Digital Citizenship: Expanding Information Technology Literacy with a Service-Learning Approach
Evaluation Report
August 2003 to July 2004

The Digital Citizenship: Expanding Information Technology Literacy with a Service-Learning Approach grant is funded by the National Science Foundation and awarded to Drake University. This project is a collaboration between Drake University and Iowa State University's Research Institute for Studies in Education (RISE). Its primary goal is to work in partnership with the Drake community to identify IT skills needed by its citizens that Drake undergraduate students can provide as part of their academic pursuits.

This report assesses program effectiveness and synthesizes the data in the form of policy recommendations. Focus groups with workshop participants and Drake students, structured citizen surveys, and biannual interviews with the Lab Coordinator, Teresa Larson, were used to evaluate program implementation and effectiveness. RISE has provided assistance in planning and implementing the program, survey construction and dissemination, focus group evaluation, and the collection of quantitative and qualitative data. The researchers conducted numerous activities to support these goals between August 1, 2003 and July 31, 2004.

The researchers have fulfilled the research component of the grant by publishing results from a digital citizenship and technology survey administered to a nationally representative random sample; in addition, the research team has published findings from Drake student reflection papers, participant surveys, and focus group analysis. Research

findings have been presented at conferences and published in refereed journals, and additional presentations and refereed publications are forthcoming or in review; copies of all manuscripts that have been submitted to scholarly journals are attached (Appendix A).

EVALUATION OF ACTIVITIES RELATED TO RECRUITMENT OF FALL 2003 PARTICIPANTS

Interview with Teresa Larson: Fall 2003 Reflections

In the summer and fall of 2003, Larson led outreach to underserved community members and implemented the service-learning curriculum designed to disseminate ITL. In collaboration with Drs. Shulman and Beisser, Larson co-taught one class per semester at Drake University and had full responsibility for the fieldwork laboratory that implemented the service-learning treatment with the served community.

The Coordinator also was given some inaccurate information about the potential client base. Since the 2003 client base did not provide sufficient numbers to sustain the project's goals, this created the need to "do a little bit more recruitment in different kinds of ways for our clients." In addition, the multiplicity of sites reduced the number of clients served because of "a little bit of confusion on the part of the clients as to where they were headed and what site they would be attending," Larson stated. This year the project reached "a higher percentage of the under-resourced group ... and people of color," stated Larson. Larson said that the project was able to reach more people of color and immigrants, but it continued to struggle with building a relationship with the churches and Drake community groups. According to Larson, computer training was provided to clients at five satellite sites, including the Central Senior Center in Des Moines, Iowa. Of persons who completed

surveys in fall 2003 and spring 2004, 116 participated in the workshop training this year. In comparison to last year, this was a decline of 42 members served.

EVALUATION OF ACTIVITIES RELATED TO PROGRAM IMPLEMENTATION

Interview with Teresa Larson: Fall 2003 Reflections

Due to building site changes and recruitment issues, the fall 2003 workshops faced some challenges. When defining her role in the project, the Coordinator said she originally predicted that it would be 50% teacher/50% facilitator. Larson commented that the additional time required for problem solving "tends to shave off the time I can devote to what I think should be a quality experience for both our community members and our Drake students." She stated that the project would have a greater benefit if she were able to spend more time on the planning/facilitating side and "preparing the students for the experience."

However, in the fall 2003 term, 60-70% of Larson's time was spent "on logistics." The building where the workshops were conducted originally was no longer available. The proposed location for the workshops was "in a building that had no identifiable front door," "had no real good handicap accessibility," "absolutely no parking," and planned construction. Two and a half weeks prior to the first laboratory session, Larson discovered the construction and accessibility issues and scrambled to find alternative sites.

The best solution was to secure "off-campus sites for our workshops," stated Larson. Larson reflected on the enthusiastic welcome from the directors of the senior centers where the workshops were held. She stated, "The site directors were absolutely thrilled. They had

these little computer labs of two to four computers.... They were just very, very, very pleased that we were coming."

During her outreach, Larson reported that elders at an east side senior center were "put off" that the Digital Divide Project was not coming to them. This semester the project used their center as a workshop site. Larson indicated, "They only had two computers, but they had a waiting list.... So, there is a need." Elders at this specific location felt devalued, as less affluent members of the Drake community. The project was able to build a bridge to a segment of the Drake neighborhood that was marginalized and "forgotten."

Project Impact. The consequences of logistical issues had a significant impact on the fidelity of the data collection and the quality of client learning; by the same token, it promoted service-learning, as students were challenged to lead and "help shape the project." The multiplicity of sites resulted in some client absenteeism and in a lower rate of survey completion. Since Drake students were responsible for administering the surveys to their clients, inconsistencies were common (e.g., variation in survey administration and collection). Larson noted, "Although I did my best to drill the Drake students on the protocol, it was sloppy."

Larson was stretched thin as she negotiated five different sites for a given lab session. Therefore, she was unable to provide a cohesive framework and curriculum that reflected the "goals of fluency and informational technology ... in terms of {the} grander goals of creating digital citizens." In addition, Larson acknowledged that workshop decentralization prevented her from knowing the scope of the curriculum, the application of teaching strategies, and the development of student/client relationships. However, when she dropped by the various sites, Larson said that clients and students were "engrossed" and "on-task." Through

evaluating students' reflection papers, Larson believed that clients had made "good progress" in their learning. For instance, an immigrant client with limited English skills wanted to learn how to use e-mail. Larson indicated, "This was a person that felt isolated in the world, so the fact that she [Drake student] was able to teach that particular strategy to him was very liberating in his life, and was very meaningful to him." As a result of the workshops, Larson indicated that client attitude toward college students and the nation's future leaders was much improved.

Logistical problems and client absenteeism had some unintended positive consequences. It became "a purer service-learning experience." Students were encouraged "to take ownership" of the project and "make some independent decisions." Students reduced client absenteeism by phoning their clients prior to their first session. Larson stated, "The students came up with the idea of phoning the clients three or four days in advance, and we did it for the last session; and they found it to be meaningful." Larson shared that students also wanted to do the prescreening of clients and match a student with a particular client's interest and skill level.

Larson recounted that students had to solve hardware problems. For instance, a computer at the Central Senior Center frequently malfunctioned. Students talked to the director and arranged for the use of another computer. Students were in a position to have the "opportunity to demonstrate that they were independent thinkers, and they had to work as small team members at these various sites," stated Larson.

Student Involvement. Due to the extra pressures faced this semester, early on, Larson orchestrated "team building exercises" with Drake students. These activities demonstrated that every student contributed an important skill and played an integral role in

the project's success. Larson showed that the service-learning experience would further their career development. A positive outcome of the logistical difficulties was that Drake students had to take leadership roles. Larson said, "They absolutely had to. They had to be their own troubleshooters. They did have my cell phone number, but they didn't call it as often as they could have." Four student leaders emerged. It appeared to Larson that leadership was a "natural extension" of their personalities; they shared excellent communication skills and a strong service-orientation. Larson said, "The student leaders emerged as people who could help define the problem, look at possible solutions, and then lead that person to it." For the other students, Larson noted positive changes as well. In their reflection papers, students generally suggested that the class helped them realize that people were being left behind in the digital age and/or that their actions could help alleviate the problem. For the most part, students got much more out of the class than "one-credit of grade." In sum, Larson said, I thought their interest was strong. I didn't have ... any aloof students. You couldn't be."

This term was not without its challenges, as the broader goals of digital citizenry and IT took a backseat while the Coordinator dealt with the more practical elements of juggling five workshop sites. In addition, the integrity of the research was compromised, as survey administration and collection was less standardized. Nevertheless, clients walked away with stronger computing skills; students made a valuable contribution and received much more than one-credit of grade in return, and the project adapted to the needs of its constituents.

Spring 2003 Workshop Attendee Focus Group Results

Iowa State University sponsored a focus group to talk with spring 2003 computer workshop participants. Ten senior citizens participated in a focus group held at the Central Senior Center in March 2004 (summary attached). Participants were randomly selected from a list of workshop attendees; the participation rate was 40% of those who were invited. Senior citizens attended the workshop to learn about basic skills, computer terminology, e-mail, search engines, privacy issues, scanners, and digital cameras.

Seven of the 10 participants were very pleased with the course. Others stated that they were "grateful" to have taken the course and found it "extremely helpful," "interesting," and "real good." Eight of the ten participants were "very impressed with the students at Drake." Another participant commented, "They [Drake students] didn't make us feel ... stupid." One participant shared, "If we asked her [a Drake student] a question that she couldn't answer, she went home and looked it up on her computer; and then came back with the answers for us at the next session." One of the participants commented on a "side bus." The participant said, "In my head, I could just see the guy who ran the grocery store there in Walton, who's mounted on his motorcycle with a little side arm." Participants discussed the learning challenges facing older persons. Six participants made specific reference to difficulty with learning about IT and retaining the information. One participant said, "People like we older folks, it takes a while for it to soak in."

Five participants shared that they wanted to learn more about computers. After the conclusion of the workshops, participants still wanted more training. For instance, three participants wanted to learn more about Microsoft Word. One person wanted to know how

to complete a mail merge. Two people did not feel confident with their Internet search capabilities. Four people wanted to learn about the recreational uses of the computer and the Internet. For instance, playing music, using a scanner, and downloading pictures from a digital camera were among the areas of interest. There was a common sentiment that more computer workshop sessions were needed to improve their computing skills. One participant said, "We could have used a lot more time. But, all in all, I was thankful for what they offered us, free of charge." One participant recommended "a continuing course for seniors."

Overall, seniors' comments on their workshop experiences were positive, with seniors being satisfied with what they had learned, feeling less fearful about IT, and becoming more comfortable with computers. Most seniors expressed gratitude for having the opportunity to attend a free computer course. Half of the participants specifically said that they wanted more computer training. Written materials were most consistent with participants' learning style. Most found the student instructors knowledgeable, cordial, and patient. Improvements often centered on a core curriculum, an increased number of sessions, and identification of client skill levels. All in all, seniors developed new IT skills and enjoyed their Drake student/instructors.

Fall 2003 Workshop Attendee Focus Group Results

Six senior citizens who attended the fall 2003 workshops participated in a focus group discussion held at the Central Senior Center in June 2004 (summary attached). The participants were randomly selected from a list of workshop attendees. Twenty-two

participants were mailed a letter of invitation; the participation rate was 27% of those who were invited.

For most participants, expectations revolved around learning basic skills. Participants said they wanted to use the Internet (e.g., genealogy, business website, etc.), and e-mail, and to learn about deletion and mouse functions. Currently, five of the six respondents use the computer. They reported using e-mail, Microsoft Word, and Access, as well as playing games. For the most part, they attributed their technological literacy to assistance from others in their social network—not the computer workshop.

Participants recommended several changes to the workshop structure. All participants related that the instruction must be geared to the skill level of the client. Another participant said, "My complaint is that they had us tell them what we wanted to learn, but they never addressed that." This participant recommended a client survey of computer applications, so instruction could be targeted to needed areas. One participant shared that "not all the computers were operable." Participants suggested that for seniors to learn more effectively, homework, multiple weekly sessions, and skill level should be addressed.

The benefits and downfalls of intergenerational instruction were discussed. Several complained that instructors went "too fast." One participant said, "I didn't learn anything. I didn't know what a cursor or mouse was. I didn't know how to turn it on." She said [Drake student], "'Push this, this, and this,' but I couldn't follow fast enough." Two participants commented on the same student, and shared that "he did a fine job."

Participants discussed how information technology would impact their lives. One participant said, "It is all getting to an electronic stage that we have not all been into, until it has been thrown at us in these later years. Now, if you don't have just a little bit of computer

experience, or you don't speak a little bit of Spanish, you have a problem." When asked whether the Internet is an appropriate forum for politics, one person advocated on-line voting. Three people were concerned about voting scams or confidentiality.

Attitudes about the computer workshop were mixed. A few were very satisfied with their learning, while several others were disappointed that Drake student instructors did not adapt their teaching style to client needs. Prior to the workshop, several did not know how to turn a computer on or open a computer application. Afterward, most were using computers. Improvements often centered on more weekly sessions and classes offered for different skill levels. Half argued that older people should be offered free computer training, while other perspectives were based on skill level, equality, and disability.

Fall 2003 Workshop Attendee Survey Results

Computer workshop attendees were asked to complete a survey prior to the computer training session. Teresa Larson, Workshop Coordinator, and Drake students conducted the administration and collection of the baseline surveys completed by 56 fall 2003 workshop participants.

Background Information. As reported in Table 1, over half of workshop participants were female (53%). Nearly two-thirds of respondents were Caucasian (61%); 20% were African American; Asians and American Indians represented 7%; and 12% of respondents did not provide information. Less than half of respondents (45%) were over 70 years of age, 27% 61-70 years, 12% 51-60 years, 11% 21-50 years, and 5% did not respond. The majority were married (50%), while roughly one-third were single (16%) or widowed (16%). Over

ten percent (11%) were divorced, and 7% did not provide relevant data. Most participants owned an apartment or home (61%) or rented an apartment (23%).

Table 1. Background Information (Wave 1) (*n* = 56)

	n	%
Gender		
Female	30	53%
Male	24	43%
Missing	2	4%
Current Age Range		
21-30 years	2	4%
31-40 years	0	0%
41-50 years	4	7%
51-60 years	7	12%
61-70 years	15	27%
Over 70 years	25	45%
Missing	3	5%
Race		
African American	11	20%
Asian	1	2%
Caucasian	34	61%
American Indian	3	5%
Missing	7	12%
Marital Status		
Single	9	16%
Divorced	6	11%
Married	28	50%
Widowed	9	16%
Missing	4	7%
Residential Status		
Rent apartment	13	23%
Rent house	2	4%
Own apartment or house	34	61%
Shared living apartment	1	2%
Shared living house	3	5%
Missing	3	5%

Computer use. Thirty-nine percent of respondents reported using a home computer (Table 2). Twenty-one respondents (38%) had never used a computer, 10 (18%) had used a computer for less than 1 year, 14 (25%) for 1-5 years, 3 (6%) for more than 5 years, and 8 (13%) failed to provide data.

Of the 56 participants surveyed in the fall of 2003, 47 were sent a follow-up survey; 9 of the workshop attendees did not provide complete names or addresses. Fifteen participants provided usable responses to the follow-up questionnaire. The response rate was 32%.

Table 2. Computer use (Wave 1) (*n* = 56)

	n	%
Currently use a personal computer at home	20	39%
Years using a computer		
Never used	21	38%
Less than 1 year	10	18%
1-5 Years	14	25%
6-10 Years	0	0%
11-15 Years	1	2%
16-20 Years	2	4%
Missing	8	13%

Statistically significant changes were noted in participants' mean level of e-mail skill (Table 3). Prior to the workshop, participants indicated that they had limited skill with e-mail (mean = 1.5). The post-test results suggested that participants had increased their skill significantly (mean = 2.3). In addition, participants' desire for Internet skill and training decreased significantly. Prior to the workshop, participants strongly desired Internet skill (mean = 3.5). Higher values indicate respondents improved their computing skill.

After their workshop experience, participants reported significantly less desire to learn more about the Internet (mean = 3.1). Furthermore, participants were significantly less interested in Internet training (mean decrease = 0.9). In addition, they expressed less support for the statement that people without computers could benefit from IT training (mean decrease = 0.3). Effect sizes were robust, so we can conclude that the magnitude of the differences was noteworthy. The workshop curriculum resulted in appreciable increases in senior citizens' Internet and e-mail proficiency that in turn reduced their IT needs. This suggests that the computer workshop was beneficial and increased IT proficiency. There were no other statistically significant findings in computer application and computer hardware skills, attitudes toward technology, or digital government variables.

Table 3: Comparison of statistically significant pre-test and post-test scores for fall 2003 clients (*n* = 15)

Groups	Pre-test			Post-test		Mean Change	*t*	Effect Size[+]
	N	Mean	SD	Mean	SD			
E-mail skill	13	1.5	0.8	2.3	1.0	0.8	2.3*	.81
Desire Internet skill	11	3.5	0.6	3.1	0.9	-0.4	-2.1*	-.70
People without computers need training	11	3.3	0.7	3.0	0.6	-0.3	2.1*	-.86
Desire IT training	11	3.7	0.5	2.8	1.0	-0.9	-2.3*	-.87

* significant at $p \leq .05$; ** significant at $p \leq .01$.
[+] Effect size was measured as mean change divided by the standard deviation of the change

Fall 2003 Student Focus Group Results

The perspectives of eight Drake students were evaluated in a focus group held at Drake University in December of 2003 (summary attached). Participants discussed teaching strategies, digital citizenship, and needed improvements in workshop structure. All students

reported having a volunteer background, and over half took the course to serve community needs. At first, many students were concerned about what questions seniors would have. Student confidence grew when the instructional needs centered on basic computing skills. Several teaching strategies were found to be successful, including: analogy, good listening skills, application of concepts, and client note taking. There was a need to be attentive to seniors and to teach at a pace that allowed them to "take it all in." It was noted that making it relevant to clients' lives was critical to maintaining interest.

Participants reported thinking more critically about what they were getting out of the experience and looking for creative ways to fix problems. One student said, "It's a huge step from the beginning of the semester to the end of the semester, just being out in the world working with people who have more or less knowledge than you and are in a different set of life {circumstances} than most of us came from." Another student noted the importance of the reflection process when doing service work.

Participants provided many suggestions for improving the structure of the workshops to provide a better foundation of FITness for their clientele. All students agreed that more than two sessions were necessary for the seniors really to benefit from the experience. They also felt that multiple sites created tensions for the project in terms of client learning. For students to prepare a client-centered curriculum, all students believed that a prescreening assessment was essential and would lead to more productive sessions.

When asked what digital citizenship benefits seniors gained from the service-learning sessions, it was expressed that in most cases they gained basic computer skills and enjoyed the interpersonal interaction. One student indicated that the goal of the workshop was to bridge the digital divide, but found that many seniors wanted companionship instead.

Another student added, “To become a digital citizen, you have to start from somewhere. So, we’re just building the ground {work} for certain people to get to that point. But with other people, we can actually help them become more involved.” However, a student commented, “I realized that with income or whatever else has a big impact on whether or not you can be a digital citizen.... Through this lab, ... I’ve learned how to possibly go out and maybe make a difference.”

In conclusion, the participants were pleased with their service-learning experience. They felt some groundwork had been laid and interest sparked in their clientele. Most felt capable of teaching technology and utilized successful teaching strategies. The students recommended prescreening of skills, student/client groupings, and a pre-session telephone call between student and client. While all students had prior volunteer experience, they felt this class helped them evaluate and reflect on their service experience and their future engagement. Clients did not make major gains in bridging the digital divide because two sessions were inadequate to meet these goals. Overall, students believed that seniors acquired computer skills and an introduction to digital citizenship. In addition to their new awareness, students gained interpersonal skills, developed relationships, and enhanced their textbook learning.

Interview with Teresa Larson: Spring 2004 Reflections

In a July 2004 interview with Teresa Larson, she reflected on spring 2004 program implementation, assessed program impact, and offered design changes that would strengthen the project’s goals. By spring, the computer lab was offered in one site that met the needs of

the clientele and Drake students. It made a tremendous difference in the learning that took place. Larson said, "We had a comfortable computer lab that was handicap accessible, environmentally controlled, with working equipment." Larson reported that customer service was better this term. In addition, clients could participate in three sessions instead of two. Larson believed that preparing "the [Drake] students to be better interviewers" paid off. She taught them how to assess the mental and physical capacities of their clients and focus their discussion on "finding out what they [clients] needed." Larson suggested that advertising "different courses at specified levels" was not practical in the context of the service-learning lab because the IT sophistication of the Drake students was not predictable from semester to semester. Instead the Lab Coordinator adapted by having Drake students interview the client and personalize the training.

Larson reflected on the fact that several spring 2004 Drake students were disgruntled with the service-learning preparatory class sessions. In previous semesters, Drake students had failed to work as a team and to internalize that service-learning "goes beyond just teaching and individual." Larson offered that an assessment of team building skills might facilitate the learning process.

Larson advised that the "semester model" was fraught with difficulty juggling the requirements of service-learning with "community needs." She said, "If one is to maintain the semester model, then I think the class would need to meet more times and have more credit tied to it. I believe that very strongly." She advised that students would be more apt to "buy in" if they were helping to define the problem and felt that they were meeting the needs of the community. She indicated that communities "all have their own social structures and ways of communicating. It is presumptive on my part to think that we know how the

information is best delivered." Getting the community to "buy in" requires a long-term commitment of time and resources and demonstrating that it is a key player in framing the problem and working toward solutions. To facilitate goodwill in the Drake community, she recommended a letter to clients "thanking them for their participation" and listing "available resources" for additional training.

Larson concluded that, in spite of the challenges the project faced, "there is a group of Drake University students who will view the world differently as a result of having been involved in this project." She estimated that roughly 75% of participating students now were in tune to issues of societal inequality. It is hoped that this experience will play out for the "greater social good." Larson also believed that nearly two-thirds of clients now could e-mail their family members. She shared that clients were less "isolated" and "disadvantaged." Hopefully, the project enabled them to strive for greater digital equity and community involvement.

Spring 2004 Workshop Attendee Focus Group Results

Ten senior citizens who attended the spring 2004 workshops participated in a focus group in June of 2004 (summary attached). The participants were randomly selected from a list of workshop attendees. Twenty-four participants were mailed a letter of invitation; the participation rate was 42% of those who were invited.

Participants said they attended the computer classes to learn how to use the Internet and e-mail, and to play games. After the computer training, participants shared they used e-mail and the Internet, played games, conducted medical research, prepared a yearbook, and

did word processing the most. At the present time, nine of the ten participants use a computer.

Participants were asked whether there were any barriers (e.g., skill, generational, etc.) between Drake students and workshop clients. They resoundingly gave positive reviews of the Drake students. One person said, "She met us in the parking lot, walked us to the classroom, and took us back to our cars. All this personal attention was unexpected." A participant commented, "You felt almost like you were part of their family." Many said that the computer workshop was enjoyable and that they learned new technological skills. Participants reported that Drake students demonstrated how to use the technology and answered any lingering questions. It was also reiterated that Drake students were understanding and used appropriate teaching methods.

Nevertheless, several related that they needed "more lessons and time" to be proficient with information technology. Although a few people brought their digital citizenship manuals with them, several wanted better documentation of basic computing concepts. One participant suggested that homework would aid in learning. In addition, it was recommended that computer classes be offered for different skill levels. They offered suggestions for improving the workshop, such as skill-level placement, step-by-step written materials, and homework.

Many had not overcome a fear of technology. One person related a fear of digital cameras, another a concern about camera phones, and yet another was adjusting a car mirror and activated the OnStar system. Nevertheless, many were still using computers and reported accessing the Internet and e-mail. Participants reported that Drake students were in

tune to their learning and interpersonal needs and that they were very pleased with the computer workshop training. Many inquired whether the classes would be offered again.

Spring 2004 Workshop Attendee Survey Results

Computer workshop participants were asked to complete a baseline survey prior to the training session. Teresa Larson, Lab Coordinator, conducted the administration and collection of the surveys from the 60 spring 2004 participants.

Background Information. According to baseline results, over half of the 60 workshop participants were female (Table 4). The majority of respondents (60%) were over 70 years of age, 26% 61-70 years, 7% 51-60 years, 5% 41-50 years, and 2% of ages were missing. Eighty-six percent of seniors reported Caucasian racial origins, 2% African American, 3% Asian, 2% Hispanic, 2% American Indian, 3% multiple racial origins, and 2% did not provide data. Over half (60%) were married, 22% widowed, 7% divorced, 10% single, and 1% did not report martial status. The vast majority (81%) of participants owned an apartment or house with 11% reporting apartment rental, 2% shared living, 4% other arrangements, and 2% did not report housing. Over one-fifth (22%) of respondents had income of $50,000 or more, 15% $40,000-49,999, 12% $30,000-39,999, 20% $20,000-29,999, 18% $10,000-19,999, 5% $5,000-9,999, 2% below $5,000, and 6% did not provide financial information.

Table 4. Background Information (Wave 1) (*n* = 60)

	n	%
Gender		
Female	31	52%
Male	29	48%
Current Age Range		
41-50 years	3	5%
51-60 years	4	7%
61-70 years	16	26%
Over 70 years	36	60%
Missing	1	2%
Race		
African American	1	2%
Asian	2	3%
Caucasian	52	86%
Hispanic	1	2%
American Indian	1	2%
Other	2	3%
Missing	1	2%
Marital Status		
Single	6	10%
Divorced	4	7%
Married	36	60%
Widowed	13	22%
Missing	1	1%
Residential Status		
Rent apartment	7	11%
Shared living/apartment	1	2%
Own apartment/house	49	81%
Other	2	4%
Missing	1	2%
Income		
Less than $5,000	1	2%
5,000-9,999	3	5%
10,000-19,999	11	18%
20,000-29,999	12	20%
30,000-39,999	7	12%
40,000-49,999	9	15%
50,000-74,999	8	13%
75,000-99,999	4	7%
100,000-124,999	0	0%
125,000-149,999	1	2%
Missing	4	6%

Computer use. Seventy-three percent of senior respondents reported using a home computer (Table 5). Sixteen senior citizens (27%) had never used a computer, 13 (22%) had used a computer less than 1 year, 15 (25%) for 1-5 years, 8 (13%) for 6-10 years, and 6 reported using computers for 11 years or more (10%). Three percent did not provide relevant data.

Table 5: Computer use (Wave 1) (*n* = 60)

	n	*%*
Currently use a personal computer at home	44	73%
Years using a computer		
Never used	16	27%
Less than 1 year	13	22%
1-5 years	15	25%
6-10 years	8	13%
11-15 years	3	5%
16-20 years	2	3%
Over 20 years	1	2%
Missing	2	3%

Of the 60 elders surveyed in the spring of 2004, 33 respondents completed the follow-up questionnaire. Complete addresses were not available for seven respondents. Therefore, the response rate was 62%. Statistically significant findings are presented in Table 6. Changes in respondents' skill level and IT attitudes were compared. Respondents reported a statistically significant increase in home computer use (mean increase = 0.4). Statistically significant changes were noted in participants' mean level of skill with simulations or tutorials, computer games, and chat rooms. Prior to the workshop, respondents reported virtually no skill with tutorials (mean = 1.1) and chat rooms (mean = 1.2). Afterward, they had achieved some proficiency. With computer games, respondents continued to report low, but improved, skill (mean increase = 0.3). Statistically significant increases were evidenced

in respondents' word processing, Internet, and computer skills, but they still lacked proficiency. However, e-mail skill increased from low to moderate levels (mean increase = 0.6), as did printer expertise (mean increase = 0.5). At the pre-test, respondents strongly desired basic computer, e-mail, and Internet skill, as well as IT training. Upon completion of the program, they still wanted to improve their skills, but not to the same degree, which suggests that they benefited from the workshop and were less concerned about increasing IT proficiency. These findings suggested that computer workshop participants were more technologically sophisticated after workshop completion. However, participants did not achieve dramatic improvements in basic skills.

Interestingly, participants reported significantly less supportive digital citizenship attitudes. In the pre-test results, respondents agreed that IT should connect people to the government (mean = 3.2), but were significantly less supportive in the final wave (mean = 2.9). Similar results were found with the desirability of public access to computers. Respondents voiced significantly less support for the public improving its IT capacity (pre-test mean = 3.6; post-test mean = 3.3). In the final wave, participants were significantly less likely to support giving free computers, software, and Internet access to people who could not afford them (mean decline = -.03). All other computer application and computer hardware skills, technological attitudes, and digital government items were nonsignificant. The effect sizes are suggestive of modest, but meaningful, differences between the pre- and post-test results.

Table 6: Comparison of statistically significant pre-test and post-test scores for spring 2004 senior citizens (*n* = 33)

Groups	Pre-test			Post-test		Mean Change	t	Effect Size[+]
	n	Mean	SD	Mean	SD			
Tutorials	27	1.1	0.4	1.5	0.8	0.4**	2.9	.60
Computer games	26	1.7	0.8	2.0	0.9	0.3*	2.4	-.40
Chat rooms	25	1.2	0.5	1.6	0.8	0.4*	2.4	.48
Word processing	28	2.0	1.0	2.4	1.0	0.4**	3.5	.67
E-mail skill	28	2.0	0.9	2.6	0.9	0.6**	3.7	.69
WWW skill	28	1.5	0.7	1.9	0.9	0.4**	3.1	.59
Computer skill	28	2.0	0.9	2.4	0.8	0.4**	3.1	.59
Printer skill	29	2.0	0.9	2.5	1.0	0.5*	2.5	.47
Home computer use	28	3.0	1.0	3.4	0.8	0.4*	2.2	.41
Desire basic skills	27	3.6	0.5	3.2	0.8	-0.4*	-2.5	-.48
Desire e-mail skill	26	3.5	0.6	3.2	0.8	-0.3*	-2.1	.41
Desire Internet skill	27	3.7	0.5	3.2	0.6	-0.5**	-3.3	-.64
Desire IT training	29	3.8	0.4	3.3	0.7	-0.5**	-4.2	-.78
Public improve IT use	27	3.6	0.5	3.3	0.7	-0.3*	-2.6	-.49
IT connect to government	26	3.2	0.7	2.9	0.8	-0.3*	-2.2	-.43
Desire public access to computers	29	3.2	0.6	3.1	0.8	-0.1*	-2.3	-.47
For poor, free public computer & IT access	30	2.6	0.9	2.3	0.9	-0.3**	-3.3	-.61

* significant at $p \leq .05$; ** significant at $p \leq .01$.
[+] Effect size was measured as mean change divided by the standard deviation of the change

Spring 2004 Student Focus Group Results

The perspectives of 20 Drake students were evaluated in the context of a focus group discussion in April of 2004. Most students reported taking the course to fulfill academic requirements and to help others. Many had a volunteer background, and at least 7 students acknowledged that the course was meaningful, while several stated that it enhanced their future desire to serve.

For the most part, students indicated that they felt prepared to teach technology. A student said, "I also drew a little picture because I saw in her eyes that she was kind of confused, so I drew computers and the cloud as the Internet and how they are connected. I thought that helped a lot." A few students mentioned that they needed more preparation. One student reflected, "I noticed that what we all prepared for in the first few sessions of this class was completely almost off the topic…. My clients didn't even know how to turn on the computer."

Students measured their success by setting goals, asking clients if they had accomplished their objectives, and observing clients' level of comfort with IT. Most students agreed that clients gained only basic computer skills. One student said, "I think they did learn, but what we taught them was still very basic, very limited." A student reflected, "It is more important when you are teaching people something new that [you] teach them the confidence to be able to do it, instead of more mechanical things." Many students reported that their clients gained skill, confidence, a better appreciation for IT, empowerment, and a new mode of communication with their families.

A few students said that the interaction with clients led to a new level of understanding. One student shared, "The machine … was already on, so I asked him to click on the start button, and he picked up the entire mouse pad. That is when I realized there is a huge divide between me and this senior citizen." Nevertheless, very few students supported the government providing public access to computers, while four students argued that citizens ultimately decide whether they will incorporate IT into their everyday lives.

Teaching presented some challenges, as students dealt with poor recall of learning, hearing impairment, poor eyesight, and adaptation of the curriculum to the "beginner level."

A few mentioned difficulty with keeping clients on track because they liked to talk. A student said, "I had a man who was a veteran of a foreign war. And, then he pulled out his wallet and … his card and explained to me all about it." A student said, "After we had our first session and had a reflection, [we realized] … that even though you had the opportunity to talk to each other … not a lot of people did. When we reflected …, we realized that a lot of people had similar obstacles."

Many students agreed that more than two sessions were necessary for the seniors to benefit meaningfully from the experience. Some students reported the curriculum was not challenging enough. Several students commented on the limitations of using lab computers. They were unable to adjust the control panels and resolution and to save to the hard drives. Students from both sections were less than enthusiastic about the six weeks of preparatory classes. One student said, "I don't think we started teaching people until almost six weeks into the class. I think that could be condensed more because some of the information was somewhat repetitive."

Overall, students were positive about the workshop and felt that it was a rewarding and worthwhile experience. Several did voice dissatisfaction because many believed more time should have been devoted to service—not preparation. They helped their clients develop basic computer skills and the confidence to use IT. Prior to the class, many had an abstract notion of the digital divide; but upon completion, they reflected on how IT illiteracy affected real people and their quality of life. They also suggested a pre-workshop assessment of client skill to pair a student with a client. They gained more confidence in teaching IT and put into practice effective teaching strategies (e.g., client-centered learning, setting goals, and

overcoming client fear). The course had a meaningful impact on most students as well as the clients they served.

EVALUATION OF ACTIVIES RELATED TO RESEARCH

Due to the challenges of recruiting a representative random sample, in 2003, the research team developed a Technology & Citizenship survey suitable for computer-assisted telephone interviewing. The survey was administered to residents in Pennsylvania, Colorado, and Iowa (n = 478). This enabled the researchers to collect data suitable for statistical analysis and sample characteristics that would be generalizable and publishable in scholarly journals. The researchers met their goals of creating an instrument suitable for a national audience and serving as the baseline for digital citizenship issues. The researchers have explored attitudinal and technological barriers to e-citizenship and contextual differences such as place. In the final year of the project, an article and a book chapter have been accepted for publication, three additional manuscripts are under review, one other manuscript is in preparation, and seven presentations have been given (Appendix A). This research includes an article and a book chapter based on data compiled from computer workshop participants and Drake students.

CONCLUSION

Several of the fall 2003 workshop participants reiterated that the computer workshop did not help them improve their IT proficiency. In fact, they attributed any change in IT skill to those in their social network. It appears that the multiplicity of sites and the additional

commitments placed on the Lab Coordinator resulted in a decline in the quality of experience for participants. Managing five different sites for a given lab session, Larson was unable to provide a cohesive framework and curriculum, which reflected the "goals of fluency and informational technology" and precluded her from having first-hand knowledge of the curriculum, teaching strategies, and student/client relationships. It is not surprising that participants felt that their technological and interpersonal needs were not being met. It seems too much to ask for Drake students to fill the role of an experienced educator. Nevertheless, Fall 2003 clients improved their ability to access e-mail and the Internet. Even if the workshop learning did not increase their IT literacy (as they say), it may have given them the courage to seek out other members of their social network to provide more systematic training.

There is no question that clients from both semesters are at the lower end of the IT continuum, but they did demonstrate appreciable change. It is evident that the Spring 2004 clientele were very satisfied with the computer training and the relationship with Drake students. These findings make clear that the workshops should be held in an environment that is comfortable and has up-to-date equipment. However, a university lab setting can create new barriers of access to the computer control panel and other IT components that are central to learning.

Due to the multiplicity of sites in fall 2003, it became "a purer service-learning experience," as students set the agenda for client learning and developed recruitment strategies to deal successfully with lower than expected turnout. In addition, some students reflected on the impact of the digital divide and the importance of service in ameliorating these conditions. Spring students were eager to begin the service-learning experience and

were dissatisfied with the extent of preparatory lessons. It seems that they may have been more advanced in their ability to grasp the nature of service-learning and the value of working together as a team. It is important to note that the final semester faced fewer procedural challenges; therefore, students may have overlooked the broader implications of the preparation.

It seems instructive that participants' desire for digital equity declined over time. This has been a perplexing finding. However, in the focus groups with participants from last year, it appears that clients differentiated the types of groups who should be eligible for free computer training. It may be the case that since the survey questions required a blanket commitment to free training for the general public, for example, they became more sensitized to these issues and more resolute about the characteristics of recipients. Therefore, they were less supportive of offering computer classes to all citizens.

In conclusion, there are several key lessons that future researchers should take into consideration.

- First, as Larson has noted, pre-planning is essential to meet the multi-faceted project goals.
- Second, building relationships with community leaders and the potential client base cannot be overlooked as a critical component in any intervention. This project was more successful at threading together the needs of Drake students and participants than meeting community needs. This project would have been more successful if the Drake community bought into the "product" that the service-learning lab offered. Trust is built over time and with consistency. As Larson pointed out, "The trust is just really essential, because we're not

just going in and dropping a packet of food." Building trust is making a long-term commitment to the community and its citizens.

- Third, any intervention must be relevant to constituents' lives and their place in the broader community. In Larson's outreach, she said that she was told, "'You're talking about digital citizenship, what you really need to talk about to these people is ... jobs.'" Digital citizenship is not a pressing issue for groups struggling to meet basic subsistence needs. Citizens, community leaders, students, and the researchers should be working together to define the issues, find solutions, and implement them.
- Fourth, a target group that is at the lower end of the continuum of IT sophistication requires more than three of four computing lessons to achieve any degree of IT literacy and to overcome a fear of technology. It also was evident that the service-learning curriculum should be geared to various skill levels.
- Fifth, the course should be given more credit and require more weekly sessions to provide students with the theory, preparation, and practice to engage meaningfully in service-learning. The service-learning lab should be offered in conjunction with the digital citizenship course offered by PI Shulman, to have a significant impact on student views of societal inequality and their responsibility in ameliorating the digital divide.
- Sixth, an ongoing evaluation of student and participant learning and satisfaction should be implemented so that adaptations can be made sooner.

> As Larson has noted, the Lab Coordinator should be part of the planning team, and well-defined goals should be articulated for this position.

Over the last three years, the project served 285 Des Moines area residents. They recounted the value of a small class size, one-on-one instruction, and intergenerational learning. Participants improved their computing skills and comfort level with IT. They did not make great strides in linking the Internet to civic participation, but goodwill was created. Larson said, "There were senior citizens who told me in phone calls and in e-mails that they felt better about the future of the world knowing that there were kids like these who would be helping to run things." In addition, students strengthened their interpersonal skills, teaching strategies, and understanding of the digital divide. It appears that some students and participants developed relationships that are ongoing today. It was not an easy task, but the project made needed adjustments and scaled back its goals to provide a quality experience for participants and students alike.

Appendix A: Research Findings

Conference Presentations

e-Political Empowerment: Age Effects and Attitudinal Barriers, submitted for a paper presentation at the Midwest Sociological Society, Minneapolis, MN (April 2005).

e-Political Empowerment: Are Seniors Slipping through the Digital Cracks?, accepted for presentation at the Gerontological Society of America, Washington, DC (November 2004).

e-Political Empowerment: Age Effects and Attitudinal Barriers, Syracuse University Summer Institute on Digital Empowerment, Syracuse, NY (July 2004).

Generational Differences in Informational Technology Use and Political Involvement, National Grantee Workshop for Digital Government Researchers: "dg.o 2004," Seattle, WA (May 2004). Poster.

Learning to Serve: Critical Lessons from the Voice of Engaged Students in a Service-Learning Lab, Association of the American Colleges and Universities Chicago, IL (April 2004).

Service-Learning and the Digital Divide, International Conference on Civic Education Research, New Orleans, LA (November 2003).

Parameters of the Digital Divide. Science and Society Seminar Series, Iowa State University, Ames, IA (September 2003).

Digital Citizenship: Parameters of the Digital Divide, Joint Statistical Meetings, San Francisco, CA (August 2003).

Roundtable on Digital Government Research Trends: Emergence & Evolution, American Political Science Association, Philadelphia, PA (August 2003).

Referred Journals

Mack Shelley, Lisa Thrane, Stuart Shulman, Evette Lang, Sally Beisser, Teresa Larson, and James Mutiti, "Digital Citizenship: Parameters of the Digital Divide," *Social Science Computer Review, 22*(2), 256-269 (2004). [This is an update of the journal manuscript indicated as "forthcoming" in the previous report.]

Beisser, Sally R., Shulman, Stuart W., and Larson, Theresa B. "Closing the Digital Divide with Service-Learning," *Academic Exchange Quarterly,* Accepted for Publication.

Shelley, Mack, Thrane, Lisa, and Shulman, Stuart. "Generational Differences in Informational Technology Use and Political Involvement," *Social Science Computer Review*, Under Review.

Shelley, Mack, Thrane, Lisa, and Shulman, Stuart. "Lost in Cyberspace: Barriers to Bridging the Digital Divide in e-Politics," *International Journal of Information Policy, Law, and Security*, Under Review.

Thrane, Lisa, Shelley, Mack, Shulman, Stuart, Beisser, Sally, and Larson, Teresa. "E-political Empowerment: Age Effects and Attitudinal Barriers," *Journal of E-Government*, Under Review.

Book Chapters

Thrane, Lisa, Shulman, Stuart, Shelley, Mack, Beisser, Sally, and Larson, Teresa. "Does Computer Training Translate to E-political Empowerment among Midwestern Senior Citizens?" B. Jaeger (Editor), *Young Technologies in Old Hands—An International View on Senior Citizens' Utilization of ICT*, Accepted for Publication.

Manuscripts in Preparation

Beisser, Sally R. "Teaching Technology to Senior Citizens: Empowerment through Service-Learning," *The Innovation Journal: The Public Sector Innovation Journal*, In Preparation.