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A Community Initiative that Diminished the Digital Divide

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ABSTRACT

During the 1990s, businesses began relying on the convenience of ubiquitous computer systems and on the efficiencies of digital networks. This new techno-economic dynamic prompted White House administrations of the 1990s to take note of public policy issues surrounding the "information superhighway" and the "digital divide." Yet, because the digital world seems intangible, relatively few policymakers connected the virtual world with its potential impact on the physical world [Frye, 2002].

A case study of a community organizing program was conducted to examine the digital divide in the United States and its connection to other factors. This field study of computer-illiterate people in a public housing community was undertaken to better understand the complexities of the "have vs. have not" divide so that effective public policies can be deployed to bridge the gap. Community members ran this program with assistance from volunteers and set their own technology learning plan to minimize their techno-disadvantage. Overall, the results indicate the importance of a community-driven organizing strategy.

Even though the program was effective in that participants learned computers skills, their emotional state declined. Becoming computer literate did not eliminate feelings of isolation from mainstream society, which is considered a factor contributing to the divide. Those who are adversely digitally divided may also be divided by a culture of failure. Bridging the digital divide requires a more comprehensive approach—and not a quick fix. It requires a process that is, for example, driven by a local community program and strategy to initiate and sustain members' use of technology.

Keywords: Digital Divide, Computer Training, Internet Access, Computer Access, Community Development

I. INTRODUCTION

The digital divide[1] is defined as "the gap between individuals, households, businesses, and geographic areas at different socio-economic levels with regard to their opportunities to access information and communication technologies and their use of the Internet" [OECD, 2001]. It is frequently referred to as the gap between technology 'haves' and 'have-nots' [Holmes, 2002; Novak and Hoffman, 1998; Wilhelm and Thierer, 2000].

This technology gap can also reflect the economic disparity between those who can use information technology (IT), particularly the Internet, and those who can not. Those concerned about the digital divide describe it as

> *"arguably the single, largest, segregating force in today's world. If it is not made a national priority, a generation of children and families will mature without these tools that are proving to be the key to the future"* [PR Newswire, 2000].

Internationally, the G8 established a "Digital Opportunity Taskforce" in 2000. In May 2001, this taskforce submitted their *Proposed Plan of Action* to the personal representatives of each of the G8 leaders. Their report focused on the need "to overcome the digital divide." [Goodman and Brenner, 2002].

MODELING AND OVERCOMING THE DIGITAL DIVIDE

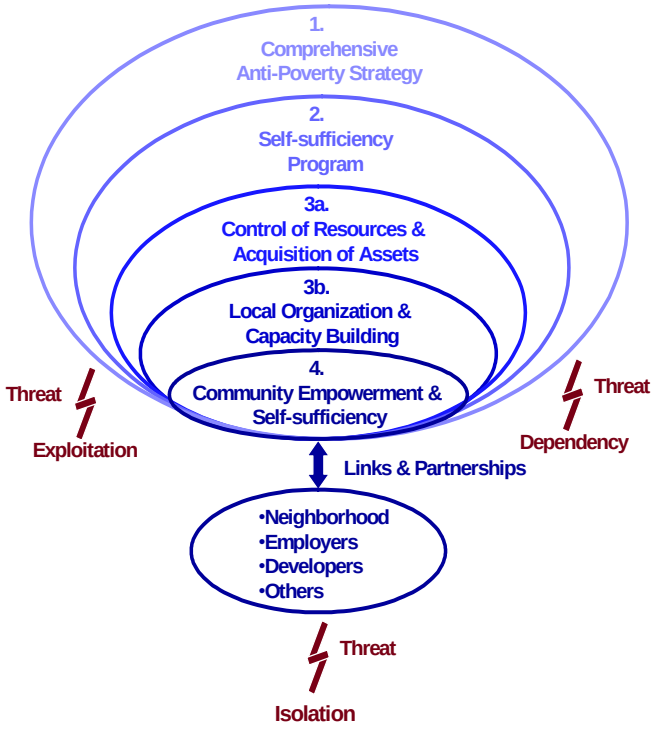
The divide cannot be expected to continue without adverse consequences to society and its economy. Business and government leaders recognize the importance of bringing everyone onto the information grid, but that may not be adequate. Strategically planned initiatives focused on social, cultural, economic, and educational differences within individual communities are needed. This paper explores characteristics of those affected negatively by the digital divide in the United States through a case study of a local community organizing strategy, which is based on the Assets-Based Community Development Model [Kretzmann and McKnight, 1993] presented in Figure 1. The theoretical premises of this model are described in Sidebar 1.

Section II presents the general research questions, followed by descriptions of the research method and the community (Section III). The analysis, using both qualitative and quantitative approaches to study individuals within their natural setting of a public housing community, is presented in Section IV. The results show that a local community organizing strategy helped a community implement a computer training program, which is a significant achievement for this community. This computer training program was effective in that participants learned computer skills. However, the program failed to improve participant's emotional state—in fact, their happiness declined.

II. RESEARCH MODEL AND PROPOSITIONS

The case study of a community-based initiative was undertaken to gain insight into the digital divide within the United States and more importantly, to help narrow it. Two general questions are addressed through three propositions, based on the model presented in Figure 2.

[1] The term "digital divide" was in common use by the mid-1990s.[NTIA 1998]



Based on [Kretzmann and McKnight, 1993]

Figure 1. The Assets-Based Community Development Model

SIDEBAR I. THEORETICAL PREMISES OF THE ASSETS-BASED COMMUNITY DEVELOPMENT MODEL

"First, *comprehensive anti-poverty strategies* are best implemented through a system that connects with people and families in the…communities where they live…."

Second, an effective *self-sufficiency program* cannot focus solely…on the needs and deficiencies of the people being served, but requires an appreciation of existing *assets and opportunities* as well….Among the most important of these local resources is social capital—human support networks. Collaboration and communication…can be powerful tools in the promotion and support of self-sufficiency programs.

Third, *control of resources and acquisition of assets…*are the marks of true self-sufficiency. *Local organization and capacity building* through locally controlled and coordinated programs are more likely to involve the residents themselves in the ownership and control of programs and resources, and more likely to develop and retain local assets and capacity.

Fourth, isolation of poor communities is a major cause and effect of their poverty….C*ommunity empowerment and community self-sufficiency* are key to enabling and maintaining individual self-sufficiency. Otherwise, the capacity for self-sufficiency remains tied to resources largely beyond the control of community residents….Local organizing and capacity building must be directed toward overcoming…isolation; and creating effective links and partnerships between the neighborhood and employers, developers and others outside the neighborhood….These links and partnerships…must be engaged in from a position of strength and self-sufficiency, to avoid the dangers of exploitation and dependency."

From Kretzmann and McKnight [1993]

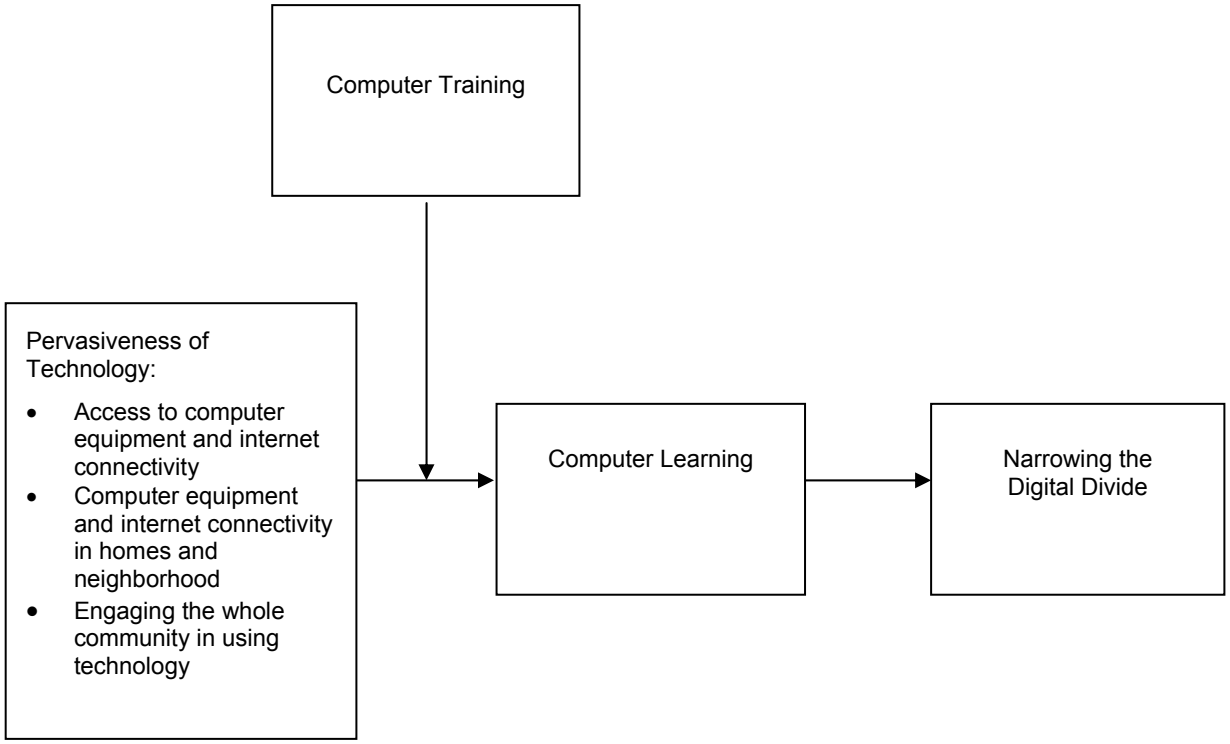


Figure 2. Model of Factors Associated with Narrowing the Digital Divide

Proposition 1:

The factors associated with the digital divide are:

- income
- age
- education level
- race
- household type
- geographic location.

WHAT CONTRIBUTES TO NARROWING THE DIGITAL DIVIDE?

Home Internet access is viewed as the key to narrowing the divide [Keller, 2001]. Access must be made convenient and readily available by placing computer technology in homes and neighborhood institutions. Furthermore, computer use must be pervasive, engaging the whole community on a regular basis. The factors for pervasiveness are presented in Figure 2, leading to the following proposition:

Proposition 2

The pervasiveness of computer technology within the community will be associated with:

- access to computer equipment and internet connectivity,
- convenient and readily available access to computer equipment and internet connectivity in homes and neighborhood institutions, and
- engaging the whole community in using technology.

Also important in bridging the divide is successful learning of computing skills [DiMaio et al., 2002; Holmes, 2002]. Thus, computer training is included as a mediating factor, as shown in Figure 2, resulting in the following proposition:

Proposition 3

Computer learning results in narrowing the digital divide:

- computer training will improve computer learning
- computer learning will diminish the divide

III. RESEARCH METHOD

The digital divide emerged with the advent of the PC in the late 1970s and became a focus of concern in the 1990s. Few previous studies deal with this relatively new area of research. Being at an early stage of investigation, the research reported here is exploratory in nature, with a focus on discovery and theory building, for which a single case study is appropriate [Benbasat et al., 1987 and Galliers, 1992]. The unit of analysis must allow for the research questions to be adequately addressed [Benbasat et al., 1987]. The two general research questions (Propositions 2 and 3) address understanding the factors inherent to the digital divide to bring about its reduction, requiring a focus on individual members of the community. The selection of the William Penn Housing Development (WPHD) community members is narrow in scope. However, this group represents the 'have-nots' because few of them possessed skills, training, or access to computer technology.

The authors served as volunteers within the community, which cultivated familiarity and trust necessary "to cross the boundary and become accepted" in collecting cultural data [Rubin and Rubin, 1995]. A computer training program was launched in the fall of 2000 and continues through the present. This program provides on-site training to members of the community by university students. This study focuses on the first training session in the fall of 2000. At the completion, a survey was administered to address Propositions 1–3.

Quantitative measures, based on survey data and objectives from the community development plan, serve as indicators verifying the major factors. The quantitative approach offers insight through a range of data sources [Myers, 2003; Silverman, 1993]. We include contextual data; observations from participants and volunteers; community members' written and oral comments from informal interaction and feedback forms; documentary sources including internal community meeting minutes, memos and reports; written and oral communications between the community and interested parties; published reports; and a class action lawsuit. The hermeneutics approach, for which the results' validity is assessed based on the logical reasoning to describe results and draw conclusions [Larsen and Myers, 1997; Myers, 2003; Walsham, 1993], was used to interpret the data. Standards for the quality of conclusions drawn were incorporated. The "justificatory" point of view, supported by convergence among the multiple field workers involved [Miles and Huberman, 1994], was the primary standard used.

IV. THE CONTEXT

Following the principle of contextualization [Klein and Myers, 1999], a description of the environmental, historical, and organizational context of the WPHD public housing community, explains how technological disadvantage emerged and how it may be reduced.

ENVIRONMENTAL CONTEXT: THE DISADVANTAGED SIDE OF THE DIVIDE

The WPHD is located in the City of Chester, which occupies 4.8 square miles in Delaware County, PA USA. "During the last 100 years, Chester has evolved from a boom town ... to ... one of the most distressed cities in the nation" [Council of the City of Chester, 1994]. Chester began its decline in the 1950s, when it experienced a "deteriorating home stock, a dramatic decrease in

size, a four-fold increase in the African-American population, and a significantly poorer population" [Brief of Amicus Curiae, 1998]. In the 1980s, state and local governments instituted programs to improve the economy and living conditions with little success. This formerly industrial city is home to a low-income population of 39,000, 65% of whom are African-American. Its infant mortality rate is the highest in Pennsylvania [Worsham, 2000]. By contrast, the remainder of Delaware County is 91% White [Brief of Amicus Curiae, 1998], portraying an isolation from mainstream society not unlike that of an inner city.

HISTORICAL CONTEXT: STRUGGLING FOR HABITABLE HOUSING

In 1987, a class action suit, *Clements v. City of Chester* (1990), consisting of "all residents of Chester Housing Authority public housing units in the City of Chester, Pennsylvania," was filed. The residents claimed to be plagued by dangerous and unhealthy conditions, "substandard, intolerable and uninhabitable" housing, "dark hallways strewn with garbage, human waste, and the thrown-away paraphernalia of drug and alcohol activity; inadequate plumbing and sewage; unsafe electrical systems; leaking roofs; and doors without locks" [*Clements v. City of Chester*, 1990]. The case was temporarily settled in 1988 by a Stipulation between the residents and Chester. However, in 1990, the residents filed a motion to hold Chester in contempt for alleged violations of the housing and safety codes well after the Stipulation was signed. Although the contempt motion was unsuccessful, an out-of-state attorney was appointed as Receiver, who is paid for his continuing role in overseeing the funds awarded as a result of the class action lawsuit.

Figure 3. WPHD Multi-room Community Center

In the early 1990s, the Chester Housing Authority (CHA) demolished substandard housing units, including the William Penn project, and built new public housing. The WPHD, completed in March 1999, includes 158 reasonably attractive garden apartments and a multi-room community center (Figure 3), surrounded by arun down, high crime area with social ills (e.g., low educational performance, teenage pregnancy, vandalism, graffiti, noise, trash, drug use on the streets, violence, crime, drive-by shootings, murders). In brief, the environment fosters a culture of failure.

ORGANIZATIONAL CONTEXT: PLANNING FOR SELF-SUFFICIENCY

After struggling to attain the basic need of housing fit for occupancy, the William Penn Tenant Association (WPTA), assisted by volunteers, applied the Assets-Based Community Development Model [Kretzmann and McKnight, 1993] shown in Sidebar 1 in Section 1 to guide the formulation of the WPTA Preliminary Development Plan in 1999. According to this model, an effective local organizing strategy is fundamental to successful community self-sufficiency. Volunteers include the Community Organizer, whose expertise includes community program planning, and Unity Center, Inc., a nonprofit corporation founded in 1987 to "bring people together who would normally not come together" to work on a common concern or project.

The basis for the Development Plan [WPTA, 1999] is a survey of 200 WPHD and neighboring households in Fall 1999. The results, based on a response rate of 37.5%, showed 60% of responding households included one or more members in need of employment. Only 12% (24 households) reported skills or training in computer technology. A strong interest in computer training was expressed by 46% of respondents. None had a computer in their home. In response, eight objectives, presented in Sidebar 2, were planned to upgrade an existing Computer Laboratory housed in the WPTA office and develop computer technology within the community. Overseeing these objectives was the WPTA Technology Committee, comprised of

tenant leaders from the WPHD. To support the Development Plan, the WPTA Computer Training Program was initiated.

SIDEBAR 2. OBJECTIVES TO ENHANCE THE COMPUTER LABORATORY AND DEVELOP COMPUTER TECHNOLOGY

1. Expand acquisition of computers for computer laboratory from 5 functioning Intel 80486 computers to 15 Pentium computers.
2. Connect lab to Internet.
3. Develop Community Webpage.
4. Enhance computer training capacity with combination of paid, intern, and volunteer trainers.
5. Provide computer training, installation, and repair experience to Community residents.
6. Develop employer-linked computer training programs for Community residents.
7. Implement home-based technology initiative by installing computers and software in at least 200 homes in the community.
8. Develop Community-based Network through internet connection among participating households.

Source: William Penn Tenant Association Preliminary Development Plan [1999].

ORGANIZATIONAL CONTEXT: OBSTACLES TO IMPLEMENTING THE PLAN

Obstacles were encountered in the first attempt at computer training. A simple request, made to the Chester Housing Authority (CHA) and the Receiver, to use an unused conference room in the WPHD Community Center, was denied. The CHA and the Receiver wanted the residents to use computers located at Community Hospital, about 2.5 miles from WPHD, under its "One Stop Shop" training program. However, this location is not convenient and would not promote the major strategic goal of community empowerment and self-sufficiency [Kretzmann and McKnight, 1996]. After much negotiation, permission was finally granted to use the WPTA office in the Community Center.

Although the office is small (five PCs refurbished and donated by Unity Center) it accommodated a small pilot training program, resulting in four graduates. In March 2000, the WPTA wanted to expand the training program and again petitioned the CHA and Receiver for resident use of their own Community Center's conference room, still unused except to store trash cans. This request was again denied, resulting in an acrimonious relationship among the parties involved. As one resident stated, the struggle was a means of "keeping us down so that he can ride around in a limo." Around the same time, a grant from the Villanova Institute for Teaching and Learning (VITAL) provided support for a service learning project as a requirement in an MIS course. The WPTA pressed the issue of University involvement and overcame the opposition from the CHA and the Receiver. Finally, the CHA granted permission in July 2000, but still held back by characterizing this permission as a limited license to Villanova University, not the WPTA.

Fifteen Intel Pentium computers were donated by local law firms. Refurbishing of 15 donated 486 PCs was accomplished through a partnership with students from Cardinal O'Hara High School, Springfield, PA. The on-site Computer Lab (Figure 4) was made functional through a partnership with students from Widener University, Chester, PA. As word of this initiative spread, a second location, equipped with 15 PCs donated from local law firms, was developed at In the

Figure 4. The Computer Laboratory in the WPHD Community Center

Name of Jesus Outreach Church (Figure 5), two miles from the public housing community. The Training Program "kicked off" in September 2000 and concluded with examinations and a graduation ceremony in December 2000. Of the initial 60 community members who began the Training Program, 31 participants, representing 27 households, received certificates and free refurbished PCs to take home.

Figure 5. Computer Laboratory in the Name of Jesus Outreach Church

V. ANALYSIS OF THE CASE STUDY

The analysis and interpretation of the case study through both quantitative and qualitative approaches provide evaluative insight not otherwise obtainable [Trauth and Jessup, 2000]. The quantitative approach is based on a survey administered to all 31 community participants who successfully fulfilled the requirements of the program. The qualitative approach broadens the analysis by validating, interpreting, clarifying, and illustrating quantitative findings. Demographics of participants are provided in Table 1. Results for Propositions 1–3 are summarized in Table 2. For each proposition, quantitative results are followed by qualitative findings.

Table 1. Characteristics of Participants Fulfilling Training Program Requirements

Characteristic	Participants
No. Participants	31
Age	Range: 13-65 years of age Mean: 43
Sex	Male: 10 (32.3%) Female: 21(67.7%)
Educational attainment	No high school: 1 (3.2%) Some high school: 2 (6.5%) High school equivalency: 5 (16.1%) High school diploma: 23(74.2%)
Race	African American: 100%
Employed	Overall: 18 (58.1%) Male: 7 (70.0%) Female: 11 (52.4%)
Household income	Mode: US$15-25,000
Household type	Single: 5 (16.1%) Single with children: 9 (29.0%) Married: 5 (16.1%) Married with children:12 (38.7%)

PROPOSITION 1

A summary of the findings for Proposition 1, the factors associated with the divide, of these analyses is presented in Table 3.

Quantitative Analysis

While a seemingly simple set of demographic characteristics is associated with the divide, it is recognized that a complex combination of factors determines in which side of the divide an individual resides. Each of the demographic characteristics identified in Proposition 1 (Section II) is examined for the graduating participants by comparison with comparable statistics, as summarized in Table 3. This analysis is intended to provide a relative assessment of the community in contrast to previous findings generalizing the characterization of the digital divide.

PROPOSITION 2

Proposition 2, pervasiveness of computer technology within the community, is intended to provide an assessment of whether implementing the Development Plan to enhance the community's computer lab and develop computer technology is realized. Can pervasiveness be achieved by implementing the Assets-Based Community Development Model in a community on the have-not side of the divide? Quantitative and qualitative analyses are combined within the discussion. The findings are summarized in Table 2.

Quantitative and Qualitative Analysis

The quantitative analysis, for each of the three factors (access, convenience, engagement) of Proposition 2 is based on objectives 1, 2, 7, 3, and 8, of the Development Plan (Sidebar 2 in Section 2). A 0-1 measure is used for each objective. A value of 1 indicates the objective was met; a value of 0 indicates the objective was not met. The qualitative analysis then shows additional factors, beyond those addressed by the objectives, which provide insight into the threats confronting the community and the struggle to overcome them by increasing the pervasiveness of technology.

Table 2. Summary of Findings for Propositions 1 through 3

Proposition	**Quantitative Analysis**	**Qualitative Analysis**
1. Factors associated with the digital divide are:	Demographic Characteristics	Culture of Failure Exploitive Dependency Isolation
2. Pervasiveness of computer technology within the community: access to computer equipment and internet connectivity	Objective 1 met Objective 2 met	Community leadership Implement the Assets-Based Community Development Model Overcome Threats Links & Partnerships Resources / Maintenance
Access to computer equipment and internet in homes and neighborhood institutions	Objective 7 not met, but limited progress made	More Links & Partnerships Additional Resources / Maintenance Champion
Engaging the whole community in using technology	Objective 3 not met Objective 8 not met (dependent on Objective 7)	More Links & Partnerships Emergent leadership Champion Word of Mouth & Neighborhood Grapevine Motivation to participate / Ownership of program Curiosity Sense of community Sense of self-empowerment
3. Computer learning results in narrowing the divide: Computer training will improve computer learning	Increase in Positive Sense of Control Increase in Positive Self-Concept Decrease in Negative Self-Concept Decrease in Worry Decrease in Happiness Decrease in Physiological Symptoms Decrease in Distractibility	Initial anxiety about what they did not know became anxiety about much more to learn Sense of accomplishment Focused on computer tasks Desire to learn more Perception of others as less experienced / desire to be among more advanced Worry about inability to keep pace Recognition of themselves as disadvantaged / expectations unfulfilled
Computer learning will diminish the divide	Decrease in number at beginner level (77.4% to 19.4%)	Overwhelming gratitude Perceived lack of opportunity Ownership of program Environment conducive to learning Self-esteem / Optimism Appreciation of links & partnerships Overcome threats to sustain momentum in use

Table 3. Relative Assessment of Internet Use Among Community Participants Contrasted with Previous Findings Characterizing the Digital Divide

Demographic Characteristic	Community Internet Usage by Demographic Characteristic	Comparable Internet Usage Statistic in the U.S. by Demographic Characteristic
Household Income (US$)	Mode is $15-25,000,	Average in PA: $43,742, U.S.: $42,148 [U.S. Census, 2001]
Internet Use	6.5% (2 of 31) use the Internet	Of households with income <$25,000, 19% use the Internet [U.S. Census, 2001]
Age	In the 35-44 age group, none use the Internet	In the 35-44 age group, 39.8% use the Internet [www.ntia.doc.gov, 1999]
Educational attainment	Mode is high school diploma/ equivalency, None use the Internet	Of those with a high school diploma/equivalency, 20.9%use the Internet [www.ntia.doc.gov, 1999]
Race	All are African-American, 6.5% use the Internet	Among African-Americans, 19% use the Internet [www.ntia.doc.gov, 1999]
Household type	Mode is married couples with children <18, Of these 12 couples, 2 (16.5%) use the Internet	Among married couples with children <18, 37.6% use the Internet [www.ntia.doc.gov, 1999]
Geographic location	Chester, with a population of 39,000, is not served by either a DSL or cable modem carrier	For towns with population <10,000, <5% have DSL or cable modem; For cities with population >100,000, 56% have DSL For cities with population >250,000, >65% have cable modem [U.S. Department of Commerce, 2000]

Access to Computer Equipment and to the Internet. This factor is assessed through Objective 1, expand the number of PCs, and Objective 2, connect laboratory to Internet, of the Development Plan. Both objectives were met but with limitations in the number of PCs, the number with Internet connectivity, and connectivity speed and availability.

Five stand-alone 486s were available in the Community Center when the Training Program was planned. That is access to PCs, but without Internet connection, was available but not in sufficient number to support community demand. Critical to providing adequate access was securing a location, which hinged on overcoming resistance from CHA and the Receiver. After significant time and energy were expended, the use of a conference room was secured. For the launch of the Training Program in September 2000, links to area organizations supported the realization of the Computer Laboratory. Objective 1 was thereby met.

Only two PCs were equipped with dial-up modems, competing for use of the only phone line in the Community Center office, when the Training Program began. Internet access was obtained through Kmart's then free BlueLight.com. To improve Internet access, a server was later donated by Wyeth Pharmaceuticals[2] and installed during the spring 2000 semester to network all the PCs allowing for internet connectivity from any of the PCs. While Objective 2 was met, Internet connectivity was limited, slow, and sometimes unavailable due to overwhelming demand for BlueLight.com.

Achieving Convenient and Ready Availability to Computers and the Internet. This factor is assessed through Objective 7, install PCs in 200 community homes (Sidebar 2), and by examining the status of computers and Internet connectivity in neighborhood institutions.

[2] Wyeth Pharmaceuticals, a division of Wyeth, is headquartered in Collegeville, Pennsylvania,

Participants fulfilling the Training Program requirements received free refurbished PCs to take home. Only 31 participants met the requirements, far short of the objective of installing computers in at least 200 homes in the community. Some of the PCs provided lacked modems and Internet connectivity in homes remains unsupported. Although Objective 7 was not met, 28 (17.1%) of 158 households in the WPHD own PCs, some with the potential for Internet connectivity, compared to none previously. However, sustaining PCs in homes in the long run requires providing maintenance.

Access to computer equipment and to the internet was extended by inviting other community organizations to partner in the Training Program initiative. The minister of the In the Name of Jesus Outreach Church championed the set-up of a second computer laboratory on-site at her church, increasing the number of PCs from none to 15. However, no Internet access was available at this location. At the time of the Training Program, no public libraries operated in Chester. However, the Crozer Library, then a private, nonprofit corporation stated it would "…soon offer computers with Internet access" [www.chestercity.com, 2002]. Within the Chester/Upland school district, installation of computer laboratories, with internet connections, began in 1999. In that year, PC use was not fully integrated in the curriculum. Neither cybercafes nor DSL or cable modem service were available within Chester then or even now. While Objective 7 was not met and access within neighborhood institutions is limited, some progress toward increasing the availability of computers was made in the Community Center and in the church.

Engaging the Whole Community in Using Technology. This factor measures community member participation and interest in computer-related activities including end-user activities and other related activities such as developing a community webpage and a network. To assess this factor, Objective 3, develop a community webpage, and Objective 8, develop a community network through internet connection (Sidebar 2) are examined. A community webpage was planned but deferred until Spring 2001 when web development software was to be installed, precluding the achievement of Objective 3. Objective 8, (developing a community-based network through internet connections in households) depends on successfully fulfilling Objective 7 which, as stated above has not yet been met.

Access to computer technology and the Training Program was promoted by an emergent leader in the community. She demonstrated her excitement with and interest in the Training Program to be provided by university students by taking the initiative, through word of mouth communication, to announce the program to members of the community and neighborhood. After the weekly planning meetings, she was observed going from person to person she encountered, on warm summer evenings, talking up the program and distributing fliers and sign-up forms. As word of mouth spread, newly interested individuals started showing up at the weekly planning meetings to express their concerns and desires, gaining ownership of the program. Motivation to participate was provided by the promise of a refurbished PC to take home for those who completed the Training Program. This motivation was effective, as one participant commented, "I did this because I wanted a computer." Others were motivated by employment opportunities. One of the community leaders related the interest expressed by her employer, a neighborhood gas station, to have her develop a website for his business.

Curiosity within and around the community was evident as individuals passing by the open door of the Community Center would walk up to ask, "What's going on?" "What are you doing in there?" and "Are you one of the computer people?" New participants arrived to ask if they could join in. One stated, "We heard about the computer training. I want my daughter to attend. Is it too late to start?" Consistent among the newly arriving participants was evidence of the word of mouth communication and the neighborhood grapevine, which were important to increasing awareness of access to computer technology and engagement through participation in the Training Program.

As the training sessions began, participants appeared enthusiastic, excited, and upbeat as they milled about the room for the first time looking and pointing at equipment while eagerly chattering

among themselves. The majority seemed intimidated or uneasy with the PCs in the sense that they did not know where to begin. Two participants turned on their PCs while others approached asking, "How'd you do that?" A clear sense of community was evident in that those who knew how to complete this task readily shared their knowledge with others. The participants demonstrated an eagerness to receive and accept instruction by asking questions and listening intently to instructions. After completing a task on the PC, some just sat and stared at the screen with a look of pleasure and wonderment as evidenced by a smile. In addition to interest in employment opportunities, some participants also discovered a sense of self-empowerment through computer-related personal endeavors. For example, more than half of the participants used the computer for personal interests such as poetry, artistic creations, and illustrated writing. These creations were proudly shown to others.

PROPOSITION 3

Proposition 3, computer learning results in narrowing the digital divide, is analyzed both quantitatively and qualitatively. The discussion of the first factor, (computer training will improve computer learning) combines both these analyses; while the two methods of analysis are addressed separately for the second factor, (computer learning will diminish the divide). Table 2 presents a summary of the results.

Computer Training Will Improve Computer Learning

According to the theory of reasoned action [Ajzen and Fishbein, 1980], attitudes influence behavior. Computer anxiety is an attitude that has been a primary focus in computer training [Speier, et. al, 1996; Torkzadeh and Angulo, 1992; Torkzadeh and Koufteros, 1993]. To assess improvement in computer learning from the Training Program, the validated Computer Anxiety and Learning Measure (CALM) [McInerney et al., 1999], included in the survey administered to participants, was used for the quantitative approach. This measure captures multiple dimensions of computer anxiety and learning, in a training situation for adult learners, including anxiety about gaining initial computing skills, sense of control when using a computer, self concept in computing ability, and state of anxiety in computing situations. Each dimension consists of several factors. Responses for each dimension before and after training are discussed below and summarized in Appendices I through VI. The qualitative approach is included within this analysis. The results are summarized in Table 2.

Anxiety about Gaining Initial Computing Skills

This scale consists of 21 questions, divided into four factors:

- Competence with Computers
- Handling Computer Equipment,
- Receiving Feedback on Computing Skills, and
- Learning about Basic Computer Functions.

Appendix I presents the mean and standard deviation before and after the Training Program for the 21 questions, divided into the four anxiety factors. The results of a paired samples t-test, comparing the participants' before and after responses for the four factors are presented in Appendix V. None of the paired difference t-tests is significant at the .05 level of significance. That is, the hypothesis that levels of anxiety about gaining initial computing skills were reduced as a result of computer training is rejected. This quantitative finding is consistent with previous results which indicate that high anxiety before training is likely to continue after training (Speier et. al, 1996).

The qualitative analysis confirmed that anxiety levels were about the same before and after the instruction. Initially, the majority of participants appeared uncertain and somewhat bewildered as to what to do. Many walked from one room to the other, asking questions such as "Where should I sit?" "Should I turn it [pointing at the computer] on?" "What should I do?" and "When do we start?" Based on the results from the CALM measure, high anxiety was reported initially, but this

anxiety did not significantly decrease after training. Perhaps the initial anxiety was attributable to not knowing what they did not know; while the completion of training left them with a different anxiety in realizing they had so much more to learn. Some participants admitted, "There's so much I still don't know," "I still don't know ____ [e.g., internet access and use, basic file management tasks, word processing, spreadsheets]," and "When I have questions they are fully answered and when I don't there has still been things for me to know that I might not have known."

Sense of Control When Using a Computer

Twelve questions capture Factor 5, "Positive sense of control," and Factor 6, "Negative sense of control" (or fear) when using a computer (Appendix II). The participants' mean response for Factor 5 was 3.79 before the Training Program versus 3.06 after. Participants gained a more positive sense of control in using a computer after training. The paired samples t-test (Appendix V) shows this result is statistically significant at the .05 level.

Except for the five people (16.1%) who reported having previous skills or training in computer technology, participants initially did not know how to turn the computer on and off. One participant commented, "I feel the program beginning should be [a] more basic teaching method such as learn first your computer itself- such as keyboard, hard drive viewer- even cutting on and off of the computer etc." Those who successfully completed the Training Program could, at a minimum, boot up and turn off the computer and, depending on their level of capability, accomplish basic tasks such as solitaire; paint; create, save, and print documents; use a browser; or send email. Achieving these capabilities lends support to a positive sense of control in using the computer.

Similarly, a negative sense of control was initially evident and diminished as training progressed, but not significantly. Initially, some participants waited patiently for instructions on how to turn on the PC, demonstrating an unwillingness to touch the PC without guidance. This reluctance was overcome as training progressed. Participants would arrive early, sit down, talk less, and get underway with various tasks, based on their skill set.

Self-Concept in Computing Ability

Appendix III presents the before and after means and standard deviations for the 11 questions on Factors 7 and 8. These factors examine the positive and negative self-concepts in computing ability, respectively. The participants' positive self-concept in computing ability increased after the Training Program, as shown by the mean response of 2.93 before, decreasing to 2.10 after. Similarly, participants' negative self-concept in computing ability decreased from a mean of 4.48 before to 2.92 after. The results of the paired samples t-test performed on the mean responses (Appendix V) before and after training for both Factors 7 and 8 are statistically significant at the .05 level.

Participants demonstrated an increasing positive self-concept in computing ability through their desire to learn more functions as training progressed, thereby demonstrating a belief in themselves that they could learn more. Comments included, "I can do the mouse and solitaire. Need [to] show more [on] the computer and exactly what it does hands on," "Quiz or test to see if we are actually learning and what still needs work," and "We need more hands on and probably a[n] instruction booklet maybe even some tests." The participants asked for more hands-on instruction and expressed confidence in their performance by requesting formal testing.

Similarly, participants were less negative about their computing ability. Comments from participants reporting a beginner level of experience include, "I think for some the classes are moving to[o] fast, and for others, too slow[ly] because, for those with little knowledge of the computer, [instruction] can hinder those with beginner skill[s] of it's [sic] use" and "If possible the advanced students will have to be separated from the slow or beginning student[s], and at times need these [beginner] student[s] in among the advanced student[s]." These participants felt challenged in learning the computer. The negative self-concept in computing ability is diminishing

as shown by the beginner's perception that there are participants with even less experience and the beginner's desire to be among the more advanced participants.

State of Anxiety in Computing Situations

Four anxiety states, "Worry," "Happiness," "Physiological Symptoms," and "Distractibility," (Factors 9 through 12) are captured through 22 questions (Appendix IV). The mean for Factor 9, "Worry" in computing situations decreased from 2.83 before, to 1.73, after the Training Program. Conversely, the mean for Factor 10, "Happiness" in computing situations, decreased from 2.39 to 1.90. The mean for Factor 11, "Physiological Symptoms" of anxiety in computing situations, was 2.12 before, decreasing to 1.56 after. Finally, the mean for Factor 12, "Distractibility" in computing situations, decreased from 2.65 before to 1.85 after training, indicating participants generally felt less distracted. As shown in Appendix V, the results of the paired samples t-test performed on the mean responses before and after training for Factors 9, 10, 11, and 12 are statistically significant at the .05 level of significance.

Worry about not being able to keep pace with instruction and learn was expressed by the participants. Comments include, "I would like to see the class separated so the advanced student can move on, I would like a less stressful class for beginners. Something I can keep up with and learn and benefit from," "The instruction is fine as far as a more knoweledgeable [sic] student is concerned, but for the beginner- we are getting lost in the space and told that we can do it," and "Please start a real basic computer class for those who want and need it, and let the more experienced ones move on, or all will be lost."

Insight into the Happiness factor may be gained by examining state of anxiety in computing situations. Anxiety is comprised of three components including cognitive, emotional, and somatic anxieties [McInerney et al., 1999]. The cognitive component consists of two factors, worry and distractibility; while the somatic component consists of the physiological symptoms factor. The emotional component consists of the happiness factor. Interestingly, it is the emotional factor on which participants waned. At the completion of the Training Program, participants were asked to "Please *make any comments* about the Computer Training Program and your feelings about learning to use computers." Responses are presented in Appendix VII. Participants' statements were all extremely positive, with the exception of four participants who all simply expressed a desire to learn more. The positive statements contained overwhelming expressions of gratitude and characterizations of their participation as "[It] really help[ed] me," "It really broaden[ed] my mind and really help[ed] me…," "I enjoyed this program very much. It was very nice being in the computer class," "I feel the program was successful," "it help[ed] me," "I really enjoyed the computer class," "The computer program was a great experance [sic] for me… It was a joy…," "I thought it was a good experience," "I injoy [sic] it… I realy [sic] loved it," and "It was a joy." Many participants stated they learned about computers, but wanted to learn more, indicating they realized there was much more they did not know. Several expressed a desire to learn more web skills. However, participants became more aware of their technological disadvantage because of the program. They also realized that, despite their new computer knowledge, their opportunities remained relatively unchanged. One participant even characterized the Training Program as "an experiment [sic] of a lifetime." Their expectations remained unfulfilled, as one female stated, "…it would help me out with problem[s] that I have with money and other problem[s] in my life," while another referred to employment in a computer-related position, "It was a joy to learn and to look for a job in using the computer." At the completion of the program, the student trainers left to resume their studies and futures, while the participants returned to their daily struggle in the government housing project.

Physiological Symptoms of anxiety are themselves difficult to observe. The occurrence of bodily symptoms would coincide with sense of control when using a computer. The observed increased sense of control and decreased negative sense of control is based on the participants' increased confidence in computer interaction. This confidence was evident in the reduced distractibility of participants as they arrived early, sat down, talked less, and focused on getting underway.

Computer Learning Will Dimimish the Digital Divide

The quantitative analysis of this factor is based on a self-assessment of both computer experience and the importance of using the computer. Participants were asked, "How would you rate your computer experience?" As shown in Appendix VI, 24 (77.4%) rated themselves as beginners (described as no experience or games only) before the Training Program. After training, the majority of respondents no longer perceived themselves to be beginners, with only 6 (19.4%) rating themselves at this level. Participants were also asked to indicate their level of agreement with the statement, "Learning to use the computer is important." The difference in mean before training versus after, as presented in Appendix VI, is not statistically significant at the .05 level but is statistically significant at the 0.10 level.

The qualitative analysis provides additional insight. At the graduation ceremony, every participant overwhelmingly orally expressed gratitude. This overwhelming gratitude is echoed in the written statements (Appendix VII) and is indicative of a perceived lack of opportunity to participate in such programs. In written comments, one resident stated, "We need more programs in Chester like this so that we can be educated." Although job skills training is offered at the government sponsored "One Stop Shop," residents feel ownership of and a sense of accomplishment in their own Development Plan. The residents were able to learn in their own program, offered in their own familiar, comfortable, non-threatening environment, with their peers. Self-esteem and optimism on the part of the residents is evident, "I feel that the Program was full[y] success[ful] especially since the program is just getting started. I also feel with time and more recognition of the program, more people throughout the community will come to be a part of the program." This desire for greater participation demonstrates a sense of community, also evident in the statement, "Most of all I enjoyed helping people in my class with question[s] and problem[s]." An appreciation of forming links and partnerships was shown, "…we look forward to having an ongoing relationship w/[ith] staff and students."

It was evident from oral comments made at the graduation ceremony that community members gained not only technology skills, but an increased sense of accomplishment and self-esteem. Many of the participants commented that two worlds, differing racially, socio-economically, and technologically, were bridged. University student trainer comments focused on the meaningfulness of interacting and training the community members in a world very different and less fortunate than theirs. While the divide was narrowed in terms of computing skills, it is broadened in the sense that participants are now aware of their comparatively low level of knowledge. In written comments, one participant stated, "…I didn't know anything about computer[s], today I am a little more knowlegable [sic] about a computer and its ascess [sic]."

VI. DISCUSSION

This exploratory research, focusing on one case study of a community-based initiative, provided insight into the digital divide within the United States (Table 2). The demographic characteristics of the community members are consistent with those less technologically advantaged, as stated in Proposition 1. Previous research called for the examination of technology acceptance in different environments to identify broader environmental factors [Lee, Kozar, and Larsen, 2003]. The qualitative analysis showed the community residents have a history of struggling to attain what they need, showing broader environmental factors. Among these factors are a culture of failure, exploitive dependency by those ostensibly trying to make improvements, and isolation from mainstream society.

The implementation of the Assets-Based Community Development Model led to the formation of the community Development Plan. Included within this plan is enhancing the pervasiveness of technology. Some improvement in pervasiveness, addressed in Proposition 2, was made. Objective 1 in Sidebar 2 was achieved with the addition of 15 Pentiums in the Community Center. Internet connectivity, Objective 2, is available on a limited basis. Progress was made on Objective 7 by providing computers to participants, resulting in a presence in 17.1% of the homes

in WPHD, up from 0%, but none were connected to the Internet, precluding the achievement of Objective 8. Engaging the whole community, Objectives 3 and 8, remains challenging.

The qualitative analysis shows the Assets-Based Community Development Model, used by the community leadership, enabled recognition of threats to be overcome and necessary links and partnerships to be formed to secure resources and maintain them. Other factors contributing to an increased pervasiveness of technology were the presence of a champion, emergent leadership, word of mouth communication and the neighborhood grapevine, curiosity among residents not yet involved, participation in planning their own Training Program, increased community ownership of the program, and a sense of community. Although limited progress toward Proposition 2 was made, pervasiveness of computer technology is short-sighted. Also important is successful learning of computer skills, as stated in Proposition 3.

We can draw several conclusions about Proposition 3, computer learning results in narrowing the digital divide. Participants' initial observed anxiety stemmed from lack of knowledge and transformed into anxiety from recognizing they still must learn more. [Speier et. al, 1996]. Previous research shows the persistence of high anxiety levels after computer training [Leso and Peck, 1992; Marcoulides, Mayes, and Wiseman, 1995; Rosen, Sears, and Weil, 1993]. Speier et. al, [1996] found high anxiety before and after training ultimately results in poor performance, suggesting computer training should include a component which focuses on attitudes related to computer anxiety. Among participants, computer learning resulted in an increased perceived positive sense of control when using a computer. The participants felt a sense of accomplishment in achieving basic tasks and became more focused. Further, the participants' perceived self-concept in computing ability was enhanced, both in terms of increasing their positive self-concept and decreasing their negative self-concept in computing ability. These improvements are consistent with previous research which shows a decrease in negative reaction to computers and an increase in positive reaction to computers after training [Torkzadeh and Koufteros, 1993; Torkzadeh and Koufteros, 1994]. The participants expressed a desire to learn more, regarded others as less experienced, and wanted to be among the more advanced users. Previous research shows that training programs are more effective for participants with positive, as opposed to negative, attitudes toward computers [Torkzadeh, Pflughoeft, and Hall, 1999]. Finally, the perceived states of anxiety in computing situations were also improved in terms of decreased worry, reduced physiological symptoms of anxiety, and less distractibility in computing situations. However, participants did worry about not being able to keep pace with instruction. While the Training Program was effective in improving computer learning, participants' reported their emotional state of happiness declined.

The decline in perceived happiness may be attributable to the residents' recognition of a gap between themselves and the more technologically fortunate University student trainers. They realize they need to learn much more before such knowledge makes a difference in their lives, leaving their expectations unfulfilled. Nonetheless, participants overwhelmingly expressed gratitude for the opportunity to participate in the Training Program, as such opportunities were perceived as lacking. Designed with and for the community, the program thereby provided ownership and an environment conducive to learning. Participants were optimistic about the success of the program, but recognized the necessity to persevere in the struggle to overcome external threats, by forming links and partnerships, to sustain the momentum in computer use.

VII. CONCLUSION

The WPTA computer technology initiative benefited both the community members and the University student trainers. The benefits were not just educational and academic, but sociological and spiritual. As a result of these achievements, this program was nominated by the U.S. Department of Housing & Urban Development (HUD) to receive a "Best Practice" Award. Additional details of the program can be found in Figure 3 taken from on HUD's website (www.hud.gov/local/phi/WilliamPennTechnologyCenter.html) and in two newspaper articles [Hardy, 2000a and Hardy, 2000b].

The overwhelming gratitude expressed by the participants about the training program demonstrates excitement and eagerness to join the world of computers, which they viewed as important to future opportunities. Some participated in the program to, as one participant stated, "increase my knowledge and be a part of the Internet craze." Another participant stated, "It's a new millennium; I want to be able to keep up." She then indicated she had previously been a secretary at a travel agency and was told that she would have to learn more computer skills to be able to do the job. This participant, as did some others, wanted to improve their computer skills to seek employment or a better job. "I know absolutely nothing about computers, but I do know that they are now the way of the world. I want to learn about them to get a job and to pass on my knowledge to my family. It will help me in many ways. I'm very glad for this opportunity," stated another participant. As a result of the publicity of the program in the local media, Unity Center received some inquiries from prospective employers. However, many realized that this was just a beginning and that they had much more to learn, stating, "I feel that I can learn more about computers after this course," "I hope that I keep learn[ing] [the] computer," "I still want to learn," and "I am looking forward and can hardly wait for the next class to start." Some participants had specific skills in mind, as one stated, "I would like to set up and develop web pages," and specific software, "I would like to learn Front Page."

Drawing upon the definition of the digital divide presented in Section I, the divide was narrowed in the sense that individuals with ample opportunity to access information and communication technologies and the internet introduced their skills and knowledge to those whose previous opportunity was rare. These two groups were at considerably different socio-economic levels with a geographic distance, of 16 miles, amplified by the isolation of the City of Chester. While the technological, socio-economic, and geographic distances separated these individuals, they came together for several months, with input from local businesses including Computeach, Wyeth Pharmaceuticals, and law firms. Working together reduced the divide by bringing joy, appreciation, and a new understanding to all.

More can certainly be done to move toward a decrease in the digital divide. The challenge is to further knock down the barriers that exclude individuals. Although developing an information infrastructure is the basic building block, additional initiatives should be undertaken to connect those in poor and rural areas. The key factors in reducing the divide include access to technological resources, education and training, and sustained use, all advanced by a community organizing strategy, with links and partnerships to external entities, that gives community members ownership in their own future. Providing access to PCs and the internet through community centers is a necessary first step. Extending this first step, convenient and ready availability in homes and pervasiveness in the community enhances access. Education and training programs based on a community organizing strategy gives community members ownership in their own future. Sustaining strides made requires motivated community members dedicated to overcoming threats and to continuing the organizing strategy with the goal of community self-sufficiency. Serious challenges, including the isolation from mainstream society, exploitive dependency by those ostensibly assisting the community, and a culture of failure persist in maintaining the divide. Reaching out to more and more individuals and communities on the unfortunate side through further research is essential to understand and thereby reduce the divide.

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APPENDIX I. ANXIETY ABOUT GAINING INITIAL COMPUTING SKILLS

Factor 1. Anxiety about competence with computers				
	Before		After	
	M	σ	M	σ
Taking a test on computer competence	3.31	1.73	3.31	1.49
Working in a job that requires some computer experience	3.11	1.70	2.66	1.29
Getting error messages from computer	3.07	1.60	3.17	1.37
Teaching someone else about computers	3.48	1.64	3.52	1.30
Dealing with computer malfunctions	3.20	1.92	3.34	1.47
Being evaluated on computer competence μ	3.13	1.87	3.43	1.31
Learning about computers without structured guidance	3.14	1.90	3.45	1.15
Factor 1	3.22	1.46	3.28	.79
Factor 2. Anxiety about handling computer equipment				
	Before		After	
	M	σ	M	σ
Using computerized equipment	3.38	1.86	3.31	1.29
Printing off documents	3.17	1.77	2.63	1.62
Using a mouse	3.16	1.72	2.77	1.65
Presenting work completed on a computer	2.90	1.84	2.90	1.50
Factor 2	3.19	1.54	2.90	1.32
Factor 3. Anxiety about receiving feedback on computing skills				
	Before		After	
	M	σ	M	σ
Being taught how to use a computer by a work colleague	2.96	1.40	2.83	1.79
Getting feedback from work colleagues on my computer skills	3.30	1.35	3.04	1.90
Collaborating with a friend while learning	3.34	1.61	3.10	1.84
Collaborating with a work colleague while learning	3.31	1.58	3.00	1.76
Factor 3	3.24	1.10	2.98	1.57
Factor 4. Anxiety about learning about basic computer functions				
	Before		After	
	M	σ	M	σ
Taking a course in a computer language	3.76	1.24	3.42	1.73
Learning computer terminology	3.45	1.33	3.32	1.59
Reading a computer manual	3.13	1.36	3.23	1.59
Learning how a computer works	3.45	1.65	3.06	1.46
Learning the operating system of a computer	3.66	1.34	3.40	1.92
Learning a new computer application	3.41	1.48	3.17	1.77
Factor 4	3.47	.88	3.26	1.18
Rating scale: 1. Very much, 2. Much, 3. A fair amount, 4. A little, 5. Not at all				

Measure Used: Computer Anxiety and Learning Measure [McInerney et al., 1999].

APPENDIX II. SENSE OF CONTROL WHEN USING A COMPUTER

Factor 5. Positive sense of control				
Questions	Before		After	
	M	σ	M	σ
I can master the computer	3.50	.86	2.61	1.69
I know I can do it	3.97	1.14	3.27	1.66
I will be able to get the computer to do what I want	3.68	1.28	3.07	1.68
I will understand what to do	3.87	1.38	3.23	1.63
I feel in control of what I have to do	3.83	1.21	3.20	1.65
I feel sure of my ability with computers	3.94	1.15	2.79	1.80
Factor 5	3.79	.97	3.06	1.49
Factor 6. Negative sense of control				
Questions	Before		After	
	M	σ	M	σ
Everyone else but me knows what they are doing	2.63	1.65	2.19	1.22
People will notice if I make a mistake	3.29	1.68	2.42	1.09
I'm afraid I'll wreck the computer program	1.79	1.50	1.72	1.39
What if I hit a wrong key?	2.97	1.70	2.10	1.01
I'm too embarrassed to ask for help	1.39	.79	1.57	1.19
I might break the machine	1.67	1.42	1.48	1.29
Factor 6	2.36	1.08	1.19	.85
Rating scale: 1. Not at all, 2. A little, 3. A fair amount, 4. Much, 5. Very much				

Measure used: Computer Anxiety and Learning Measure [McInerney et al., 1999]

APPENDIX III. SELF-CONCEPT IN COMPUTING ABILITY

Factor 7. Positive self-concept in computing ability				
	Before		After	
	M	σ	M	σ
I am very confident working with computers	3.03	1.82	2.26	1.34
I can get good grades in computer courses	2.57	1.65	1.97	1.27
I am confident storing important information	3.13	1.80	2.07	1.29
I am sure I could solve computer problems	3.13	1.63	2.13	1.14
I can help others solve computer problems	2.57	1.79	2.00	1.04
I am sure I can help others to use the computer	3.03	1.82	2.07	1.29
Factor 7	2.93	1.47	2.10	.92
Factor 8. Negative self-concept in computing ability				
	Before		After	
	M	σ	M	σ
I am no good with computers	4.38	1.27	2.80	1.85
I am not the type to do well with computers	4.61	.88	2.87	1.71
I think using a computer would be very hard for me	4.29	1.16	2.68	1.83
I don't think I could handle a computer course	4.47	1.22	2.94	1.84
I avoid using computers because I am not confident	4.71	.82	3.35	1.74
Factor 8	4.48	.66	2.92	1.55
Rating scale: 1. Strongly agree, 2. Agree, 3. Unsure, 4. Disagree, 5. Strongly disagree				

Measure used: Computer Anxiety and Learning Measure [McInerney et al., 1999]

APPENDIX IV. STATE OF ANXIETY IN COMPUTING SITUATIONS

Factor 9. Worry				
	Before		After	
	M	σ	M	σ
Threatened	2.74	1.63	1.58	1.12
Insecure	3.16	1.68	1.74	1.09
Helpless	2.40	1.57	1.42	.72
Worried	2.90	1.58	1.39	.62
Rattled	2.39	1.61	1.71	1.04
Anxious	3.32	1.49	2.57	1.43
Factor 9	2.83	1.20	1.73	.48
Factor 10. Happiness				
	Before		After	
	M	σ	M	σ
Happy	1.87	1.31	1.45	1.06
Comfortable	2.70	1.60	1.97	1.22
Secure	2.06	1.44	1.81	1.30
Relaxed	2.42	1.43	1.87	1.34
At ease	2.81	1.68	2.35	1.50
Content	2.41	1.57	1.94	1.37
Factor 10	2.39	1.17	1.90	.83
Factor 11. Physiological symptoms				
	Before		After	
	M	σ	M	σ
Nervous stomach, “butterflies”	2.10	1.30	1.68	1.08
Hot and sweaty	1.84	1.19	1.43	.77
Heart palpitations	2.42	1.71	1.42	.67
Dry mouth	2.13	1.31	1.52	.81
Sweaty palms	2.13	1.50	1.77	1.20
Factor 11	2.12	1.10	1.56	.68
Factor 12. Distractibility				
	Before		After	
	M	σ	M	σ
Lack of concentration	2.97	1.56	2.00	1.07
Distracted	2.48	1.41	1.68	.79
Interference from irrelevant concerns	2.37	1.40	1.71	.90
Intrusive thoughts	2.52	1.48	1.93	1.11
Wandering attention	2.81	1.54	1.97	1.11
Factor 12	2.65	1.10	1.85	.69
Rating scale: 1. Never, 2. Almost never, 3. Sometimes, 4. Almost always, 5. Always				

Measure Used: Computer Anxiety and Learning Measure [McInerney et al., 1999]

APPENDIX V. SUMMARY: BEFORE AND AFTER PAIRED SAMPLES T-TEST

		Paired Differences			T	df	Significance. 2-tailed
		Mean	σ	Std. Error Mean			
Anxiety about Gaining Initial Computing Skills							
Factor 1	Competence with computers-Before Competence with computers-After	-.0595	1.67865	.30648	-.194	29	.847
Factor 2	Handling computer equipment-Before Handling computer equipment-After	.3011	2.18048	.39163	.769	30	.448
Factor 3	Receiving feedback on computing skills-Before Receiving feedback on computing skills-After	.2611	2.02081	.36895	.708	29	.485
Factor 4	Learning about basic computer functions-Before Learning about basic computer functions-After	.2081	1.17375	.21081	.982	30	.332
Sense of Control When Using a Computer							
Factor 5	Positive sense of control-Before Positive sense of control-After	.7269	1.29304	.23224	3.130	30	.004*
	Negative sense of control-Before Negative sense of control-After	.4484	1.26806	.22775	1.969	30	.058
Self-Concept in Computing Ability							
Factor 7	Positive self-concept-Before Positive self-concept-After	.8237	1.79965	.32323	2.548	30	.016*
Factor 8	Negative self-concept-Before Negative self-concept-After	-1.5661	1.30801	.23493	-6.666	30	.000*
State of Anxiety in Computing Situations							
Factor 9	Worry-Before Worry-After	1.0968	1.13775	.20435	5.367	30	.000*
Factor 10	Happy-Before Happy-After	.4925	1.32823	.23856	2.064	30	.048*
Factor 11	Physiological symptoms-Before Physiological symptoms-After	.5613	1.07507	.19309	2.907	30	.007*
Factor 12	Distractability-Before Distractability-After	.7952	1.04772	.18818	4.226	30	.000*

* significant at .05 level of significance

APPENDIX VI. COMPUTER EXPERIENCE AND THE IMPORTANCE OF LEARNING TO USE THE COMPUTER

How would you rate your computer experience?	Before		After	
	Freq.	%	Freq.	%
Beginner (no experience or games only)	24	77.4	6	19.4
Intermediate (familiar with one application only such as a word processor or spreadsheet)	2	6.5	14	45.2
Advanced (familiar with a number of applications)	5	16.1	11	35.5
	M	σ	M	σ
Learning to use the computer is important	1.39	1.09	1.71	1.40

	Paired Samples Test Paired Differences			t	df	Sig. (2-tailed)
	Mean	σ	Std. Error Mean			
	-.32	1.01	.182	-1.77	30	.086

Rating scale: 1. Strongly Agree, 2. Agree, 3. Unsure, 4. Disagree, 5. Strongly Disagree

Measure used: Computer Anxiety and Learning Measure [McInerney et al., 1999]

APPENDIX VII. WRITTEN PARTICIPANT COMMENTS AT THE COMPLETION OF THE PROGRAM

Thank you for the program. [It] really help[ed] me.
I enjoyed this program very much. It was very nice being in the computer class. I got a chance to learn so much about computers and the classes were challenging. And the instructors were pleasant. [T]hey really made learning enjoyable. I am looking forward and can hardly wait for the next class to start.
The computer training program was an experance [sic] of a lifetime for me[.] [I]t was not as hard as it see [med]. [o]n[c]e you get the understanding of what it was all about it was easy and with teacher from [in the] name of jesus church program it was a challenge for me and joy to be in the computer training program[.] [i]t really broaden[ed] my mind and really help[ed] me to be ready for the computer world. [y]our[s] truly e_____ m_____
I would like to work with front page a whole lot more.
I feel that the program was full[y] success[ful], especially since the program is just getting started. I also feel with time and more recognition of the program, more people throughout the community will come to be a part of the program. I would like to thank villanova students for their time and dedication.
Before this program I knew nothing about computers. Now, at the end of this class I'm more experienced and more confident about using them. The Villanova students have taught us so much and I know I speak for the William Penn Center and Jesus Christ Center when I say thank you for taking time out of your busy schedule to come down here and teach us. One of many skills we know you all posses. I hope that cute Jay returns.
Thank you for the computer program. It help[ed] me learn about computers.
I R_____ L B_____ would like to thank everyone for helping me to learn about the computer. I really didn't think that could learn so much about computer. The students were so friendly, pleasant and concern[ed] about our learning the computers. I pray that this program carry on so it can help others as much as it help me and also my Husband.
We would like to thank the staff and the Villanova students for their support of this program. And appreciate all their dedication and hard work and we look forward to having an ongoing relationship w/[ith] staff and students. And are eager to learn more (especially Front Page).
I feel the program was successful.
I want to thank all the people who made the computer classes possible. I knew nothing about computers and now I can do some stuff on it.
I would have liked to work with Front Page and the Internet.
I would like to set up & develop web pages.
The Computer Program was a great experance [sic] for me. In the program I learn how to type, I learn a great deal about the computers. It was a joy to get all this information about the computer. I didn't know anything about a computer, today I am a little more knowlegable [sic] about a computer and its ascess [sic]. I want to thank you very much for your help. M_____ M_____
I really enjoyed the computer class.
Learning about computers was a joyful experience. It was really nice of the Villanova students to help us. I feel that I can learn more about computers after this course.
I thought it was a good experience and to practice my computer skills. Most of all I enjoyed helping people in my class with question[s] and problem[s]. It is a course I would not mind doing over if I had to.
I cam[e] here to learn and I did. I still want to learn.
I enjoyed the classes, However, some of the instructors were not as thorough as others. I would like to have followed a designated curriculum as opposed to being asked what do you want to learn. I did finish the program knowing more than I did when I started.

It was a joy.
Hi, my name [is] N____ C____. I "like to learning computer I" [e]njoy it because I" would like to learn more about computer[.] It would help me out with problem[s] that I have with money and other problem[s] in my life. But I hope that I keep learn[ing] [the] computer. I real[l]y loved it.
You are never too young or too old to learn about modern technology. We had great instructors. I took my computer class at In the Name of Jesus Christ Church on Tuesday & Thursday night[s]. It was a joy to learn & to look for a job in using the computer. I want to take time out to thank Villanova and associates for improving my skills. We need more programs in Chester like this so that we can be educated. Thank you
I injoy [sic] it… I realy [sic] loved it.
Thank you for all you [have] done.
We need more programs like this to work on the computer. The Villanova kids were really nice. Maybe they learned from us to[o].
I would like to learn Front Page.
Personally, I'm still interested. I don't want to quit.
I like to thank all the girl and boy from Vilinova [sic]school for all their help and taking time out to help us learn how to work computers. I hope this help there [sic] grade. They earn[ed] it.

LIST OF ACRONYMS

CALM	Computer Anxiety and Learning Measure
CHA	Chester Housing Authority
G8	The Justice and Interior Ministers of the Group of Eight [the United States, Japan, Germany, Britain, France, Italy, Canada and Russia]
HUD	U.S. Department of Housing & Urban Development
VITAL	Villanova Institute for Teaching and Learning
WPHD	William Penn Housing Development
WPTA	William Penn Tenant Association

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