were able to serve other youths (more) from around south Seattle."

For STAR Center, obviously, the most valuable asset they can utilize from the community is all the volunteer helpers from within the Center Park housing complex—a place-based community. Besides, they occupy an office space in the housing property free of charge. They also receive assistance from other social service providers or institutions—together forming a kind of interest-based community, which serves the same disabled populations.

Literacy Source, as a long-time adult learning center serving King County for more than 20 years, has been very successful in seeking support from the locals.

> "Our in-kind donors provide coffee, donuts, movies, plays and other treats to our volunteers and students, not to mention office supplies, instructional materials and meeting space."

Literacy Source also works closely with other organizations on student referrals or curriculum sharing. These organizations serve similar populations with a shared mission to provide adult learners with basic education and life skills training. This is another clear example of the interest-based type of collaboration.

East African Community Services has been enjoying the supports they have received from within the East African community.

> "We have got a great community around us, we are in the middle of New Holly, people feel a lot of ownership and responsibility, every time we had events, just a lot of community volunteers within the east African community, that came in to help out , so we been supported the whole way."

> "We look at this (the computer lab and the literacy program) as part of community and built by the community."

EACS presents a unique case for the comparison of place-based vs. interest-based collaborations. Even though a lot of their clients are within New Holly or other surrounding neighborhoods, a significant amount of their clients are from all over the King County area. The case of EACS can be seen as a hybrid between place-based—serving residents in New Holy, and interest-base—serving East African refugees and immigrants across King County.

Although all the nine RecTech-affiliated CTCs are located in the local Community Centers, they do not receive much volunteer help with respect to technical assistance from their respective community due to the requirements of specific knowledge and expertise on the computer technology. In fact, this problem happens to almost all five cases in the study.

> "Right now we providing for the community more, it has been hard for the community to contribute, I mean they supported, but it is hard for them to find what they can do for the CTC, it is still very much a one-way situation. ….. I think that is because that the spread of the knowledge is so big, and the community has very little skills."

Instead, they rely on local professionals in the nearby neighborhoods to provide instructions for workshops, sort of a mixture of place-based and interest-based collaborations. Some of RecTech CTCs also receive help with computer tutoring from other staff in the Community Centers. For example, one staff member has been helping Garfield CTC with their web design workshop and Adult-Times.

Besides the assistance for tutoring and instructions, RecTech CTCs also enjoy the facility resources they have from the local Community Centers.

RecTech also presents a unique case with respect to asset-based collaboration. As mentioned before, the nine RecTech CTCs share their technological resources with one another by forming three clusters and developing programs together. This can be

regarded as a unique case of interest-based community effort within a cross-region coalition type of organization.

All five cases present their unique ways in which they seek out help from the communities, either place-based or interest-based. For an easy comparison between cases, a quick summary is provided in Table 4-3 below.

Table 4-3. Asset sources in communities

	Students served	Tutors/instructors	General volunteer help	Other assets
Youth Media Institute	**Place-based**—youths in surrounding neighborhoods	**Place-based**— in-house artists in the Youngstown Cultural Arts Center **Interest-based**—artists in the relevant fields		Facility in the Youngstown Cultural Arts Center
STAR Center	**Place-based**—residents of the Center Park housing complex **Interest-based**—disabled population in King County	**Place-based**—volunteer helpers from the Center Park housing complex	**Interest-based**— Helpers from social service providers or other institutions	Facility in the Center Park housing complex
Literacy Source	**Interest-based**—adult learners in King County	**Interest-based**—any qualified volunteer tutors		
EACS	Place-based— East African residents in New Holy and surrounding neighborhoods **Interest-based**— East African refugees and immigrants in King County	**Interest-based**—any qualified volunteer tutors	**Interest-based**— East African businesses and residents in King County	
RecTech	**Place-based**—youths and adults in surrounding neighborhoods	**Interest-based**—professionals in the relevant fields; TechNet Leads from other CTCs	**Place-based**—staff in Community Centers	Facility in city-owned Community Centers

4-2-3-2. Internally Focused

Internally focused effort states that a CTC initiative calls upon community members to identify their interests and build upon their capacity to solve problems. A successful CTC project puts a special emphasis on leveraging what is in the community first, before looking to outside entities and/or resources.

The Youth Media Institute encourages their students to relate their learning process with issues that are important to themselves, to their families, or to their communities.

> "With respect to community technology relating to community development specifically, (we are) seeking to give young people a chance to learn the skill and ability to project their own ideas and the truth about the White Center, because White Center itself had pretty bad reputation, historically, media basically covered a lot of negative things, but then (we) noticed that not a lot of good things had been covered, they don't talk about the rich diversity, the cultural diversity the positive things that had happened, so that kind of how YMI started, that gave youths technology, use media to affect their community, to show the truth about what actually happen in White Center. All the changes taking place in White Center, some good things that take place. I think technology can be used as a tool. That is really something we try to push here."

STAR Center initially was a direct response to the demand for free access to ICTs from tenants in the Center Park housing complex. Since its beginning, STAR has been working closely with residents to make sure that their offerings meet residents' needs. For example, in January 2005, in preparation for the TMF application, STAR worked through Digital Promise—the fiscal sponsor of STAR— and met with the Center Park Resident Council, and officials of SHA to identify the needs of the community and discuss the future of the STAR Center. STAR also maintains a communication channel through their Advisory Board for the residents to express concerns or offer suggestions.

> "We have an advisory board for the STAR center, ….. We do have residents involved, and (providing) inputs, suggestions, or requests as to how this place should work, what services should be delivered. ….. We want to do it (board meetings) at least every other month, we reactivating that a bit, getting more people involved."

Literacy Source values community input for shaping their computer tutoring program. In 2003, Literacy Source formed a computer tutoring committee to identify needs for their computer tutoring program. The committee consisted of three community members and three Literacy Source staff.

EACS attempts to build their computer literacy program around the issues that interest their clients. They are currently developing a curriculum that will link their basic computer skills training with employment and job skills assistance. This is a direct response to the needs facing their students.

4-2-3-3. Relationship Driven

Relationship driven states that an effective CTC project requires the ongoing establishment of productive relationships among community members, as well as the associated trust and norms necessary to maintain and strengthen these relationships.

The Youth Media Institute nurtures all the connections, collaborations, and partnerships they have with other organizations.

> "We want to work more closely with other organizations, because they already have youths that they have contacted with them, so we can collaborate with them to reach to all their youths simultaneously, we can work together. ….. We actually went to some area high schools, and met with teachers, passed out flyers, ….. We met with other organizations, both within Youngstown, and also met with other organizations in south Seattle, basically to let them know what we have been doing so they can tell their youth."

YMI has been using their monthly e-newsletters as a communication channel to reach out to their partners and students.

> "Once a month, we send out our monthly e-newsletters, that will detail our up-coming events, news, and our programs, and we also keep our website up-to-date, and if there is a special event, we might send out a reminder newsletter, special notice, advertise that special piece of event. ….. We send out our monthly newsletters, when we need teaching artists, we will put out a call for teaching artists."

Although YMI now is an independent non-profit, they still value and maintain the

relationship they have with their previous fiscal sponsor.

> "When we received 501(c)3 status, that marks our official departure from the White Center Community Development Association, that means that we are officially on our own, we are independent from CDA, but we still work with White Center, we got funding to provide service to White Center youths, that was through Making Connections, that specifically focused on White Center."

Literacy Source keeps all their donors, community volunteers, and students updated with their programs, services, and events through their newsletters, annual reports, and other publications available online and offline. Their outreach team constantly meets and make sure that Literacy Source is closely connected with other parties and the populations they serve.

EACS continues to cultivate any forms of relationships they have with members in the East African community.

> "EACS is pretty community-based, very much grounded within the community, it started in 2001, there were four Somali refugees, started this organization, and it just kept growing beyond that, our board members are almost entirely East African. Everybody is very much involved, we have got a great community around us. ….. The executive director here, he has a very good network of support within the community, he is quite well respected within East African community so those are just his contact, I have been provided with a lot of supports they had been built before I came here"

4-2-3-4. External Connection

External connection means that CTC sustainability depends heavily on activities, investments, and resources from outside the community to support asset-based, locally defined community technology projects.

The Youth Media Institute also explores other opportunities to work with other non-arts-focused organizations. For example, they are currently working with the Seattle

Housing Authority to provide service to High Point youths.

Literacy Source maintains a long list of partners who constantly offer generous supports in various forms to Literacy Source, just to mention a few: United Way of King County, City of Seattle's New Citizenship Initiative, Women's Funding Alliance, and the State Board for Community and Technical Colleges.

EACS is currently collaborating with the Puget Sound Training Center on the new curriculum for their computer literacy program.

> "We have been working on developing right now is with Puget Sound Training Center they provided three job readiness workshops have some technology focused as far as resume building online application and just some office skills."

RecTech welcomes any forms of assistance from outside organizations, such as the Seattle School District, the Seattle Public Library, and the University of Washington, as they have collaborated in many cases to offer various programs for RecTech CTCs.

4-3. The Role of Seattle Community Technology Program

At least one common aspect is shared by all the five cases in the study, which is that they all have been the recipient for the Technology Matching Fund from Seattle Community Technology Program. Some have received the grant more than once. Obviously, Seattle Community Technology Program (CTP) has played a role in each of the cases, though to varying degrees; some may have benefited more than the others from the Program.

This section first describes what is offered to TMF grantees by CTP. This part of discussion is based on an interview with the TMF manager, who is in charge of grant application and approval processing. The second part of this section then discusses how the five study cases conceive of the impact CTP may have on their CTC project(s).

Assistance from CTP

First of off, CTP provides pre-application assistance to all interested organizations. They hold pre-application workshops in several neighborhoods to explain the process, help develop their CTC project ideas, and fill out the applications.

> "That was actually more on providing assistance on applying for the grant, it is really on helping people who have not applied for the grant before, to understand how to fill out the grant application, ….. So that is mostly on the mechanical side of the grant, writing a good application."

After the approval, CTP helps grantees carry out and implement their individual project by a number of different ways:

They first hold an opening celebration event while announcing names of new grant recipients. All newly approved grantees have a chance to get together and meet each other.

> "We had a celebratory event where people would come and kind of a meet-and-greet celebration party, so we invited our grantees to come and participate in that."

CTP hopes to help new grantees form a network among them to exchange information and share experience, knowledge, and resources with one another. This networking effort is an on-going process continually done by personal communications between the TMF manager and the grantees.

> "Basically I will know who their project coordinators are, I just send out emails just basically communicate with them, emails or phone calls, ….. we just communicate back and forth, and they will check in with me on their reporting or on what is happening with their project, then I will typically send out our newsletters, Brainstorm, to our grantees, and I like to try once a month try to facilitate communication with them or check in to see how the project going."

> "I think quite often many of the non-profits don't know other organizations that we might have seen build partnerships with other programs, so we might know an

> organization that has provided training that we might think would be great partner for them, because they are doing a similar thing, so I think one thing we are able to do is because we see so many projects so many non-profits doing some of the work that we are able to provide this kind of referral and program that matching type of advice, we do a lot of that kind of things, just that kind of referral and networking among our grantees. ….. so they can build their network with their peers for them to talk to one another, so we try to find out that if you are doing tech support in this area, maybe somebody doing similar thing you can talk to each other, so try to build this kind of connection among community members."

CTP provides technical assistance to grantees and help them make plans for implementation.

> "In each case, we like to sit down with the grantees, and talk about their projects, what we like to do is to provide technical assistance throughout the project, I do planning in the beginning of the projects, we look at what their project plans are, see if there are areas that they might have missed. ….. We sort of sit down with them and kind of look at what their plans are, we sort of offer advice on what are some of the planning pieces they need to put in place."

Throughout the grant cycle, CTP continues to provide grantees with useful information for implementing their project through 1) monthly e-newsletters—Brainstorm; 2) personal communications through emails and phone calls. Information offered to grantees includes: 1) successful stories of other CTC projects; 2) tips on computer technical issues, such as setting up security features for Internet safety; 3) grants/funds opportunities; 4) city policies/programs regarding technology access.

> "As we find out other educational opportunities that we try to pass on that piece of information to our grantees, and communicate them throughout the year, like CTCNet has another conference coming, have a lot of great things, we pass out that information on to our grantees, or there are other events happening, we try to make sure that they are aware of that information that may help them."

> "Other kinds of assistance we do this year, City has discount program with HP for equipment purchasing, so something we are doing is sort of leveraging our purchasing power with the City and extend that discount to the non-profits that are our grantees, so if they want to purchase HP computers, they are able to purchase them, at a discounted rate through this special program we have to our grantees,

so we trying to do things like that."

CTP provides grantees with standardized documents for reporting purpose, including progress report form, expense form, and final report form. It helps grantees process all reporting requirements.

Grantees' Feedback

Our study cases offer positive feedbacks on the assistance they received from CTP.

The Youth Media Institute appreciates the grant moneys they received through TMF and also the help with networking from CTP.

> "It was the money that we can paid for the equipment and staff times. Then also, what they had done very well was try to connect us to the community of other organizations that also doing similar work. Like they have monthly newsletters that go out through emails, also connect us to other funds, so there were other opportunities to look for other technology funds, also just hearing other programs you know. They have put together a couple of little receptions for like giving you money so you meet other projects knowing what they are doing, so you become more aware of what is going on, they do try to make more like a network. When you get their money, you are kind of in their network with other organizations, but you get the money too."

STAR Center emphasizes the significance of having TMF grants to Center's early establishment.

> "About 1998, a few people with disabilities who were living here they decided to have a computer center, ….. it wasn't until Seattle Community Technology Program stepped in, it got formalized. ….. This was really a grassroots effort, with those folks over there, Seattle Community Technology Program funded the first computer lab, which is this one we still have right now and right here."

STAR Center also appreciates the useful information they can access through CTP's e-newsletters.

> "Community Technology Program they put out great email-based newsletters every month, a lot of useful stuff on there, we were able to get some out of there for a couple occasions."

East African Community Services values the help they received from CTP during the early phase of their project.

> "Delia in DoIT provided a lot of assistance, helping me kind of forming direction. We were kind of late, supposedly we should have started a little bit earlier, so she kind of helped us play catch-up, we re-worked our time-line, so that fit my hire date, so that was really helpful. So that was kind of how we started."

EACS is also pleased about the networking effort made by CTP.

> "I think they provided just a very good network between all the CTCs. I was able to get a pretty good idea about whom I can talk to for what programs. They provided something to build partnerships, to connect to people in the field. I definitely felt they (CTP) were very much involved in the process."

In short, Seattle Community Technology Program, through its Technology Matching Fund, offers its grantees various forms of assistance, which are confirmed and appreciated by some of the study cases in this research.

Some of the study cases also offered suggestions for CTP:

YMI hopes that CTP can continue to offer grant moneys for CTCs to take on more projects.

> "I think what they could so obviously is that still give us grants, that is very helpful. Because we can't do our programs without their grants, without their supports, but one thing we return to them is connecting communities that are not usually served by the technology, these people link together with city through us."

YMI also suggests a possible database for all grantees to look for technical help from other organizations or local businesses.

> "But one thing I had mentioned to Delia and David about what would be helpful for us (is that) anybody who can help with technology, maybe finding resources so we can have people come help us with technology infrastructure. They could also do things like creating a database of volunteers like tech-volunteers, who would be willing to come over to help with your tech stuff, I think that would be helpful just about for anybody."

Even though STAR appreciates the monthly e-newsletters, they suggest more in-person types of contact can be useful.

> "A lot of useful stuff on there, but that is not collaboration, that is not connecting, that is nothing better than people getting eyeballs to eyeballs, and to get to know each other and know each what they are doing, so they can share stuff. But that has really not happened here."

4-4. Summary

This study attempts to answer the question of what factors contribute to CTC project sustainability. It relies on the three-layered CTC operating model to find the answers. This model, based on the three major schools of literature, identifies a total of 15 factors, which are categorized into three main areas: 1) individual empowerment; 2) CTC sustainability; and 3) community partnerships. These 15 factors together function as the roadmap for the data collecting process, by which the research findings are drawn. Evidence observed on the field based on these 15 factors is presented in this chapter and organized into three major sections corresponding to the three main categories respectively. A quick summary of the findings from these three major areas is presented below in this section.

As for individual empowerment—perceived as the fundamental responsibility for a CTC, evidence shows that the five study cases provide users with resources for accessing ICTs in a variety of different ways:

- Providing technology resources by 1) offering access to computer equipment, software, and other digital devices during structured classes or workshops; 2) offering minimum-to-non-monitored computer access during drop-in hours, or known as open labs.
- Providing knowledge resources by offering 1) basic computer skills training for adult or senior users; 2) multi-media classes for youth or adult users; 3) special assistive technology training for people with disabilities.
- Providing content resources by 1) linking computer skills training with learners' personal needs, such as learning languages, seeking employment opportunities, or accessing information regarding education, health care, or other social needs; 2) offering useful materials in digital forms, either for skills training or for personal needs.
- Providing social resources by 1) recruiting volunteer tutors; 2) hiring outside instructors; 3) hiring peer trainers from recent graduates; 4) encouraging networking among learners; or 5) encouraging participation from learners' families.
- Providing psychological resources by 1) offering training classes on various topics; 2) employing multiple teaching methods for delivering learning materials; 3) offering rewards or certificates; 4) making assistance always available.

As for CTC sustainability—critical to a CTC's functioning as an enabling force for closing the digital divide, findings from the field show that the five study cases maintain their service capacities by securing critical operating resources from various sources:

- Acquiring technological resources by 1) purchasing through grants or public funds; 2) through donations or refurbishment programs; or 3) sharing digital devices or facilities with other organizations.
- Acquiring facility resources by 1) renting office spaces; 2) sharing facilities with other organizations; or 3) utilizing facilities in parent organizations.

- Attaining personnel resources by 1) maintaining a core group of personnel for administration purpose; 2) recruiting instructors or tutors for teaching/training purpose; and 3) hiring tech personnel for equipment maintenance.
- Seeking funding resources through 1) public funds, including local and State governments; 2) private foundations or corporations; or 3) small cash contributions from locals.
- Obtaining social/cultural resources by 1) maintaining close ties with other social service providers serving similar populations; 2) utilizing personal relationships with professionals in the fields; 3) seeking volunteer helpers from within communities.
- Seeking institutional resources by 1) working closely with other departments within parent organizations; 2) maintaining connections with other educational institutions; or 3) working with city officials.

As for community partnerships—perceived as a means by which a CTC leverages resources from within a community, either place-based or interest-based. Evidence shows that the study cases nurture partnerships and leverage available resources from communities where they are located or affiliate to.

- Taking an asset-based approach to focus on resources already existing within a community, either 1) a community of place such as an arts institution, a residential complex, or a neighborhood; or 2) a community of interest such as a specific group of artists, an association of special education providers, or a coalition of CTCs.
- Making internally focused effort to 1) encourage community members to identify interests and needs and set up programming orientation accordingly; 2) relate their programs/services to issues concerning communities or facing CTC users.
- Using relationship driven strategies to maintain and strengthen partnerships with concerned parties, including 1) issue newsletters or other publications to keep members informed; 2) foster personal relationships among volunteers or support groups; 3) maintain institutional ties both internally and externally.

- Cultivating and utilizing external connections with outside organizations on program/curriculum development and student referrals.

Research findings also show that Seattle Community Technology Program has been helping local CTC projects with 1) funding for equipment purchasing or personnel expenses; 2) technical assistance with project implementation; 3) networking with other CTC practitioners; 4) information sharing through e-newsletters or personal communications. Although most of the study cases have had satisfactory experiences in working with CTP, they did offer suggestions of additional resources or activities that CTP may consider to offer in the future.

In the following chapter, more suggestions for Seattle Community Technology Program and other relevant policy considerations will be discussed and presented in greater depth. Also in the next chapter, connections between these research findings and the theoretical models based on literature will be presented and discussed.

Chapter 5 - Discussion and Implications

This dissertation has investigated how community-based CTC projects implement and sustain their programs and service capacities. In this research, a working CTC project has been interpreted as both being able to continually provide ICT access and training to underserved populations, as well as being sustainable, both institutionally and financially. This research has also built a linkage between the community technology movement and the rich body of knowledge regarding asset-based community development.

The research findings emerged from examining five community technology projects in Seattle and asking the following three major questions: 1) what does your CTC project offer to your clients? 2) what do you need to maintain the capacity for serving the clients? 3) how do you accomplish that? especially, how do you seek help from within or outside the community to maintain your service capacity?

Both the model-building based on the review of literature and the empirical research are ongoing activities, which require critiques, replication, and reformulation. The findings of this specific research will become of value only when properly contextualized and critiqued within and alongside other research literature. This final chapter will link the findings back onto the literature, which has helped build the theoretical models and empirical design of the study. After doing this, this chapter will consider areas for future research and suggestions for policy.

In previous chapters we have identified key ideas in three major bodies of scholarly literature (Chapter 2), designed the research approach (Chapter 3), and analyzed empirical data (Chapter 4). In this final chapter, a summary analysis will be presented

consisting of five sections:

1. a recapitulation of the research findings;
2. a quick revisit to the origin of the theoretical models;
3. a discussion of the new factors emerging from the research findings;
4. a reconceptualization (revision) of the theoretical models based on these empirical findings;
5. a discussion of future research directions;
6. policy implications of this research.

5-1. Recapitulation of the Research Findings

The study findings that were presented in Chapter 4 are summarized below in the following three points. This summary can also be regarded as a re-interpretation of the findings using a common language in a hope that the findings can be understood by a broader audience.

1. A good Community Technology Center (CTC) helps its users learn the computer technology by doing the following two things:

First of all, it provides its users with a ***Supportive Learning Environment***; and it does so by:

1) offering access to computers with appropriate software and other digital devices, such as printers, scanners, digital cameras, etc;
2) hiring or recruiting computer instructors, volunteer tutors, or peer trainers to help users in the CTC;
3) encouraging collaboration and networking among users themselves;
4) utilizing different teaching methods to accommodate users' different skill levels.

Secondly, it provides its users with ***Useful and Practical Learning Materials***; and it does so by:

1) offering computer skills trainings at various levels, such as basic vs. advanced;
2) linking computer skills trainings with users' personal needs, such as learning languages, seeking employment opportunities, or accessing information regarding education, health care, or other social needs;
3) offering multiple learning packages for users to choose from and meet their personal needs;
4) offering useful learning materials in digital forms, such as digital documents, or web links available on its website.

2. A good CTC helps maintain its service capacity by doing the following three things:

First of all, a CTC is able to secure its ***Basic Needs to Ensure its Proper Functioning*** as a public computer learning center by:

1) acquiring suitable computer equipment and appropriate software;
2) securing a space with proper furniture and furnishings;
3) maintaining a sufficient amount of staff for both administration and teaching purposes.

Secondly, this CTC maintains ***A Steady Income of Funding*** in order to support its basic needs listed above; and it does so by:

1) having personnel dedicated to fundraising;
2) understanding the "money game" on both the public sector side and private foundations side;
3) having a good record of public service and always keeping a portfolio of programs for fund/grant hunting purposes.

Thirdly, it builds ***Community Partnerships and Collaboration*** to leverage resources available in the community in order to seek out help with its basic needs; and it does so by:

1) having personnel dedicated to building relationships with users, volunteers, supporters, and potential donors in the community;
2) maintaining close ties with other social service providers serving similar populations;
3) seeking volunteer helpers from within the community;
4) utilizing personal relationships with professionals in the computer-related fields;
5) assembling a semi-governmental coalition or organizational structure by a collaboration between city departments and not-for-profits and utilizing resources available from both sides;
6) focusing on what already exist within these relationships and leverage available resources from these partnerships;
7) engaging members of the community in designing programs and ensuring a direct connection between the programs and issues concerning the community or facing its users.

3. A good CTC achieves all these things discussed above in this section (highlighted in *Bold*) by doing this important thing:

It relies on ***A core of Dedicated Leaders*** to take on the tasks and carry out the center's core mission as a social service provider; and it does so by:

1) having a hard-working and dedicated group of leading individuals—the champions—to be the locomotive of the CTC;
2) relying on team work within its own organization; especially for a larger organization with multiple service focuses, internal collaboration is essential to the success of its CTC project.

5-2. Model Revisited

The theoretical models utilized in the current research were developed from three streams of literature: 1) Digital Divide & ICT Access; 2) CTC Practice; and 3) Asset-based

Community Development. The specifics of this study, including unit of analysis (community-led CTC), social activities (seeking resources, building partnerships), social context (community of place/interest), and research approach (qualitative methods), were all derived from the basic conceptualizations of these three bodies of literature. With the research findings unveiled, the general relevance of this research may be best understood in its contribution to these three main literatures. The next three subsections will discuss the findings and their relations to these three existing research areas.

5-2-1. Digital Divide & ICT Access

Research on the digital divide and ICT access emphasizes that the issue of the digital divide needs to be discussed from multiple viewpoints; rather than just simply viewed as a techno-economic problem. Efforts to bridge the digital divide must be primarily about empowering people. We should look for the deeper social, cultural and psychological causes behind the lack of access for particular populations.

Skills

Mossberger, Tolbert and Stanbury (2003) argue that having access to a computer is insufficient if individuals lack the skills they need to take advantage of technology. Certain knowledge and skills are necessary to exploit the potential of computers. DiMaggio et al. (2004) argue that computer vary in their possession of at least four kinds of relevant knowledge: *recipe knowledge* about how to log on, conduct searches, and download information; *background knowledge*; *integrative knowledge* about the way the technology operates; and *technical knowledge* about software, hardware, and networks necessary for troubleshooting the problems that invariably emerge.

Content/use

DiMaggio et al. (2004) call attention to the inequality in the purposes for which people use the technology. Oden (2004), in developing a heuristic framework of assessing the digital divide, argues that how individuals actually use the technology to better perform

tasks and create content is one important aspect when thinking of bridging the digital divide.

Social support

In dealing with the digital inequality, DiMaggio et al. (2004) also stress the importance of social support from which new computer learners can draw, including formal technical assistance (for example, office staff in workplaces, customer support staff in businesses, librarians, and teachers); technical assistance from friends and family members. Hargittai (2003) offers a definition of the digital divide involving five factors, one of them is presence of social support networks, which he defines as the availability of others one can turn to for assistance with use and the existence of networks among learners to encourage use.

Psychological support

Stanley (2003) argues that several psychological obstacles interfere with individual motivation to engage with the new technology, including relevance, fear, and self-concept. Oden (2004) also points out that lack of knowledge about the potential value of the technology, anxiety, lack of interest, and fear are all associated with the complex and rapidly changing character of ICT. Jos De Haan (2004) and Maike van Damme et. al. (2005) also argue that a positive attitude towards digital technology is becoming increasingly relevant to properly function in an information and network society.

The findings of this research suggest many parallels to previous studies in this area. In addition to offering basic computer skills to their clients, the five CTC projects in the study also provide their clients with useful resources or guidance that allow them to apply the technical skills they learn to the needs that are important to them. These CTCs also utilize resources from other institutions, social service groups, and community-based organizations to provide both practical support and emotional support to computer learners. They also help learners overcome mental resistance by creating a supportive learning environment that can accommodate learners' psychological comfort zone.

5-2-2. CTC Practice

Research on CTC practice attempts to layout a blueprint for building an effective CTC project. Researchers in this area suggest that a working CTC project needs to be focused on not only gaining technical capacity and knowledge base, but also a number of critical prerequisite requirements, including those mechanisms that can leverage cultural capital, social capital, and institutional support.

Social/cultural support

Kvasny (2006) suggests that CTC programs should assume a holistic approach by providing technical skills as well as strong linkages to existing social services such as workforce development programs, adult education programs, child and elder care programs, and transportation services. Clark (2003) argues that we should see CTCs as locations for social change. We must encourage CTCs to enable themselves to be advocates and activists and bring resources and social capital into the realm of resources available for CTC users. Hayden (2007) also makes a similar statement that contextual (cultural) and environmental (social) considerations are important in developing programmatic guidelines for future CTC policy intervention.

Institutional support

Servon and Nelson, (2001) point out that CTCs cannot be expected to solve the problem on their own. CTCs must work with other local institutions, such as schools and government agencies, to deal with the problem of the digital inequality. Simpson, Daws, and Pini, (2004) argue that CTCs should be re-conceptualized as essential community infrastructure like schools and libraries, rather than potential economic enterprises.

The findings here suggest that all five cases in the study attempt to work closely with other organizations in various ways. They rely on formal and informal social networks/coalitions/partnerships to receive tangible assistance (cash contribution,

equipment/software donation, or volunteer help) to function and sustain effectively. They work with public agencies to acquire resources available through established community technology initiatives and funding mechanisms. They also collaborate with educational institutions or public service providers to seek out supports or relevant services relating to their CTC project implementations.

5-2-3. Asset-based Community Development

Research on asset-based community development provides the CTC field with knowledge on how CTC practice can depend on community development efforts. Researchers in this area suggest that CTC success will be determined by whether or not these public access points (CTCs) serves their intended purpose for the communities they plan to serve. This also rests on the degree to which these CTCs are able to engage the communities and draw resources from them.

Community partnerships

O'Neil and Baker (2003) emphasize the importance of establishing partnerships from within the community as a means of leveraging available community resources. They argue that community partners support CTCs by contributing resources such as hardware, educational materials, cash contributions, job counseling and placement services, mentoring, legal services, expanded community-based services, and educational services. Pinkett (2000) argues that the asset-based approach to CTC operation can guarantee broad participation including residents, community-based organizations, local businesses, and institutions when designing strategies to set out a community technology initiative.

The research findings suggest that the five cases rely on local assets in their communities (place-based or interest-based) to maintain their teaching/tutoring capacity. These CTCs call upon their members to identify the needs and build upon their capacity to achieve their goals. They also attempt to nurture all the connections, collaborations, and partnerships they have with other organizations within the communities by sharing or

exchanging knowledge and experiences with one another.

5-3. New Factors

The empirical findings of this research have shown that the theoretical models along with their underlying 15 factors are applicable to the real-world cases and useful to understand how CTCs operate and sustain in the real world. These 15 factors, in general, cover two key aspects of the CTC implementation: *what* and *how*. The first group of factors details what resources are needed to operate a CTC; while the second group of factors indicates how to obtain these resources.

Those factors fall into the first category include the five personal resources for empowering individuals: *technology*, *knowledge*, *content*, *social*, and *psychological resources*. Four of the six CTC operating resources are also in this category, including *technological*, *facility*, *personnel*, and *funding resources*.

The remaining six factors are in the second category and specify the "means" by which a working CTC can acquire those resources in the first category. For example, *social/cultural resource* allows a CTC to acquire certain operating resources (such as equipment or volunteer help) from other organizations; the *asset-based approach* factor states that a CTC should focus on what is present in the community and rely on local assets as opposed to perceived needs.

In addition to these 15 factors, the research findings have identified two additional factors that also contribute to the health and sustainability of a CTC project. These two new factors are *Leadership* and *Team Work*. These two additional factors span across both two dimensions of the CTC operation, as each of them is what a CTC needs and how a CTC maintains its energy and capacity.

Leadership

The research findings show that all five study cases rely on strong leadership to operate and sustain their service and programming capacities. Strong leadership is particularly important to small stand-alone CTCs, such as YMI and STAR Center, which rely on leading individuals to carry out CTCs' major administrative tasks, which range from fundraising, personnel hiring, programming, curriculum design, to course instructions and training. Their dedication to their jobs play a crucial role in the health of these stand-alone CTCs. On the other hand, in multi-service agencies, such as Literacy Source and EACS, usually one member from their staff is in charge of their computer learning programs. Even if this designated personnel may not have to deal with some agency-wide administrative tasks, such as fundraising or personnel hiring, he/she is expected to carry out major assignments relating to CTC programming, such as curriculum development, course instructions, and student recruitment. Likewise, their devotion to the assignments is central to the implementation and success of their CTC projects.

Furthermore, *Commitment* is an essential element of strong leadership. If strong leadership is seen as the engine of a CTC project, then it is the commitment provided by the core leader(s) that powers up that running engine. In YMI, the two young leaders believe in the role of community media in re-shaping their community. They devote their passion and energy to helping local youth to understand the power of the digital media. In STAR Center, the lone coordinator has been concerned with the inequality in access to ICT available to the disabled populations. She has been helping people with physical disabilities gain access to and knowledge of computer technologies over the past seven years. It is these leaders' commitment and their belief in accomplishing their core missions that keep CTC projects running and moving forwards.

Teamwork

Close collaboration between staff members also plays a key role in the health of CTC projects. In particular for multi-service agencies or CTC coalitions, teamwork with internal administrative support enables their CTC managers to utilize resources available

inside their organizations. As mentioned above, multi-service agencies, such as Literacy Source and EACS, have one staff member responsible for their computer learning programs. However, these designated CTC program managers oftentimes receive support from and work closely with other staff on certain tasks, which are usually handled by other departments or sections inside their organizations. For example, Literacy Source assigns the grant-writing task to a person with more experience; EACS has one career coordinator to help students with work-place skills training. The functioning of these embedded CTCs depends on the team work formed inside their organizations. CTC coalitions, such as RecTech Coalition, often share resources and exchange knowledge and experiences among participating CTCs within the coalitions. Although they rely on a central administration to manage certain major operating tasks for all participating CTCs, such as fundraising, equipment purchasing, and programming, still many important tasks, such as community outreach, are carried by the teamwork created by CTC coordinators (the TechNet Leads) from all local participating CTCs.

5-4. Model Revision

A model represents a conceptual framework for research activities. This study has been conducted mainly based on a three-layered community-based model of CTC operation (Figure 2-4). The first layer of the model identifies five personal resources necessary for an individual to gain access to and knowledge of ICT in order to cross the technology gap and move to the other side of the digital divide. The second layer of the model further identifies six operating resources critical to a CTC's implementation and sustainability. The third layer of the model specifies the idea that these CTC operating resources can be located and obtained with the support from the community. In addition to this three-layered model, this research has also relied heavily on an asset-based operating model of CTC, which stresses the importance for a CTC to maintain a mutual two-way relationship with the community (Figure 2-5).

The empirical study of this research has proven that these two theoretical models do help

understand how a CTC operates and maintains its service capacity. The empirical findings have also helped identify two additional factors that were not in the original theoretical models, as discussed in the previous section. Now, with research findings and evidence from the CTC practices, a revised model of CTC operation can be realized. This re-conceptualization of the CTC practice does not intend to reject the original three-layered model of CTC and the asset-based operating model, but rather helps clarify the actual working relations among all 15 factors originally identified in the three-layered model, as well as the new additional factors that emerged from the empirical findings in this research. In other words, this revised model of CTC rearranges the relationships among all 17 factors based on the observations from the empirical work.

This re-conceptualization is mainly portrayed by a metaphor of the ecological cycle of a fruit tree, illustrated in Figure 5-1.

The tree, which itself represents a CTC, produces fruits—***supportive learning environment*** and ***useful and practical materials***—for people. But in order to do so, the tree needs to depend on its strong roots—***equipment***, ***facility***, and ***staff*** —to grow. Obviously, nutrition—***funding***, ***community partnerships***, and ***institutional support***—in the soil is important to the health of the tree. Furthermore, without gardeners' dedication and care—***CTC champions***, and ***team work***, the tree will not be able to thrive and grow all its sweet fruits for people to enjoy. Also, the oxygen—***CTC contribution*** to the community—generated by the tree purifies and benefits the environment—***the broader community***, in return, the fresh air with clean rainfall in the environment—***community support***—nurtures the tree.

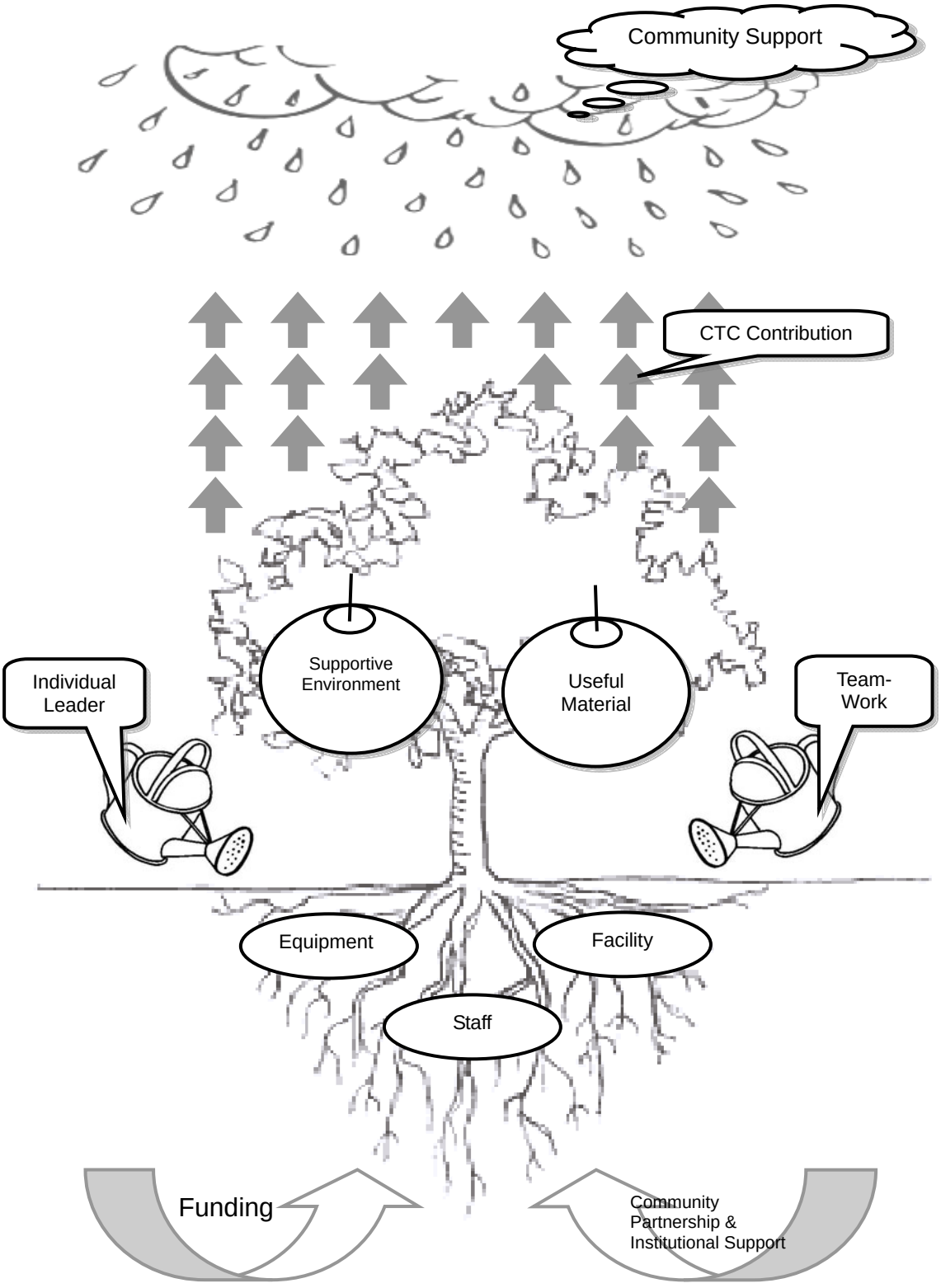

Figure 5-1. Revised Model of CTC

Now put the 17 factors back in this revised model, it says that:

1. A CTC's core mission is to help underserved populations access and learn the computer technology by providing them with: 1) a supportive learning environment with ***technology***, ***social***, and ***psychological*** resources; and 2) useful and practical learning materials made of ***knowledge*** and ***content*** resources.
2. In order to sustain its service capacity as an enabler for empowering individuals, a CTC needs to build its service(s)/program(s) on a firm groundwork with three fundamental resources in place: including ***technological***, ***facility***, and ***personnel*** resources.
3. The acquisition of these three basic needs, in turn, relies heavily on two other crucial resources: 1) ***funding*** resources; and 2) community partnerships and institutional support (in response to ***social/cultural*** and ***institutional*** resources respectively).
4. Most importantly, a group of core leading individuals with their ***leadership***, mission-driven commitment to the ideals of digital inclusion, and the ***teamwork*** formed by staff of a CTC, have to take on all the tasks and set all these resources in place.
5. Furthermore, a CTC is of value to the community in that it has the ability to transcend individuals and contribute to the overall betterment of the community. A CTC must be ***internally focused*** on members' real needs and relies upon relationships among members to solve problems (***relationship driven***).
6. On the other hand, its operation and healthy functioning depends heavily on the nutrition it can absorb from the supportive environment surrounding it. In other words, a CTC depends on what is present in the community in order to sustain itself (***asset-based approach***). However, it also relies on resources from outside the community to support locally defined community technology projects (***external connection***).

To illustrate this revised model, one case from the empirical findings is interpreted below using the construct of this model.

YMI

YMI bases their operation on the strong roots that are formed by three major elements: 1) plentiful hardware equipment and software programs that they purchased or acquired from other organizations; 2) available facilities that they rented or shared with other organizations; 3) steady sources of teaching artists and peer trainers. With the efforts from their dedicated leaders, YMI has been able to secure two crucial resources and sustain their programs and services: 1) public funds and private foundation grants; and 2) partnerships with Housing Authority and Public Schools for community outreach and student referrals. With its strong foundation and resources, YMI has been able to fulfill its mission and offer clients a supportive computer learning environment and a package of useful and practical learning materials. YMI has been attempting to increase people's awareness of issues facing the community by utilizing the community media in their programming. In a broader sense, the public goods—the increased awareness of the pressing community issues—that YMI has been able to produce also heighten the public's awareness about YMI's programs and services; in return, community involvement and contribution to YMI have both been increased.

5-5. Future Research

This research is situated in the field of community technology, which has been emerging as a major research area over the past ten years or so. This study contributes to this newly emerging field by synthesizing knowledge and experiences learned by past scholars and practitioners in the field, also by gathering information from the real-world situations. However, this study has a focused viewpoint, which may not cover the whole spectrum of views toward this evolving new field. For example, the semi-structured interviews were conducted only with CTC managers or directors of the five selected programs to collect information regarding their CTC operations. This study did not attempt to investigate (by

more structured methods) the benefits that CTC users obtained from participating in activities in these programs. Also, most of the five studied programs operate on a quarterly basis, in other words, their computer classes or workshops usually last three months. However, in the current study, the on-site observations and informal conversations with CTC users took place during three weeks in August 2008, which may not have been long enough to capture the entire story of their CTC operations. Future studies can build on both the findings and the limitations of this study in several ways, as follows:

(1) Specify what defines success of a CTC project. The five selected cases in this research with "successful" stories were chosen based solely on two factors: 1) the program had been continually providing its planned services/programs since its inception; 2) the program had conformed to all the guidelines for project implementing, documenting, and reporting required by Seattle TMF program. However, the current study did not intend to specify criteria for measuring outcomes of a CTC project. To increase the objectivity of this research, a more precise way to define the condition(s) of being a successful CTC project is certainly needed. There are two possible directions for this research effort:

1. Adapting Seattle Information Technology Indicators as a measurement for assessing how much "progress" is made due to the implementation of a certain CTC project within a certain geographically-defined area. The Seattle Information Technology Indicators are "a set of values and measurements describing the state of information technology as it impacts the social, economic, community and cultural health of Seattle" (City of Seattle, online).
2. Conducting longitudinal studies on individuals' life changes due to participating in a certain CTC project. A possible way to do so is to select only a few participants and conduct an ethnographic type of research to follow and record their life changes and personal development relating to use of ICT over a long period of time.

(2) Conduct outcome-based evaluations. Because of the nature of interview-based qualitative methods utilized in the study, the research findings may not be generalized and applicable to other research settings or contexts. In future research, more generalizable methods could be employed. One possible way is to design outcome-based research studies that evaluate outcomes of CTC projects and then make connections between the outcomes and the processes; instead of only focusing on the processes as this research did. There are a number of potential directions to conduct CTC evaluations:

1. Design standard evaluation forms for individual CTCs to use, including 1) a program evaluation asking students feedback on program effectiveness and instructor efficiency; 2) a student self-evaluation examining students' progress and personal development in terms of some specific learning purposes, such as basic computer skills learning, or advanced work-place skills training; 3) a CTC performance evaluation to be done by CTC managers focusing on some measurable aspects of CTC effectiveness, such as the number of clients served, the number of classes offered, community events held over a certain period of time.
2. Take neighborhoods as units of analysis and adapt Seattle Information Technology Indicators as a measurement to evaluate performance of certain CTC projects, which are intended to serve certain targeted neighborhoods.

(3) Focus on the inter-connectivity of the factors. This research relies on a descriptive case study method to investigate how a CTC project operates. Although this qualitative research method has helped identify key factors relating to the functioning of a CTC, it does not intend to examine the cause-effect relationships among these factors, For example, funding, staffing, and organizational structuring have all been identified as important factors to the sustainability of a CTC project. However, the inter-connectivity of these factors has not been explored and can not be explained by the current research method. Furthermore, all the five cases vary in terms of staffing, funding capacity, and organizational structures. Future research can be focused on this dimension to investigate the relationships among certain CTC operating factors and determine if different

outcomes are related to different performances on certain factors, such as different staffing structures vs. fundraising capacities.

(4) Conduct large-scale studies on all TMF-sponsored CTC projects by combining qualitative and quantitative methods. This may have to rely on a more standardized survey form with more measurable indicators for quantifying the outcome(s) of a certain CTC project. Again, Seattle Information Technology Indicators may be adaptable for this research purpose.

(5) Do comparative research. Taking cities or similar jurisdiction boundaries as units of analysis may provide different insights into what roles the public sector can play in promoting the community technology movement. Future research may benefit from a comparative framework at the level of local government, such as cities.

(6) Go beyond individual empowerment and look into community development as the outcome of a CTC project. The current study was focused on individual empowerment as the primary outcome of a CTC project. On the other hand, this research has taken community development as a *means* to sustain a CTC project. More precisely, it has tried to model a CTC project on the concept of asset-based community development. However, some CTC projects do target the promotion of community development as the outcome by focusing on "linking people together" with the help from ICT, rather than just focusing on "empowering individuals." Future research can look into this type of CTC project and extend our understanding on the linkage between community technology and community development.

5-6. Policy

The research on community technology has very clear policy implications. With the persistent occurrence of the digital divide—the polarity between information-rich and information-poor—community technology, in dealing with the problem by offering

public access to the new technologies, has a major role to play to ensure that the basic prerequisites of a democratic society can be set in place. The policy implications of this research can be stated at two different levels: the city and the non-profit CTC sector.

5-6-1. At the City Level

As stated in the Research Questions section in Chapter 1, the current research attempts to identify and characterize the role that public agencies can play in helping CTCs achieve their goals as enablers for positive changes. Attention has been given to the City of Seattle's Community Technology Program (CTP) during the actual field study for this research. Evidence collected from the field was reported in the previous chapter and shows that, since its inception in 1997, CTP has been helping community organizations undertake community technology projects through its Technology Matching Fund program and other forms of assistance. However, several programs in the study have provided suggestions for CTP in terms of how CTP could help them better implement their CTC projects. In this section, in addition to the suggestions from the field, the policy implications of this research for CTP based on the research findings are briefly discussed. Further suggestions on program implementation for CTP are also presented.

A city administration is always a key advocate for the community technology movement in terms of legitimacy, money, and networking. Seattle CTP has been playing an important role in helping community-based organizations establish their CTC projects and bring ICT access into communities. In general, Seattle CTP has been able to provide local CTC projects with the following three types of assistance: 1) money; 2) technical assistance in terms of grant application, implementation, and reporting procedures; 3) networking and information-sharing among TMF grantees.

While all study participants in this research gave high marks for the help they received from Seattle CTP (discussed in Chapter 4), some of the participants pointed out potential directions for CTP to move forward and increase its service capacity to support

community-led CTC efforts.

(1) Money, money, and more money. Obviously, money is one of the many tangible forms of assistance (if not the most tangible form) that CTP can offer to local CTCs. With respect to securing the money resource, CTP has been very effective. CTP has been able to increase the amount of grant money set aside for TMF each year over the past five consecutive fiscal cycles. In 2008, they awarded a total of $175,000 in grants to 15 community technology projects (web). This number is expected to go up to $225,000 for the next grant cycle in 2009. To continue this trend and maintain TMF grant capacity, CTP may consider doing the following three things: 1) understanding the city budgeting procedure and knowing how to play the "money game" inside the bureaucratic system; 2) opening channels of communications across all sectors, especially with the City Council who plays a crucial role in the city's budgeting process; the expected budget increase for the 2009 grant cycle was mainly due to the support from a number of council members, who were aware of and impressed by some of the TMF-sponsored projects (Burke, 2008). CTP should continue to make efforts to keep council members informed of its community technology programs in the hope that they can prioritize the TMF program and other ICT-related planning initiatives and continue to fund these programs; 3) exploring opportunities for local CTC groups to seek other public funds from other city agencies. For example, CTP may help local CTC groups work with other community-based organizations and explore ways to integrate their CTC projects into the neighborhood-wide planning process; by doing so, their CTC projects may be eligible for Seattle's Neighborhood Matching Fund, which is administered by Seattle Department of Neighborhoods.

(2) More awareness, more input, more support. Throughout this research, community support has been characterized as one important ingredient to the success of a CTC project. However, without a broad-based awareness of issues regarding community technology found inside communities, the connections between CTCs and the communities may seem difficult to establish. CTP can help build these connections by

increasing public awareness of the community technology movement. CTP may consider doing the following three things: 1) making their own program(s) more visible to the general public. Their monthly e-newsletters—BrainStorm—have been a major medium of communications for CTP to distribute information and showcase successful stories of local CTC projects. BrainStorm has been very informative. One thing CTP may consider doing is to work with Seattle Department of Information Technology to create a hyperlink to BrainStorm on the front page of the city website—seattle.gov—so that information on BrainStorm may become more accessible to the public; 2) CTP may also create low-cost brochures using the materials on BrainStorm and make these brochures available in community centers, libraries, and neighborhoods service centers; 3) CTP currently holds an annual celebratory event at the beginning of a grant cycle to announce new grantees for the current fiscal year. This event is initially meant to be a "meet-and-greet" celebration party for grantees to get to know each other. CTP may consider expanding this annual event to be a showcase of previous successful CTC projects; also make this showcase event open to the general public.

(3) Networking through multiple channels among CTC grantees. CTP understands the importance of building partnerships as a means to seek out support from the community. They have been helping promote networking among grantees through personal communications, such as emails. However, other new digital forms for social networking may be utilized. For example, blogging or information sharing through discussion forums may help build relationships among all participating CTCs. In addition, nothing is more direct than the old-fashioned face-to-face contact when considering building a relation. Regular face-to-face public showcase events or socials may also help facilitate networking and collaboration.

(4) Building a database for information sharing. Currently, CTP staff facilitates information sharing through either BrainStorm or personal communications. However, the process can become more robust by building a one-stop online front desk, a kind of online database for all sorts of technical issues usually facing TMF grantees. CTP can

also re-launch their Tech-map, which used to be a mapping tool for all of the CTCs in Seattle. This system is currently unavailable. They can re-design the Tech-map to be not only a map listing all operating CTCs in Seattle, but also a sort of Tech-yellow-book listing all tech-related service providers (such as audio/video production studios, tech-specific volunteer helpers) that may be helpful to some local CTCs.

5-6-2. At the CTC Level

The model presented in Section 5-4 with its 17 factors together offer a blueprint for CTCs to function as enablers to close the digital divide. Although the empirical findings of this research have confirmed the applicability of the model, not all the five study cases perform equally well on all 17 factors. In other words, some cases are relatively weak on some aspects, even though all these 17 factors are present in all the five CTC projects.

For example, STAR Center currently has only one paid staff responsible for managing the daily functioning of the computer center. Although many volunteers help her with some routine daily tasks, heavy work load on some key responsibilities, such as curriculum design and course instructions, already consume most of her energy. As the result, she has not been able to focus on other key elements of CTC operation, such as fundraising and community outreach. STAR Center has relied only on TMF funds with no other funding sources over the past five years. Even though the current director has been dedicated to helping disabled people learn computer technologies, the lack of administrative support from other staff members weakens the overall leadership for the center.

Literacy Source and EACS in the summer of 2008 both faced significant staff turnover with departures of key staff members who were in charge of their computer literacy programs. Both centers relied on an AmeriCorps VISTA volunteer to manage their CTC programming during the fiscal year of 2007-08. Although both programs are planning to fill the vacancy with a paid permanent employee, valuable experiences and knowledge may be lost during the transition. Besides, because both AmeriCorps volunteers had

played a leading role in their respective CTC programs during their service, their departures certainly weaken the overall quality of leadership in both programs.

While the CTC operation model presented in Section 5-4 already shows a clear path for any community technology program to follow, additional attention should be paid to the following areas to ensure that a proper implementation of a community technology program can be achieved.

(1) Foster leadership. Oftentimes, resources for a locally-based community-driven CTC project are limited. This makes strong leadership even more important to the sustainability of a CTC project. Leaders of a CTC must hold strong commitment to the ideals of digital inclusion and be willing to take on the core mission of the CTC project no matter how complicated it may be. Multi-tasking is often inevitable due to the insufficient supply of staff. Leaders have to prioritize major tasks that are most important to the functioning of the project. Usually fundraising and community outreach should be given higher priorities.

(2) Broaden the fundraising channel by relying on multiple funding sources. As one of the two major resources to ensure the health of a CTC, funding certainly plays a crucial role in CTC sustainability. Leaders of a CTC should explore as many funding opportunities as possible and acquire funds/grants from both public and private sectors.

(3) Cultivate community partnerships and institutional support. Equally important to the implementation of a CTC project is the tangible assistance received from both locally-based community groups and city agencies. CTC leaders have to secure this other important source of support by establishing close working relationships with other organizations and city departments, which may serve similar populations, to leverage resources available from their systems.

(4) Increase public awareness and community participation. A locally-based CTC project begins with what is present in the community. It relies on local assets to develop and sustain. Leaders of a CTC project should work to increase public awareness of the pressing issue—the digital divide—that this community technology initiative is aimed to solve and call upon community members to identify their interests and build upon their capacity to carry out the efforts.

(5) Stabilize staff turnover. It's hard for long-term CTC administrators to guide their CTC project into the future when they are preoccupied with constant employee turnover and understaffing. And not only does the tight labor situation cause stress and strife for CTC administrators, it may also weaken the foundation of a CTC and wear away its service capacity. A CTC should rely on more permanent staff to take charge of its main service-related tasks, such as course design, curriculum implementation, and program development.

(6) Develop protocols for key operations. Leaders of a CTC should devote energy to develop protocols for CTC's key operations, which may include fundraising procedures, contact lists of potential donors and sponsors, community outreach guidelines, course curricula and training materials. Putting everything in writing will preserve the precious experiences and knowledge accumulated over time and maintain the quality of CTC service.

Final Words for Academia

The policy implications of this research can extend to higher education, too. At the university level, courses introducing both the practical and theoretical sides of community technology can train future workers in the CTC field or other relevant information sectors. More importantly, curricula have to be designed in a way that both the process of community organizing/development and the key factors relating to the success of community technology efforts are introduced in the course contents. Besides,

research projects on community technology carried by a multidisciplinary collaboration should be conducted at the university level in order to further advance the knowledge and practice of the field. This type of research can draw from past work done by teams of different disciplines, such as information science, social work, and city and regional planning.

Bibliography

Arefi, Mahyar. (2004). "An Asset-Based Approach to Policymaking: Revisiting the History of Urban Planning and Neighborhood Change in Cincinnati's West End," *Cities*, 21 (6): 491-500.

Bartfai, Nicole, Joy Frechtling, Gary Silverstein, Kyle Snow, and Laurie Somers. (1999). *Collected case study evaluations: Telecommunications and Information Infrastructure Assistance program*. Report conducted by Westat for the U.S. Department of Commerce, contract 50SBNT7C1049

Barzilai-Nahon, K. (2006). "Gaps and Bits: Conceptualizing Measurements for Digital Divide/s." *The Information Society* 22: 269--278.

Beamish, A. (1999). "Approaches to Community Computing: Bringing Technology to Low-Income Groups". D. Schön, B. Sanyal, & W. J. Mitchell (Eds.) *High Technology in Low-Income Communities: Prospects for the Positive Use of Information Technology* (pp. 349-368). Cambridge, MA: MIT Press.

Bell, D. (1973). *The Coming of Post-industrial Society*. New York: Basic Books.

Bell, P., P. Reddy and L. Rainie. (2004). *Rural Areas and the Internet.* [online] http://www.pewinternet.org/pdfs/PIP_Rural_Report.pdf [accessed December 9, 2007].

Bimber, B. (1999). "The Internet and citizen communication with government: Does the medium matter?" *Political Communication*, *16*, 409-429.

Bimber, B. (2000). "The Gender Gap on the Internet". *Social Science Quarterly*. 81:3. pp. 868-876.

Blakely, E.J., S. Hadi and P. Johnson (1995) *Information city and the ghetto: the L.A. experience*. The Lusk Center Research Institute, University of Southern California.

Boeing (2007). "Key Connections". *Boeing Employees Community Fund 2007 Application*. Literacy Source, Global Corporate Citizenship, the Boeing Company, 2007

Bolt, D. B. and Crawford, A. K. (2000) *Digital divide: computers and our children's future* TV Books, New York, NY.

Breeden, L., Steve Cisler, Vivian Guilfoy, Michael Roberts, and Antonia Stone, (1998) *Computer and Communications Use in Low-Income Communities: Models for the Neighborhood Transformation and Family Development Initiative*, Annie E. Casey Foundation. December 1998. [online] http://www.austinfix.net/seminar/files/offline_sites/CTCNet.org_2_25_04/ctcnet.org/casey/index.html [accessed July 12, 2008]

Bridges.org. (2001). *Spanning the Digital Divide: Understanding and tackling the issues* [online]. Bridges.org. Cape Town. [online] http://www.bridges.org/publications/65 [accessed on June 17, 2008]

Bridges.org. (2002). *Taking stock and looking ahead: Digital divide assessment of the City of Cape Town*, 2002. Bridges.org. Cape Town. [online] http://www.bridges.org/publications/52 [accessed on June 17, 2008]

Bridges.org. (2005). *Comparison Study of Free/Open Source and Proprietary Software in an African Context. Implementation and Policy-Making to Optimize Public Access to ICT*. [online] http://www.bridges.org/publications/21. [accessed on June 17, 2008]

Brodie, M., Flournoy, R. E., Altman, D. E., Benson, J. M., & Rosenbaum, M. (2000). "Health information, the Internet, and the digital divide". *Health Affairs*, *19*, 255-265.

Bucy, E. P. (2000). "Social access to the Internet". *Harvard International Journal of Press-Politics*, *5*, 50-61.

Burke, Delia (2008). Personal Communication, Seattle, Washington, September 19, 2008

Carvin, Andy, (2000). "Mind the gap: The digital divide as the civil rights issue of the new millennium," *Multimedia Schools,* volume 7, number 1 (January), [online] http://www.infotoday.com/MMSchools/Jan00/carvin.htm, [accessed May 10, 2007]

Castells, Manuel (2001). *The Internet Galaxy; Reflections on the Internet, Business and Society*, Oxford: Oxford University Press.

Chaskin, R.J. (1997). "Perspectives on neighborhood and community: A review of the literature". *Social Services Review, 71,* 522-547.

Chaskin, Robert J. (1999). *Defining Community Capacity: A Framework and Implications from a Comprehensive Community Initiative*, Chicago: Chapin Hall Center for Children.

Chaskin, Robert J. (2001) "Building Community Capacity: A Definitional Framework and Case Studies from a Comprehensive Community Initiative", *Urban Affairs Review*, 36(3): 291-323.

Choemprayong, Songphan, (2006). "Closing Digital Divides: The United States' Policies". *Libri*, 56(4). p.201-212.

Choi, S.-Y., & Whinston, A. B. (2000). *The Internet Economy - Technology and Practice*. Austin, TX: SmartEcon Publishing.

Chow, Clifton, Jan Ellis, June Mark, and Bart Wise. (1998). *Impact of CTCNet affiliates: Findings from a national survey of users of community technology centers*. Report submitted to the National Science Foundation, grant ESI-9552567. Newton, MA: Education Development Center.

City of Seattle, (2004). *The Seattle Information Technology Indicators Project*. City of Seattle Department of Information Technology Community Technology Program. [online] http://www.seattle.gov/tech/indicators/ [accessed June 12, 2008]

City of Seattle, (2008a). *The Citizens' Telecommunications and Technology Advisory Board (CTTAB)*. The City of Seattle. [online] http://www.seattle.gov/cttab/ [accessed June 12, 2008]

City of Seattle, (2008b). *The Bill Wright Technology Matching Fund*. City of Seattle Department of Information Technology Community Technology Program. [online] http://www.seattle.gov/tech/tmf/ [accessed June 12, 2008]

City of Seattle (2008c). Census 2000 Data for Locally Defined Areas. [online] http://www.seattle.gov/dpd/Research/Population_Demographics/Census_2000_Data/default.asp [accessed November 7, 2008]

Clark, Lynn Schofield (2003) "Challenges of Social Good in the World of Grand Theft. Auto and Barbie: a case study of a community computer center for youth". *New Media & Society*, 5(1) p.95-116.

Clement, Andrew, and Leslie Shade. (1998). *The Access Rainbow: Conceptualizing Universal Access to the Information/Communications Infrastructure*. Information Policy Research Program, Faculty of Information Studies, University of Toronto. Working Paper No. 10. Toronto, ON

Coetzee, Liezl (2007). "World Wide Webs: Crossing the Digital Divide through Promotion of Public Access", in, Steinfield, Pentland, Ackerman, and Contractor (eds.), *Communities and Technologies 2007: Proceedings of the Third Communities and Technologies Conference*, Michigan State University, 2007, London: Springer, 531-544

Cohen D. (2002). "All the World's a Net". *New Scientist*, 13 April.

Community Technology Program (2004). "Technology Expansion Project". *Bill Wright Technology Matching Fund 2004 Application*. Literacy Source, City of Seattle, Department of Information Technology. 2004

Community Technology Program (2005a). "Special Technology Access Resource (STAR) Center". *Bill Wright Technology Matching Fund 2005 Application*. Digital Promise, City of Seattle, Department of Information Technology. 2005

Community Technology Program (2005b). "Special Technology Access Resource (STAR) Center". *Bill Wright Technology Matching Fund Progress Report*. Digital Promise, City of Seattle, Department of Information Technology. October 24, 2005

Community Technology Program (2005c). "Technology Expansion Project". *Bill Wright Technology Matching Fund Final Report*. Literacy Source, City of Seattle, Department of Information Technology. August 9, 2005

Community Technology Program (2007a). "Youth Out Loud Summer Program". *Bill Wright Technology Matching Fund 2007 Application*. Youth Media Institute, City of Seattle, Department of Information Technology. 2007

Community Technology Program (2007b). "Improving Basic Computer Literacy for East African Refugees and Parents". *Bill Wright Technology Matching Fund 2007 Application*. East African Community Services, City of Seattle, Department of Information Technology. 2007

Community Technology Program (2007c). "Improving Basic Computer Literacy for East African Refugees and Parents". *Bill Wright Technology Matching Fund Progress Report*. East African Community Services, City of Seattle, Department of Information Technology. October 22, 2007

Community Technology Program (2007d). "Inspiring Youth Through Technological Creativity". *Bill Wright Technology Matching Fund 2007 Application*. RecTech Coalition, City of Seattle, Department of Information Technology. 2007

Community Technology Program (2008a). "Youth Out Loud – Special 'New Voters' Workshop Series". *Bill Wright Technology Matching Fund 2008 Application*. Youth Media Institute, City of Seattle, Department of Information Technology. 2008

Community Technology Program (2008b). "Bringing the Gap: Transforming 'disabilities' into 'abilities'." *Bill Wright Technology Matching Fund 2008 Application*. Center Park Resident Council, City of Seattle, Department of Information Technology. 2008

Community Technology Program (2008c). "Moving Beyond the Basics – Basic Computer Literacy to Employment Access". *Bill Wright Technology Matching Fund 2008 Application*. East African Community Services, City of Seattle, Department of Information Technology. 2008

Community Technology Program (2008d). "Southwest Youth Speak!" *Bill Wright Technology Matching Fund 2008 Application*. RecTech Coalition, City of Seattle, Department of Information Technology. 2008

Compaine, B.M. ed. (2001). *The digital divide: Facing a crisis or creating a myth?* Cambridge, Mass.: MIT Press

Cooper M. (2002). *Does the Digital Divide Still Exist? Bush Administration Shrugs, But Evidence Says "Yes".* Consumer Federation of America, Consumer Union, The Civil Rights Forum. Washington DC. [online] http://chnm.gmu.edu/digitalhistory/links/pdf/introduction/0.26a.pdf. [accessed June 20, 2007]

Cooper, M. (2004). *Expanding the digital divide & falling behind on broadband: Why telecommunications policy of neglect is not benign.* Consumer Federation of America, Consumer Union, The Civil Rights Forum, Washington DC. [online] http://www.consumerfed.org/pdfs/digitaldivide.pdf [accessed June 15, 2008].

CTCNet (2002), *Community Technology Centers as Technology Assistance Providers to Nonprofit & Community Based Organizations: Emerging Practices, Opportunities, and Challenges*. CTCNet, Cambridge, MA August 2002

Cullen, R. (2001) "Addressing the Digital Divide", *Online Information Review* 25(5): 311

Cuthill, Michael & John Fien, (2005). "Capacity building: Facilitating citizen participation in local governance", *Australian Journal of Public Administration* 64(4)63-80: December.

Czerniewicz, L and Brown, C. (2004), "Access to ICTs for teaching and learning – from single artifact to inter-related resources". Paper presented at the e-Merge 2004 Online Conference – Blended Collaborative Learning in Southern Africa, University of Cape Town July 2004.

Davies, S., A.Wiley-Schwartz, R. Pinkett and L. Servon (2003) "Community Technology Centres as Catalysts for Community Change", report to the Ford Foundation, Project for Public Spaces, BCT Partners and New School University

De Haan, J. (2004). "A multifaceted dynamic model of the digital divide". *Information Technology and Society*, Vol. 1 (7), p.66-88.

Denzin, Norman K. and Yvonna Lincoln (2003). *Strategies of qualitative inquiry, Second edition*. Thousand Oaks, CA: Sage Publications.

Diers, Jim, (2004). *Neighbor Power: Building Community the Seattle Way*, University of Washington Press, 2004

DiMaggio, P., E. Hargittai, W.R. Neumann en J.P. Robinson (2001). "Social Implications of the Internet". *Annual Review of Sociology*, 27, p. 307-336.

DiMaggio, P and Hargittai, E. (2001). "From digital divide to digital inequality: Studying internet usage as penetration increases". Center for Arts and Cultural Policy Studies, Princeton University. *Working Paper* 15, Summer 2001.

DiMaggio, P., Hargittai, E., Celeste, C., and Shafer, S. (2004). "Digital inequality: From unequal access to differentiated use". In *Social inequality*, ed. K Neckerman, pp. 355–400. New York: Russell Sage Foundation.

Dutta-Bergman, Mohan J (2005). "Access to the internet in the context of community participation and community satisfaction". *New Media Society*, February 1, 2005; 7(1): 89 - 109

Dutton,William, Malcolm Peltu, and Margaret Brice, eds. (1999). *Society on the line: Information politics in the digital age.* Oxford: Oxford University Press

EACS (2008). *About Us*. East African Community Services, web site [online] http://eastafricancs.org/mission.php [accessed August 23, 2008]

Fink, C., and Kenny, C. (2003). *W(h)ither the global digital divide?* Washington, DC: World Bank. [online] http://charleskenny.blogs.com/weblog/files/finkkenny.pdf [accessed June 21, 2008]

Fox, S. (2001). *Wired Seniors.* [online] http://www.pewinternet.org/pdfs/PIP_Wired_Seniors_Report.pdf [accessed December 9, 2007].

Frechtling, Joy, John Lockwood, Gary Silverstein, Laurie Somers, and Paul Tuss. (1999). *Evaluation of the Telecommunications and Information Infrastructure Assistance program for the 1994 and 1995 grant years*. Report conducted by Westat for the U.S. Department of Commerce, contract 50SBNT7C1049

Goslee, S. (1998). *Losing Ground Bit by Bit*: *Low-Income Communities in the Information Age*, Benton Foundation, [online] http://www.benton.org/publibrary/losing-ground/home.html [accessed June 15, 2008]

Green, Gary Paul & Anna Haines, (2002). *Asset Building & Community Development*. Thousand Oaks, Calif.: Sage Publications.

Gundrey, George (2003). *Keys to Sustaining Your Community Technology Center*. TechSoup, a project of CompuMentor, Sep 14, 2003, [online], http://www.webjunction.org/do/PrinterFriendlyContent?id=1162 [accessed July 12, 2008]

Gurstein, M. (2001). "Community Informatics, Community Networks and Strategies for Flexible Networking" in L. Keeble and B. Loader (eds) *Community Informatics: Shaping Computer-mediated Social Relations*, Routledge, London

Gurstein, M. (2003) “Effective use: a community informatics strategy beyond the digital divide”, *First Monday*, vol. 8, no. 12. [online] http://www.firstmonday.dk/issues/issue8_12/gurstein/ [accessed February 23, 2008]

Hacker, K. and Van Dijk, J. eds. (2000), *Digital Democracy, Issues of Theory and Practice*, London, Thousand Oaks, New Delhi: Sage.

Hanseth, O., & Lyytinen, K. (2004). “Theorizing about the Design of Information Infrastructures: Design Kernel Theories and Principles”. *Sprouts: Working Papers on Information Environments, Systems and Organizations, 4*(4)

Hargittai E. (1999). “Weaving the Western Web: Explaining Differences in Internet Connectivity Among OECD Countries”. *Telecommunications Policy* 23(10/11): 701-718

Hargittai E. (2002). “Second-Level Digital Divide: Differences in People's Online Skills”. *First Monday* 7(4). [online] http://firstmonday.org/issues/issue7_4/hargittai/ [accessed June 20, 2008]

Hargittai, Estzer, (2003). “The digital divide and what to do about it”. In: Derek, C. Jones (Ed.), *New Economy Handbook*. Academic Press, San Diego, CA.

Harwood, P. & L. Rainie (2004). *Use of the Internet in places other than home or work.* [online] http://www.pewinternet.org/pdfs/PIP_Other_Places.pdf [accessed December 9, 2007].

Hassani, Sara Nephew, (2006),”Locating Digital Divides at Home, Work, and Everywhere Else,” *Poetics* 34:250-272, 2006.

Hayden, Craig, (2007). “Maintaining the digital hub: locating the community technology center in a communication infrastructure”, *New Media Society* 9 (2): 235. 2007.

Hindman, D.B. (2000) “The Rural-Urban Digital Divide”, *Journalism and Mass Communication Quarterly* 77(3): 549–60

Hoffman, D., Novak, T., and Schlosser, A. (2000). The evolution of the digital divide: How gaps in Internet access may impact electronic commerce. *JCMC* 5(3). [online] http://jcmc.indiana.edu/vol5/issue3/hoffman.html [accessed April 15, 2008].

James, Jeffrey (2008). "Digital divide complacency: Misconceptions and dangers". *The Information Society*, 24, p.54-61

Jarboe, K. (2001). "Inclusion in the information age: Reframing the debate". *Athena Alliance*. [online] http://www.athenaalliance.org/apapers/inclusion.html [accessed June 17, 2008]

Katz J.E., R.E. Rice. (2003). "Comparing internet and mobile phone usage: digital divides of usage, adoption, and dropouts". *Telecommunications Policy* 27(8-9): 597-623

Katz, J. E., Rice, R. E., & Aspden, P. (2001). "The Internet, 1995-2000: Access, civic involvement and social interaction." *American Behavioral Scientist*, *45*, 405-419.

Katz, J.E., R.E. Rice, S. Acord, K. Dasgupta, K. David, (2004) Personal Mediated Communication and the Concept of Communityin Theory and. Practice. In: *Communication Yearbook* 28. Mahwah, New Jersey. S. 315-371

Keyes, David (2008). Personal Communication, Seattle, Washington, July 24, 2008

Kirschenbaum, J. and R. Kunamneni (2001) "Bridging the Organizational Divide: Toward a Comprehensive Approach to the Digital Divide", Policylink, [online] http://www.policylink.org/publications.htm [accessed September 3, 2007]

Kling, R. (1998). "Technological and Social Access on Computing, Information and Communication Technologies". *White Paper for Presidential Advisory Committee on High-Performance Computing and Communications, Information Technology, and the Next Generation Internet*.

Kling, R. (2000). "Learning about Information Technologies and social change: The contribution of social informatics". *The Information Society* 16 217-232

Kling, R. and R. Lamb (2000) "IT and Organizational Change in Digital Economies: A Socio-technical Approach". in Brynjolfsson, Erik and Brian Kahin, editors (2000) *Understanding the Digital Economy: Data, Tools and Research*, pp. 295 - 315. MIT Press. Cambridge.

Kretzmann, John P. & John L. McKnight. (1993). *Building Communities from The Inside Out: A Path Toward Finding and Mobilizing a Community Assets*, Evanston, Ill.: Center for Urban Affairs and Policy Research, Northwestern University.

Kvasny. L. (2002) "A conceptual framework for examining digital inequality". in R. Ramsower and J. Windsor (Eds.), *Proceedings of Eighth America's conference on Information Systems*. p.1798 -1805

Kvasny, Lynette. (2006). "Cultural (Re)production of digital inequality in a US community technology initiative". *Information, Communication & Society* Vol. 9, No. 2, April 2006, pp. 160–181

Kvasny, Lynette & Mark Keil (2006). "The challenges of redressing the digital divide: a tale of two US cities". *Information Systems Journal*, Vol 16. No. 1, pp. 23-53

Kvasny, L. and Truex D. (2000). "Information Technology and the Cultural Reproduction of Social Order: A Research Program", In *Organizational and Social Perspectives on Information Technology.* R. Baskerville J. Stage, and J. DeGross (eds.). New York, Kluwer Academic Publishers, 2000, pp. 277-294

Kvasny L. and Truex, D. (2001), "Defining away the digital divide: A content analysis of institutional influences on popular representations of technology". [online] http://www.cis.gsu.edu/~dtruex/Presentations/kvasnyTruex01.pdf [accessed June 17, 2008]

Lauman, D. (2000). "Student home computer use: A review of the literature". *Journal of Research on Computing in Education*, *33*, 196-203.

Lenhart, Amanda (2000). *Who's not online: 57% of those without Internet access say they do not plan to log on*. September, 2000. Washington, D.C.: Pew Internet & American Life Project.

Lenhart, A., Horrigan, J., Rainie, L., Allen, K., Boyce, A., Madden, M., and O'Grady, E. (2003). *The ever-shifting Internet population: A new look at Internet access and the digital divide*. Washington, DC: The Pew Internet & American Life Project.

Lenhart, A. and J.B. Horrigan. (2003). "Re-Visualizing the Digital Divide as a Digital Spectrum", *IT & Society*, 15, p.23 -39.

Lenhart, A., L. Rainie and O. Lewis. (2001). *Teenage life online.* [online] http://www.pewinternet.org/pdfs/PIP_Teens_Report.pdf [accessed December 9, 2007].

Lentz, B., Straubhaar, J., LaPastina, A., Main, S., and Taylor, J. (2000) "Structuring Access: The Role of Public Access Centers in the Digital Divide," in *International Communication Association*, Acapulco, 2000.

Lievrouw, A. L., (2000). "The information environment and universal service," *Information Society,* volume 16, pp. 155-159.

Literacy Source (2008). *About Us: Staff Information*. Literacy Source, web site [online] http://www.literacy-source.org/staff.htm [accessed August 23, 2008]

Madden, M. and L. Rainie. (2004). *America's online pursuits.* [online] http://www.pewinternet.org/pdfs/PIP_Online_Pursuits_Final.PDF [accessed December 9, 2007].

Mark, June, Janet Cornebise, and Ellen Wahl. (1997). *Community technology centers: Impact on individual participants and their communities*. Report submitted to the National Science Foundation. Newton, MA: Education Development Center

Marsh, J.B.T. (2001). *Cultural diversity and the information society: policy options and technological issues*, Brussels: European parliament, DG for Research.

Martin P.S. (2003). "Is the Digital Divide Really Closing? A critique of Inequality Measurment" *A Nation Online*. *IT & Society* 1(4): 1-13

Martz, Wendelyn A. (1995). *Neighborhood Based Planning: Five Case Studies*. Planning Advisory Service Report No. 455. Chicago: American Planning Association.

Mathie, Alison and Cunningham, Gord (2005). "Who is Driving Development? Reflections on the Transformative Potential of Asset-based Community Development". *Canadian Journal of Development Studies*. Volume 26, Number 1. 2005.

Morino Institute (2001) "From Access to Outcomes: Raising the Aspirations for Technology Initiatives in Low-Income Communities", Morino Institute, [online] http://morino.org/divides/report2.htm [accessed September 3, 2007]

Mossberger, K., C.J. Tolbert, and M. Stansbury. (2003). *Virtual inequality: Beyond the digital divide*. Washington, DC: Georgetown University Press

National Telecommunication and Information Authority (NTIA) (1995) *Falling Through the Net: A Survey of the "Have Nots" in Rural and Urban America* [online] http://www.ntia.doc.gov/ntiahome/digitaldivide/ [accessed June 17, 2008]

National Telecommunication and Information Authority (NTIA) (1998) *Falling Through the Net II: New Data on the Digital Divide* [online] http://www.ntia.doc.gov/ntiahome/digitaldivide/ [accessed June 17, 2008]

National Telecommunication and Information Authority (NTIA) (1999) *Falling Through the Net: Defining the Digital Divide* [online] http://www.ntia.doc.gov/ntiahome/digitaldivide/ [accessed June 17, 2008]

National Telecommunication and Information Authority (NTIA) (2000) *Falling Through the Net, Toward Digital Inclusion* [online] http://www.ntia.doc.gov/ntiahome/digitaldivide/ [accessed June 17, 2008]

National Telecommunication and Information Authority (NTIA) (2002) *A nation online: How Americans are expanding their use of the Internet*. [online] http://www.ntia.doc.gov/ntiahome/dn/index.html [accessed June 17, 2008]

Newholm, T., Keeling, K., McGoldrick, P., Macaulay, L., & Doherty, J. (2008). "The digital divide and the theory of optimal slack". *New Media Society*, 10(2), p. 295-319.

Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide.* Cambridge, UK: Cambridge University Press

Oden, Michael, (2004). *Beyond The Digital Access Divide: Developing Meaningful Measures of Information and Communications Technology Gaps*. Knowledge, Creative & Freedom Program, The Ford Foundation.

OECD (2000). *The Digital Divide: Diffusion and Use of ITs*. Paris: OECD

OECD (2001). *Understanding the digital divide.* OECD papers. [online] http://www.oecd.org/dataoecd/38/57/1888451.pdf [accessed May 20, 2008]

O'Neil, D. (2002). "Assessing community informatics: a review of methodological approaches for evaluating community networks and community technology centers". *Internet Research: Electronic Networking Applications and Policy, 12*(1), 76-102.

O'Neil, D. and P.M.A. Baker (2003), "The role of institutional motivations in technological adoption: Implementation of Dekalb County's Family Technology Resource Centers," *The Information Society*, vol. 19, pp. 305-314

Page-Adams, Deborah and Sherraden, Michael (1997). *Asset-Building as a Community Revitalization Strategy.* Social Work. Volume 42, Number 5. September 1997.

Patterson, R. & Wilson, E. (2002) "New IT and social inequality: resetting the research and policy agenda", *The Information Society*, vol. 16, pp. 77–86

Pigg, Kenneth E. (2001). "Applications of community informatics for building community and enhancing civic society". *Information, Communication & Society, 4*(4), 507-527.

Pinkett, Randal. (2000) "Bridging the digital divide: sociocultural constructionism and an asset-based approach to community technology and community-building". *81st Annual Meeting of the American Educational Research Association (AERA)* New Orleans, LA, April 24-28, 2000

Pinkett, R. (2003). "Community technology and community building: early results from the Creating Community Connections project". *The Information Society, 19*, 365-379.

Policy Research Project (2002), "An Ideal CTC, Strategies for Community Development from Austin Community Technology Centers", Prepared by Evaluating Community Technology Centers. Policy Research Project at LBJ School of Public Affairs, University of Texas at Austin, Spring 2002. [online] http://www.utexas.edu/lbj/rhodesprp/01_02/ [accessed July 12, 2008]

Rainie, Lee & Packel, Dan (2001). *More Online, doing more*. February, 2001. Washington, D.C. : Pew Internet & American Life Project.

RecTech (2008). *Mission*. The RecTech Coalition, web site [online] http://www.seattle.gov/parks/centers/labs.htm [accessed August 23, 2008]

Riccardini F., M. Fazio. (2002). *Measuring the Digital Divide.* IAOS Conference: London.[online] http://www.statistics.gov.uk/iaoslondon2002/contributed_papers/downloads/IP_Riccardini.doc [accessed June 20, 2007]

Romm, C. T. and Taylor, W. (2000) "Thinking Creatively about On-line Education". In *Challenges of Information Technology Management in the 21st Century*, ed. M.Khosrowpour. Idea Group Publishing , Hershey. PA. pp 1167-1169

Rubin, Herbert J. & Irene S. Rubin, (1992). *Community Organizing & Development*. New York: Maxwell Macmillan International.

Sanyal, Bish & Schön, Donald (1999) "Information Technology and Urban Poverty: The Role of Public Policy", in D. Schön, B. Sanyal & W. Mitchell (eds.) *High Technology and Low-Income Communities: Prospects for the Positive Use of Advanced Information Technology.* Cambridge, MA & London: MIT Press

Selwyn,N. (2003) "Apart from Technology: Understanding People's Non-use of Information and Communication Technologies in Everyday Life", *Technology in Society* 25(1): 99–116.

Selwyn, N. (2004) "Reconstructing Political and Popular Understandings of the Digital Divide", *New Media & Society* 6(3): 341–62.

Selwyn, N. (2006) "Dealing With Digital Inequality: Rethinking Young People, Technology and Social Inclusion", paper presented at Cyberworld Unlimited: Digital Inequality and New Spaces of Informal Education for Young People Conference: Bielefeld, February 9-11, 2006.

Selwyn, N., S. Gorard and J. Furlong (2006) "Whose Internet Is it Anyway? Exploring Adults' (Non)Use of the Internet in Everyday Life", *European Journal of Communication* 20(1): 5–26.

Servon, Lisa J. & Marla K. Nelson, (2001). Community technology centers: Narrowing the digital divide in low-income, urban communities. *Journal of Urban Affairs* 23: 279-290

Simpson, Lyn, Leonie Daws, Barbara Pini, (2004). "Public internet access revisited", *Telecommunications Policy* 28 (2004) 323–337

Spooner, T. (2003). *Internet Use by Region in the United States*. Washington, D.C., Pew Internet and American Life Project: 95.

Spooner, T., and Rainie, L. (2001). *Hispanics and the Internet*. Washington, DC: Pew Internet and American Life Project.

Spooner, Tom and Lee Rainey. (2000). *African-American and the Internet*. Washington, D.C.: Pew Internet and American Life Project.

Stanley, L.D. (2003). "Beyond Access: Psychosocial Barriers to Computer Literacy". *The Information Society* 19:407-416.

STAR (2008). *STAR History*. Special Technology Access Resource Center, web site [online] http://www.starofseattle.org/history.htm [accessed August 23, 2008]

State of Washington (2008). "Literacy Online". *The Community Technology Opportunity Program Grant (CTOP) 2008 Application*, Washington State University Extension, 2008

Steyaert, J. (2002) "Inequality and the digital divide: myths and realities". In: S.F. Hicks and J.G. McNutt, *Advocacy, activism, and the internet; community organization and social policy*, Chicago: Lyceum Books.

Stone, Antonia (2000), *Center Start-Up Manual.* Education Development Center, Community Technology Centers' Network (CTCNet), Cambridge, Massachusetts.

Strauss, A. and J. Corbin (1998) *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Thousand Oaks, CA: Sage.

Strover, Sharon, Gary Chapman, Dr. Jody Waters, (2004). "Beyond community networking and CTCs: access, development, and public policy". *Telecommunications Policy.* 28, 465-485

Sullivan, Felicia M. (2003) *Community Technology and Public Discourse*. Center for Social Media. June 2003, [online] http://www.centerforsocialmedia.org/documents/commtech_sullivan.pdf [accessed June 23, 2008]

Uchida, N. (2004). *The Effectiveness of the Neighborhood Matching Fund on Community in Seattle*. Master Thesis, University of Washington, 2004

U.S. Department of Education (2003), "Tool Kit for Bridging the Digital Divide in Your Community" U.S. Department of Education, Office of Educational Technology, [online] http://www.ed.gov/Technology/tool_kit.html [accessed July 12, 2008]

Van Damme, Maike, Jos de Haan & Jurjen Iedema (2005). "Modelling a multidimensional concept: ICT-access at work", *Paper for ICT, The Knowledge Society and Changes in Work*. European Conference The Hague, June 9-10, 2005

Van Dijk, Jan (1999) *The network society; social aspects of new media*, London: Thousand Oaks / New Delhi: Sage.

Van Dijk, Jan (2000). "Widening Information Gapsand Policies of Prevention". In:K. Hacker&J. van Dijk (Eds.) *Digital Democracy, Issues oftheory and practice*, pp.166-183. London, Thousand Oaks, New Delhi: Sage Publications

Van Dijk J (2003). "Getting past the digital divide?" [online] *Electronic Networks and Democracy*. http://www.albany.edu/wwwres/edemocracy/papers/VanDijk.htm [accessed June 17, 2008]

Van Dijk, Jan, (2005). *The deepening divide; inequality in the information society*. Thousand Oaks/London: Sage.

Van Dijk, J and Hacker, K. (2003). "The digital divide as a complex and dynamic phenomenon". *The Information Society* 19 315-326.

Vicente, M.R. y López, A.J. (2006): "A multivariate framework for the analysis of the digital divide: Evidence for the European Union-15", *Information & Management*, 43, p.756-766.

Warschauer: M. (2002). *Reconceptualising the digital divide* [online] http://www.firstmonday.dk/issues/issue7_7/warschauer/ First Monday 7(7) [accessed June 17, 2008]

Warschauer: M. (2003a). "Demystifying the digital divide". *Scientific American*. August. 289(2), 42-47. [online] http://www.gse.uci.edu/markw/papers.html [accessed June 17, 2008]

Warschauer: M. (2003b). "Dissecting the digital Divide: A case study in Egypt". *The Information Society* 19 297- 304.

Warschauer, Mark, (2003), *Technology and Social Inclusion: Rethinking the Digital Divide*, Cambridge, MA: MIT Press, 2003

Wellman, B. (1999). The network community: An introduction. In B. Wellman (Ed.), *Networks in the global village* (pp. 1-48). Boulder, CO: Westview.

Wellman, B. (2001): "Physical Place and Cyberplace: The Rise of Personalized Networking", *International Journal of Urban Regional Research*, vol. 25, no. 2 (2001): 227-52

Wikipedia. (n.d.). Digital Divide [online] http://en.wikipedia.org/wiki/Digital_divide [accessed 17 June 2008]

Williams, W. & J D Lezu (2003). *Business Plan*. RecTech Coalition, March 2003

Wilson, E.J. (2000). *The global Digital Divide: Strategies for Social research*. National Academy of Sciences. Washington DC

Wilson, Ernest J. III, (2004). *The Information Revolution and Developing Countries*, Cambridge, MA: MIT Press, 2004.

Wilson, E.J. and Patterson, R. (2000). "New IT and Social inequality: resetting the research and policy agenda". *Information Society* 16 (1) p77-87

Wilson, K., Wallin, J., & Reiser, C. (2003). "Social stratification and the digital divide". *Social Science Computer Review, 2*(2), 133-143.

Yin, R.K. (2003). *Case Study Research: Design and Methods*, (3rd Edition).Thousand Oaks, CA: Sage.

YMI (2008). *About Us*. Youth Media Institute, web site [online] http://youthmediaseattle.org/?page_id=2 [accessed August 23, 2008]

Appendix A. An Annotated Literature Review on the Digital-Divide Studies

Papers by date	Key Factors	Findings
DiMaggio et al. (2001; 2004)	• ***Technical means*** • ***Autonomy*** • ***Skill*** • ***Social support*** • ***Purposes / use***	Identifying critical dimensions of inequality. DiMaggio et al. (2004) call attention to five broad forms of inequality. 1. Inequality in the ***technical means*** (hardware and connections); 2. Inequality in the extent to which people exercise ***autonomy*** in their use of the technology – for example whether they access it from work or home, whether their use is monitored or unmonitored, or whether they must compete with other users for time on-line; 3. Inequality in the ***skill*** that people bring to their use of the Internet; they further argue that computer vary in their possession of at least four kinds of relevant knowledge: *recipe knowledge* about how to log on, conduct searches, and download information; *background knowledge*; *integrative knowledge* about the way the technology operates; and *technical knowledge* about software, hardware, and networks necessary for troubleshooting the problems that invariably emerge; 4. Inequality in the ***social support*** on which Internet users can draw, including formal technical assistance from persons employed to provide it (for example, office staff in workplaces, customer support staff in businesses, librarians, and teachers); technical assistance from friends and family members to whom the user can turn when he or she encounters problems; and emotional reinforcement from friends and family; 5. Inequality in the ***purposes*** for which people ***use*** the technology. The quality of technical apparatus, autonomy of use, skill, and social support influence the efficacy with which computer users employ the technology. Skill and social support constitute a feedback loop with learning, which, along with efficacy, increases satisfaction and therefore encourages greater use.
Kvasny. L. (2002)	• ***Technical means*** • ***Cultural capital*** • ***Economic capital*** • ***Social capital*** • ***Institutional reform***	Kvasny (2002) develop a conceptual framework for examining digital inequality. The framework consists of the following five factors: 1. ***Technical means***: refers to the connectivity and availability of computers, modems, printers, scanners, telephone lines or other means of connecting to the Internet, and Internet accounts. Two factors further contribute to the inequality in the technical means: quality of the technology and degree of autonomy (where people get their access to the technical apparatus) (DiMaggio et al. 2001); 2. ***Cultural capital***: is the accumulated stock of knowledge of prestigious forms of cultural expression which is learned primarily through socialization in the family and in educational institutions. Cultural capital is crucially important for examining digital inequality because the Internet reflects the culture, tastes, preoccupations, styles and interests of the middle class; 3. ***Economic capital***: one of the most obvious factors needed for effective ICT usage, especially in a home setting, is economic capital; 4. ***Social capital***: consists of all actual or potential resources linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition (Bourdieu 1985). Social capital is an important variable affecting ICT; gaining access to new social resources at the centers is as critical as gaining access to hardware. ***Institutional reform***: the nature of the institutions that people belong to, the relations of power that exist in those institutions, and the types of institutional reform that occur all seriously affect whether people can make meaningful use of ICT (Neuman et al. 1998; Kvasny 2002; Lentz et al. 2000; Rojas et al. 2001).

Papers by date	Key Factors	Findings
Mossberger, Tolbert and Stanbury (2003)	• ***Access*** • ***Skills*** • ***Economic opportunity*** • ***Democratic divides***	Mossberger, Tolbert and Stanbury (2003) argue that the restriction of digital divide to the problem of access to technology is insufficient. They broaden the scope of the issue to include four major aspects: (technical) ***access***, ***skills***, ***economic opportunity*** and ***democratic divides***. They argue that having access to a computer is insufficient if individuals lack the skills they need to take advantage of technology. Access is undeniably important, but the real policy question is how well society will be able to take advantage of the opportunities offered by technology. Certain skills are necessary to exploit the potential of computers. They further point out that for a condition to qualify as a policy issue rather than a personal concern, there must be something at stake for the larger society. What defines the ***access divide*** and ***skills divide*** as appropriate issues for public policy are the ***uses*** of information technology. Technology disparities merit policy attentions because of their implications for important normative issues such as equality of economic opportunity and democracy
Hargittai, Estzer, (2003)	• ***Technical means*** • ***Autonomy of use*** • ***Social support networks*** • ***Experience*** • ***level of skill***	Attempting to look for a more holistic approach to the study of digital inequality at the individual user level, Hargittai offers a definition of the digital divide involving five factors: quality of equipment, autonomy of use, presence of social support networks, experience, and online skills. The author argues that in addition to relying on basic measures of access to ICTs, we need to consider the following more nuanced measures of computer use: 1. ***Technical means*** (quality of the equipment); 2. ***Autonomy of use*** (location of access, freedom to use the technology for one's preferred activities); 3. ***Social support networks*** (availability of others one can turn to for assistance with use, size of networks to encourage use); 4. ***Experience*** (number of years using the technology, types of use patterns); 5. The previous four factors together contribute to one's ***level of skill***. Skill is defined as the ability to efficiently and effectively use the new technology.
Stanley L.D. (2003)	• ***Psychosocial obstacles*** • ***Relevance*** • ***Comfort Zone*** • ***Self-Concept***	Stanley argues that efforts to increase computer literacy in underserved communities must go beyond physical access and connectivity and consider the role of cultural factors. The author argues that beyond the costs associated with access and a lack of proximity to computers, several social and psychological obstacles interfere with individual motivation to engage with and thus potentially benefit from this new technology. The digital divide's topography is defined by psychosocial factors as well as by (technical) access. Stanley points out three non-cost-related ***psychosocial obstacles*** that significantly undermine motivation for acquiring computer skills: relevance, fear, and self-concept. 1. ***Relevance***: perceiving computer technology as irrelevant to one's life reflects a lack of knowledge about what computers have to offer rather than an informed and measured rejection of them; 2. ***Comfort Zone***: computers challenge one's existing physical and/or psychological comfort zones. Many non-computer users are deterred by its high social costs: difficulty of use, presumed lack of technical competence, and computer-related anxiety. The notion of "fear" also reinforces a lack of confidence in one's perceived technological competence; 3. ***Self-Concept*****:** many non-computer users' self-concept or sub-cultural identity do not include "computer user" as being among their "possible selves."

Papers by date	Key Factors	Findings
Oden, Michael, (2004)	• ***Mental barrier*** • ***Technology knowledge barrier*** • ***Material access barrier*** • ***Skill acquisition barrier*** • ***Effective use barrier***	The author argues that the most formidable set of ***barriers*** are associated with learning how to use ICTs to perform tasks and applications that lead to positive and meaningful opportunities. Oden develops a heuristic framework based on an analysis developed by Van Dijk (2001, will be discussed in more detail later) drawing together the ideas about ***access*** and ***learning barriers*** associate with the complex and rapidly changing character of ICT. 1. ***Mental barrier***: lack of knowledge about the potential value of the technology, anxiety, lack of interest, fear; 2. ***Technology knowledge barrier***: describes the challenges encountered in understanding the components and attributes of the technology, and understanding the specific bundle of ICTs that meet a particular individual's needs; 3. ***Material access barrier***: is the direct cost of various hardware components and services required to obtain a system attuned to household or work demands; 4. ***Skill acquisition barrier***: involves the more complex and nuanced process of learning and development. Three general gradients of ICT skills: *Basic skills* (instrumental skills)—the ability to operate computers and work with a limited number of common software applications; *informational skills*—the ability to search select process and apply information; *strategic skills*—as using information to improve ones position in society; ***Effective use barrier***: how individuals actually use the technology to better perform tasks and create content.

Appendix B. An Annotated Literature Review of ICT-Access Studies

Papers by date	Key Factors	Findings
Rob Kling, (1998)	• ***Technological access*** • ***Social access***	Although he has never directly focused his academic work on the issue of the digital divide, Rob Kling (1998) is widely recognized as one of the pioneers advocating the multi-dimensional concept of the technology gap (if viewed as an issue or a concern), or, by his own words, the access to advanced information technologies (if viewed as a solution to the issue). He argue that the opportunities of the ICTs that people envision could be lost if the primary complexities are merely seen as ***technological***, and if policy makers underestimate the ways in which ***social factors*** influence the adoption, uses and usability of advanced information and communication technologies. In order for a society to fully exploit the opportunities offered by ICTs, two levels of access need to be set in place: 1. ***Technological access***: refers to the physical availability of suitable equipment, including computers of adequate speed and equipped with appropriate software for a given activity 2. ***Social access***: refers to know-how, a mix of professional knowledge, economic resources, and technical skills, to use technologies in ways that enhance professional practices and social life. In practice, social access will be critical if they are to move from the laboratories and pilot projects into widespread use where they can vitalize the nation and the economy.
Clement, Andrew, and Leslie Shade. (1998)	***Carriage facilities*** ***Devices*** ***Software tools*** ***Content/Services*** ***Service providers*** ***Literacy/Social facilitation*** ***Governance***	Clement, et. al. (1998) develop an integrated model for analyzing and discussing access to network services at the nation-wide level (Canada). Their model illustrates the multifaceted nature of the concept of access. In their seven-layered model, the lower layers emphasize the conventional technical aspects. These have been complemented with additional upper layers emphasizing the more social dimensions. The main constitutive element is the service/content layer in the middle, since this is where the actual utility is most direct. However, all the other layers are necessary in order to accomplish proper content/service access. 1. ***Carriage facilities***: are the facilities that store, serve or carry information; 2. ***Devices***: are the actual physical devices that people operate; 3. ***Software tools***: are the programs that run the devices and makes connections to services; 4. ***Content/Services***: are the actual information and communications services people find useful; information and communication services for citizens must include the ability for users to interact in a participative fashion as well as simply to receive stimuli; content and services must be community-based, and up-to-date; 5. ***Service providers***: the organizations that provide network access to users; 6. ***Literacy/Social facilitation***: the skills people need to take full advantage of information/communications facilities, together with the training and facilitation to acquire these skills; 7. ***Governance***: how decisions are made concerning the development and operation of the infrastructure. The author argue that while the uppermost layers represent the organizational and social considerations for a working system, the middle layers consider process and service content and the lower layers address the technical components. Each of these layers interact; and “in order for a system to be responsive, participants, stakeholders and users must have explicit opportunity to shape all levels.”

Papers by date	Key Factors	Findings
Van Dijk, (1999)	• ***Mental access*** • ***Material access*** • ***Skills access*** • ***Usage access***	Van Dijk (1999) distinguishes four successive kinds of access to ICTs: ***mental access***, ***material access***, ***skills access***, and ***usage access***. He identifies what he refers to as "access problems" that are associated with these four kinds of access: 1. ***Mental access***: lack of elementary digital experience caused by lack of interest, computer anxiety and unattractiveness of the new technology; 2. ***Material access***: no possession of computers and network connections; 3. Skills access: lack of digital skills caused by insufficient user-friendliness and inadequate education or social support; 4. ***Usage access***: Lack of significant usage opportunities or unequal distribution of them. Van Dijk argues that access problems of digital technology gradually shift from the first two kinds of access to the last two kinds (Van Dijk, 1999). When the problems of mental and material access have been solved, wholly or partly, the problems of structurally different skills and uses come to the fore. The arthor proposes to define digital skills not only as the skill to operate computers and network connections, but also as the skill to search, select, process, and apply information from a superabundance of sources and the ability to strategically use this information to improve ones position in society. They are called *instrumental*, *informational* and *strategic* skills respectively. The author further points out that: 1) the four stages of access are *successive*; the priority of the kinds of access for the adoption of a particular new media innovation shifts from the first to the last during the whole diffusion process of that innovation; 2) the stages are *cumulative*; the first is a condition of the latter. In this case new media adoption starts with sufficient attractiveness of the innovation and the motivation for adoption. As soon as it is purchased, skills to use it have to be mastered starting with operational skills and to be followed by skills of using it; finally, it is differently used in all kinds of practices; 3) the stages are *recursive*; with every new innovation "the problem is to separate an innovation from the next one or another one " the process starts anew with one of the previous stages, not necessarily the first one.
Bridges.org (2002)	• ***Physical Access*** • ***Affordability*** • ***Capacity*** • ***Relevant Content*** • ***Integration*** • ***Socio-cultural inequality*** • ***Appropriateness*** • ***Trust*** • ***Legal Environment*** • ***Local Economics*** • ***Macroeconomics*** • ***Political Will***	Bridges.org believes that while providing access to technology is critical, computers and connections are insufficient if the technology is not used effectively. They propose a concept of "real access" that aims to assess the extent to which technologies are *usefully* available, not just physically present. This model of access encompasses a range of dimensions as summarized below: 1. ***Physical Access***: technology must be available and physically accessible; 2. ***Affordability***: technology must be affordable for people to use; 3. ***Capacity***: people have to understand how to use technology and potential uses; 4. ***Relevant Content***: locally relevant content must be available; 5. ***Integration***: technology must integrate into people's lives and daily routines; 6. ***Socio-cultural inequality***: people should not be limited in their use of technology based on gender, race, or other socio-cultural factors; 7. ***Appropriateness***: available technology must be appropriate to local needs and conditions; 8. ***Trust***: people should have confidence in and understand the implications of the technology they use; 9. ***Legal Environment***: laws and regulations should not limit technology use; an environment that fosters its use must be created; 10. ***Local Economics***: a local economic environment favorable to technology use should be established; technology should be a crucial part of local economic development;

Papers by date	Key Factors	Findings
Bridges.org (2002)		11. ***Macroeconomics***: technology use should not be limited by the macro economic environment, e.g. in terms of transparency, deregulation, and investment; 12. ***Political Will***: there should be a political will for government to do what is needed to enable the integration of technology throughout society. These elements provide a comprehensive framework to consider in assessing the digital divide, as well as the impacts of initiatives geared towards bridging this divide
Warschauer, Mark, (2003)	• ***Physical resources*** • ***Digital resources*** • ***Human resources*** • ***Social resources*** • ***Devices*** • ***Conduits*** • ***Literacy***	Mark Warschauer identifies three models of access to new information technologies: Devices, Conduits, and Literacy. 1. ***Devices***: access, based on this model, is defined in terms of physical access to a computer or any other ICT devices. 2. ***Conduits***: access to a conduit necessitates connection to a supply line that provides something on a regular basis. However, the author argues that device ownership does not in itself constitute complete access. Full access requires connection to the Internet as well as the skills and understanding to use the computer and the Internet in socially valued ways. The concept of content encapsulates the physical access to a device and to an information channel, along with two additional elements: *institutional sources and information and sufficient individual capacity* to make use of that information to engage in social action and discourse. (Lievrouw, 2000) The author further argues that the concept of *literacy* more usefully provides a model because literacy involves a combination of devices, content, skills, understanding, and social support in order to engage in meaningful social practices. 3. ***Literacy***: ICT access necessitates a connection to a physical artifact, to sources of information that get expressed as content within or via that physical artifact; and to a skill level sufficient to process and make use of that information. Access to ICT for the promotion of social inclusion cannot rest on the provision of devices or conduits alone. Rather, it must entail the engagement of a range of resources, as summarized below, all developed and promoted with an eye toward enhancing the social, economic, and political power of the targeted clients and communities. 1. ***Physical resources***: encompass access to computers and telecommunication connections; 2. ***Digital resources***: refer to digital material that is made available online; 3. ***Human resources***: revolve around issues such as literacy and education (including the particular types of literacy practices that are required for computer use and online communication); 4. ***Social resources***: refer to the community, institutional, and societal structures that support access to ICT.

Papers by date	Key Factors	Findings
Wilson, E. J., (2004)	• ***Physical access*** • ***Financial access*** • ***Cognitive access*** • ***Design access*** • ***Content access*** • ***Production access*** • ***Institutional access*** • ***Political access***	Ernest J. Wilson, focusing on the issue of global digital divide, argues that access to ICTs requires a number of distinct elements to be present to ensure effective: 1. ***Physical access***: refers to the proximity that the potential user has to physical infrastructures and applications in a well-defined geographic space; 2. ***Financial access***: refers to the capacity of individuals and communities to sustain their payments for commercial or subsidized services; 3. ***Cognitive access***: It is the potential consumer's intellectual capacity to find the information she needs, to process that information, and to evaluate and employ it to meet her needs; 4. ***Design access***: refers to human-computer interface. It encompasses the hardware and software that are appropriate to the potential users in a given population; 5. ***Content access***: access to relevant programming, stories, and reports; especially critical is access to materials in the user's own language; 6. ***Production access***: users need the confidence and capacity to be able to produce their own content for their own local consumption; 7. ***Institutional access***: refers to the variety of organizational forms and regulations that structure and control access to digital content; 8. ***Political access***: gaining political access to the decision making for design and distribution ensures a greater chance of getting sustained reliable access to ICTs. The author further defines effective access as the one can ensure that people can find relevant content, know how to use the technologies, and are engaged and represented in the policy process. Full citizenship and full access in a knowledge society requires full engagement with all there components.
De Haan, J. (2004)	• ***Motivation*** • ***Possession*** • ***Digital skills***	Following Van Dijk and Mark Warschauer, Jos De Haan argues that for ICT to be used effectively three types of user access are relevant: ***motivation***, ***possession*** and ***digital skills*** (Van Dijk 1999, Viherä 2000, Marsh 2001, Steyaert 2002; De Haan and Huysmans 2003). 1. ***Motivation*** refers to attitudes towards IT: the interest in it, the will to use it and the lack of fear of new technology; 2. ***Possession*** refers to the availability of equipment, such as an Internet connection at home (dial-up connection or broadband), including autonomy in access to it, as well as access at work, school or university settings; 3. ***Digital skills*** refers to the extent to which potential users are able to handle ICT. The author points out that the adoption of ICT can be explained by differences in constraints between individuals, so that people are constrained in their possession of *resources*. Differences in this regard result not only from the quantity of these resources, but also from the type of these resources, with a distinction drawn between ***material resource***, ***cognitive resource***, ***social resource***, and ***time resource***. More resourceful people will adopt ICT earlier than people with fewer resources

Papers by date	Key Factors	Findings
Czerniewicz, L and Brown, C. (2004)	• ***Technology resources*** • ***Resources of personal agency*** • ***Contextual resources*** • ***Content resources***	Czerniewicz, L and Brown, C. also believe that the notion of access to different kinds of resources is a powerful way to describe what people use, need and draw on in order to gain or acquire access to specific ICT uses and practices. They identify four resources groupings: *technology resources*, *resources of personal agency*, *contextual resources*, and online *content resources*. 1. ***Technology resources*** (physical and practical): the authors define technology resources as the tangible components of computers and associated telecommunication infrastructure. Their category of physical resources is also expanded to incorporate *practical* considerations such as time and autonomy. The authors define practical resources as control over when, where, and to what extent computers are used. 2. ***Resources of personal agency***: their indicators of this resource are on knowledge, skill, experience and training. Their definition of personal resources include a person's interest in and attitude to using computers (generally and specifically for learning) as well as their knowledge and skills in using a computer. Indicators include interest, purpose, experience, knowledge, training, and skills. 3. ***Contextual resources***: include human institutions, groups and organizations that need to be accessed in order to successfully utilize ICTs. Social networks provide both practical support and emotional support. The authors define social resources as the interest and support received from a community social network. 4. ***Content resources***: they define content resources as the availability of suitable digital material online. Their research indicators focus on relevance, local production and language.
Maike van Damme, Jos de Haan & Jurjen Iedema (2005)	• ***Facilities*** • ***Motivation*** • ***Computer skills*** • ***Use of ICTs***	Following De Haan and Iedema (2004), Maike van Damme et. al. propose two models of access at work. They define the dimensions of ICT that form the bases of these models: 1. ***Facilities***: the first dimension concerns the possibilities to use ICTs; 2. ***Motivation***: a positive attitude towards digital technology is becoming increasingly relevant to properly function in an information and network society. Mental barriers may restrict people from adopting new technology. The degree to which people are willing to adopt new technology has also been called "mental accessibility" (Van Dijk 2005); 3. ***Computer skills***: changes in society demand new competences and skills. Because of the growing amount of information on the Internet and people's increasing dependence on information, the importance of digital skills or information competence has also increased (cf. Steyaert 2002); 4. ***Use of ICTs***: the previous three elements of access determine the use of ICTs. The authors further discriminate between three aspects: the complexity, the diversity, and the intensity of usage.

Apendix C. Survey Questionnaires

Basic Information about the CTC

What is the name of the project that you are referring to in the TMF grant application?
_____

What is your role in the project? _____

Who is being served in your programs and services?
(Check all that apply)
□ Pre-teens
□ Teens
□ Adults
□ Seniors
□ Disabled
□ Immigrant/Refugee
□ Homeless
□ Low-Income
□ On-site residents
□ Other (please specify)

From the list above, who are the primary people that you serve in your programs?
_____

What specific ethnic groups are being served in your programs and services? (Check all that apply)
□ American Indian or Alaska Native
□ Asian
□ Black or African American
□ Hispanic/Latino
□ Native Hawaiian or Other Pacific Islander
□ White
□ Other (please specify)

From the list above, what is the primary ethnic population that you serve?
_____

Services and Resources that CTCs *Offer* to Users

Technology Resources

Does the center offer non-monitored computer and Internet access to the users, such as drop-in open computer labs?
□ Yes, available during all operating hours
□ Yes, but only available within certain designated time frames
□ No

If the amount of time a user can use the computer facilities is limited during one visit, how long it is?

_____

Is the registration or any type of membership required for a user to be able to use the computer facilities in the center?
□ Yes, and it is free
□ Yes, but a fee is required
□ No

Are all the facilities (including computers, scanners, printers, software applications) available and accessible to all users?
□ Yes
□ No (answer the next question)

How does the center decide who can use what facilities?
□ Sign up and first come first served
□ Only those who take classes can use
□ Other (please specify)

Knowledge Resources

Does the center offer computer courses or any types of computer skill training services?
□ Yes, and it is free
□ Yes, but a fee is required
□ No

What technology skills do you teach your participants in your TMF project?
(Check all that apply)
□ Learn basic computer skills (on/off)
□ Learn basic Internet (email)
□ Learn intermediate computer (PowerPoint/presentation)
□ Learn advanced Internet (Web authoring)
□ Learn multimedia (digital photography)

□ Learn to use the Internet effectively for a specific topic or reason
□ Learn to build and/or maintain a computer
□ Electronic civic participation
□ Have general access to computers and the Internet (open lab time)
□ Learn to use assistive technology
□ Other or comments

In addition to technology skills, what are your goals for participants? (Check all that apply)
□ Education: Adult Basic Ed or GED
□ Education: Youth tutoring/homework
□ Education: Basic literacy
□ ESL/Citizenship
□ Employment training: Basic workplace skills
□ Employment training: Finding and getting a job
□ Employment training: Technical certification or
□ Employment training: Special industry training (specify?)
□ Business development: Small business or entrepreneur
□ Connect to family and friends
□ Life skills & resources: Banking & money management
□ Life skills & resources: Health
□ Life skills & resources: Legal rights
□ Life skills & resources: Services: (examples: schools
□ Other (please specify)

Content Resources

Does your center (or organization) have a Web site?
□ Yes
□ No (please skip the following questions)

What is its address (URL)? _____

What do you see as the main purpose of your Web site?
_____

How often do you update your center's Web site? _____

How many staff members have the ability to update your center's Web site? _____

What types of information are available on your organization's Web site? Check all that apply.
□ Newsletters
□ Events
□ Center fact sheets/introduction

□ Contact information
□ About your staff
□ Supplementary resources of center's programs, services, and classes
□ Links to other Web sites
□ Community resources
□ Employment/job postings
□ Audio and/or video
□ Forms (membership application)
□ Other (please specify)

Does the center have any other ways to provide the participants with useful and relevant information supplementary to the programs and services?
□ Yes, and by the following ways:
□ Written materials handed out in a class
□ Information brochures created by the center and available to all participants
□ Center newsletters
□ Oral instructions delivered by class instructors or volunteers
□ Other (please specify)
□ Not at all

Social Resources

Is the center collaborating with other community groups, community-based organizations, or educational institutions (libraries, schools) to provide information or resources that may be helpful for the participants to gain skills and knowledge on ICTs?
□ Yes
□ No

What are these community groups, community-based organizations, or educational institutions?

_____

Is the center collaborating with local business groups or companies to provide information or resources that may be helpful for the participants to gain skills and knowledge on ICTs?
□ Yes
□ No

What are these local business groups or companies corporations?

_____

Does the center encourage its participants in any ways to work with other center participants on learning computer skills?
□ Yes
□ No

Does the center encourage parents to accompany their school-aged center frequent users and participate in center's programs and services together?
□ Yes
□ No

Does the center have any programs designed in a way family can come to the center and participate in the programs together?
□ Yes
□ No

Psychological Resources

Does the center offer various programs and services at different skill levels to provide users, who have various computer experiences and knowledge levels, with appropriate course content and learning environment?
□ Yes
□ No

Does the center employ multiple methods to deliver its computer courses or skill training programs, so that participants can choose whatever method most suitable to their skill level and learning style?
□ Yes
□ No

Can you give us more detail on what exact methods the center is using to deliver the programs and services?

_____

Resources that CTCs *Need* to Operate and Sustain Themeslves

Technological Resources

How many computers does your center own (include portable computers and laptops)?
a. _____For staff/administrative use only
b. _____For client use only
c. _____For both staff and client use
d. _____Other (please specify _____)
e. _____Total (sum of a, b, c and d)

How many of each type of hardware is available for client use?

a. _____CD-ROM drive/DVD drive	g. _____ Laser Printer
b. _____Microphone	h. _____ Inkjet Printer
c. _____Speakers	i. _____ Scanner

d. _____Video camcorder
e. _____Video Editing System
f. _____Scanner
j. _____ Digital Camera
k. _____ LCD Panel, LCD Projector

l. _____Other (please specify _____)
m. _____Other (please specify _____)
n. _____Other (please specify _____)

Does the center have sufficient computer hardware facilities to support all the programs and services offered by the center?
□ Yes
□ No, more needed (Please answer the following question)

How did the center acquire these computer hardware facilities already owned?
□ Purchased
□ Donated

What types of hardware or networking equipment does the center need for the programs and services to be delivered more effectively? (Check all that apply)
□ Desktop PC
□ Portable PC
□ Printer
□ Scanner
□ Digital Camera
□ Video camera
□ LCD Panel, LCD Projector
□ CD-ROM drive/DVD drive
□ Microphone
□ Speakers
□ Video Editing System
□ Dedicated Internet Access
□ Network Wiring
□ Other (please specify)

What software is available to clients? (please check those that are available and specify the application)

Check	*Software Available*	*Brand Name of Software*
_____	Operating Systems (DOS, Windows)	_____
_____	Word Processing (MSWord)	_____
_____	Web Browser (Netscape, Mosaic)	_____
_____	Spreadsheet	_____
_____	Database	_____
_____	Graphical/Drawing	_____
_____	Desktop publishing	_____
_____	Presentations	_____

_____On-line service (AOL, CompuServe)_____
_____Simulation Programs _____
_____Drill/Practice Programs/Tutorials _____
_____Typing tool _____
_____Games _____
_____Other (please specify_____)

Does the center have sufficient computer software applications to support all the programs and services offered by the center?
 Yes
 No, more needed (Please answer the following question)

How did the center acquire these computer software applications already owned?
 Purchased
 Donated

What types of computer software applications or licenses does the center need for the programs and services to be delivered more effectively? (Check all that apply)
 Operating Systems (DOS, Windows)
 Word Processing (MS Word)
 Web Browser (Netscape, Mosaic)
 Spreadsheet (MS Excel)
 Database
 Graphical/Drawing (2D/3D)
 Desktop publishing
 Presentations
 On-line service (AOL, CompuServe)
 Simulation Programs
 Drill/Practice Programs/Tutorials
 Typing tool
 Games
 Other (please specify)

How many computers at this center are connected to the Internet? _____

Facility Resources

How many computer lab or classroom does your program own? _____

Where are your computer centers located or housed?
 Community center
 Library
 School facility
 Church
 Leased office space

□ Other

Has the center been able to secure the rights to use the physical space for operation for at least one full year?
□ Yes
□ No

Is the center properly furnished with sufficient furniture?
□ Yes
□ No, more needed (Please answer the following question)

What other furniture and furnishings does the center need?
□ Sign
□ Desk and Chair for reception personnel
□ Desk and Chair for participants
□ File Storage, Cabinet, shelving
□ Lighting
□ Bulletin Board
□ Other (please specify)

Funding Resources

Besides TMF grant, is the center also receiving funding support from other sources?
□ Yes
□ No

What are other funding sources?
□ Other local community-based organizations
□ Other city agencies
□ State government agencies
□ Federal agencies
□ CTCNet or other community technology regional consortium
□ Private corporations / Local businesses

Does the center charge participants any fees for applying membership (if there is one required)?
□ Yes
□ No

Does the center charge the participants any fees for taking computer classes or training programs?
□ Yes
□ No

Personnel Resources

How many people are part of your project daily operation?
□ Full time staff _____
□ Part time staff _____
□ Board members _____
□ Volunteers _____
□ Interns _____
□ Other _____

Do you have volunteers assist in the program or service delivery as part of your TMF grant?
□ Yes
□ No

Where do your volunteers come from?
□ Neighborhood residents
□ Local Business
□ Institutions (Library, school)
□ Previous students/clients
□ Non-profit organizations (example: AmeriCorps)
□ Others

How valuable are the volunteers to the success of your project?
□ Not important at all
□ Somewhat important
□ Important
□ Very important
□ Critical Key to our success

Are you able to increase the amount of volunteer help in your organizations as a result of the TMF project?
□ Yes
□ No

Does your association with your community volunteers help you find or secure other program funding?
□ Yes
□ No

Do you hire people handling some professional services – specialized skills required for periodic functions such as legal, accounting and technology?
□ Yes
□ No

How many staff members received any forms of training during the past 12 months?

_____

Describe the training that was provided:

_____

Social/cultural Resources

Does the center have enough staff available to help participants with computer difficulties or skill learning anytime during the center operating hours?
□ Yes
□ No

Is the center receiving help from other community groups, community-based organizations with curriculum design for center's programs and services?
□ Yes
□ No

Does the center request the participants to devote their time to helping novice participants with learning, as part of membership requirements or center usage rules?
□ Yes
□ No

Institutional Resources

Besides cash reimbursements, what other forms of support is the center also receiving from Seattle's Community Technology Program? (Check all that apply)
□ Community outreach methodology
□ Community volunteers recruiting
□ Equipment maintenance
□ Program curriculum design

Is the center a member of CTCNet?
□ Yes
□ No

If Yes, is the center receiving any forms of advise or support from CTCNet?
□ Yes
□ No

If Not, does the center have any plan to become a member of CTCNet?
□ Yes
□ No

Is the center receiving help from the following institutions with curriculum design for center's programs and services?
□ Yes, then please check all that apply:
□ Libraries
□ Schools (K-9)
□ Higher Ed
□ Not at all
□ Other community groups
□ Private corporations / Local business
□ Arts / Media / Design Studio

Community Partnerships

Do you see your center as an integral part of the community (neighborhood, such as University District, Chinatown-International District) that the center is located in? or an independent service provider or educational institution serving a broader area (such as the entire City of Seattle)?
□ An integral part of the local community
□ An independent agency serving a broader area
□ Other (please specify) _____

Does your center have any forms of community outreach efforts that aim to engage with local residents or engage in any forms of community-oriented activities?
□ Yes (please answer the following question)
□ No

What are those community-oriented activates?
□ Youth education, after school programs
□ Adult computer skill learning
□ Adult job and resource searching
□ Business assistances, local economic development
□ Immigrant/refugee assistances
□ Services for seniors or disabled populations
□ Other _____

Has the center ever been contacted and asked by other community groups or local business to offer any forms of assistances for them?
□ Yes (please answer the following question)
□ No

What are those assistances?
□ IT-related assistances, such as web design, poster design, documentation publishing
□ Community-oriented activities, such as youth programs, senior skill training
□ Other _____

Does your association with your community and other organizations help you find or secure other program funding?
□ Yes
□ No

Does your association with your community and other organizations help you find or secure other types of resources, such as hardware equipment, office furniture?
□ Yes
□ No

Does your participation in the TMF grant project result in any collaboration with other organizations?
□ Yes
□ No
□ Not sure

Does your association with the city as a TMF grant recipient help you get more funding from other sources?
□ Yes
□ No
□ Not sure

Apendix D. Interview Protocal

Thank you for taking time to do this interview. It should take from 30 to 45 minutes. Before we start, there is a consent form which I'll give you some time to read and consider before signing. This is mainly to protect the rights of study participants and enable them to make an informed decision to participate in this research.

(Each of us signs one form, give them extra form to keep)

Interview Starts

What is your role in the project?

What is the major purpose (the mission) of the project?

Can you please briefly describe the programs or services that the center offers to your participants? Such as computer courses or any types of computer skill training services.

What are these students? Where did you find them, in what ways? How did you publicize your programs? Any community outreach efforts to get local people involved in your programs?

What are the instructors? Paid staff? Or volunteers? How did you recruit your instructors?

Who designed these classes? How the classes are delivered? Do you offer classes at different skill levels? Or different ways of teaching so students can find their own ways to learn? Or different types of exercise, short exercises vs. long projects?

Other than the class materials for computer skills or literacy, does the center also provide students with other useful resources, such as websites, online resources, useful for them to get a job, get information?

Does the center have sufficient computer hardware facilities and software applications to support all the programs and services offered by the center? If not, what would be the major concerns?

Is the center collaborating with other community groups, community-based organizations, or educational institutions (libraries, schools) to provide information or resources that may be helpful for the participants in gaining skills and knowledge on information technology, or to help develop program curriculum or services?

What area(s) do you think would be the strength(s) of your administrative/organizational structure? What area(s) do you think would be the weakness or problems in this system?

Besides TMF grant, is the center also receiving funding support from other sources?

What are other potential funding sources?

Do you have volunteers assist in the program or service delivery as part of your TMF grant?

How valuable are the volunteers to the success of your project?

Besides cash reimbursements, what other forms of support is the center also receiving from Seattle's Community Technology Program?

What other forms of support or assistances do you think that the City should provide to the center (but they have still not done it yet)?

Do you see your center as an integral part of the community (such as University District, Chinatown-International District) that the center is located in? or an independent service provider or educational institution serving a broader area (such as the entire City of Seattle)?

Does your center have any forms of community outreach efforts that aim to engage with local residents or engage in any forms of community-oriented activities?

Does your association with your community and other organizations help you find or secure other program funding, or help you find or secure other types of resources, such as hardware equipment, software programs, or office furniture?

Do you see being part of a community is a very important factor contributing to the health of your center's operation?

How valuable is the support from the local community to the success of your project?

Do you think that it is true if a community technology center wants to receive sufficient support from its local community, it then has to be a good and valuable asset to the community first by contributing to the community in any positive ways?

Do you think a community technology center should see itself as a part of a broader community development effort?

Vita

MING-CHUN LEE

Research Interests

(1) Community development and neighborhood planning; (2) Community design; (3) Community informatics and community-based technology—the use of information and communication technology for the social, cultural, and economic development of local communities; (4) e-Government & e-Democracy; (5) The application of digital visualization—GIS, 2-D and 3-D graphic media—in urban design & planning.

Education

Degree	Institution	Date
Ph.D.	University of Washington Interdisciplinary Ph.D. Program in Urban Design and Planning	2008
M.Arch.	University of Washington Department of Architecture *"SpaceMaker: a symbol-based three-dimensional computer modeling tool for early schematic development of the architectural design"* Advisor: Ellen Y.L. Do	2001
M.S.	National Cheng Kung University Taiwan Department of Aeronautics & Astronautics	1993
B.S.	National Cheng Kung University Taiwan Department of Hydraulic & Oceanic Engineering	1991