SERVICE LEARNING IN POSTSECONDARY TECHNOLOGY EDUCATION: EDUCATIONAL PROMISES AND CHALLENGES IN STUDENT VALUES DEVELOPMENT

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ABSTRACT

My dissertation research begins with the call for technology education to transcend the individualistic and exclusive culture of technology experts, which has been reproduced through skill-based training and transmission of content knowledge. In the search for alternative models for postsecondary technology education, my research investigates a computer training course (INIS) that has incorporated community service projects since fall 2000. Guided by Dewey's vision of democratic education, this study inquires into the nature, reality, and implications of a practice of interdisciplinary, service learning. Through this journey, it derives knowledge about effective service integration in technology for social change.

The INIS course is designed for training future librarians, media specialists, and system librarians to acquire basic concepts about computer-networked information systems. Through the service projects, which are implemented in coordination with two university-level organizations, students collaborate in designing and building computer labs for disadvantaged community organizations in regional urban areas. In order to understand the complexity of this service-learning practice, I studied this course in terms of its situated contexts, the rationales behind the service integration, and the actual patterns of teaching and learning.

The course curriculum needs to be further developed to strengthen students' community building with their community partners and to foster their critical thinking about the larger issues of technology in relation to marginalized communities. However, despite its current limitations, this case still suggests an alternative model of learning about technology through service integration. The teacher intends to create a student

practice of technology from a pragmatic perspective, emphasizing the importance of understanding the user sphere for designing and building technology. The experiential learning in the course engages students in contextual, problem-based activities on technology and enhances their moral sensibilities.

In addition to analyzing the INIS students' service learning and the curriculum, I discussed with the instructor the challenges and future direction of service integration in technology education in general as well as specifically in relation to this course. Through my analytical discussion of this service learning, I also address larger issues related to three different levels (course-, program-, and institutional) of support or change in order to create a holistic praxis of technology education to foster social responsibility.

Dedicated with utmost respect and gratitude to my beloved parents,
To my spiritual master, Dae-Hang Keun-Seunim,
And to all those who are called parents and teachers

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CHAPTER 1

THE BEGINNING OF MY JOURNEY INTO SERVICE LEARNING

> The conception of the school as a social center is born of our entire democratic movement. Everywhere we see signs of the growing recognition that the community owes to each one of its members the fullest opportunity for development. Everywhere we see the growing recognition that the community life is defective and distorted except as it does thus care for all its constituent parts. This is no longer viewed as a matter of charity, but as a matter of justice—nay, even of something higher and better than justice—a necessary phase of developing and growing life. (Dewey, 1902, p. 86)

During my graduate study in the United States, John Dewey was one of the philosophers who most inspired me in developing my own philosophy of education. I have believed that through education, we not only reflect on who we currently are and used to be, but more importantly envision who we will be. Dewey was the one who provoked me to think about democracy as one important aspect of education. He addressed the need for public education that carries out the spirit of democracy not because it is morally right, but also because it is necessary for human life and knowledge to prosper.

One of Dewey's key notions is that the critical barrier to democratic education is the isolation of formal school learning from everyday and communal life. He argues that our educative purpose must go beyond training children to learn their social functions by making them master essential content knowledge and skills. We must also educate each member of society to develop his or her full capabilities and become a valuable citizen who actively engages in creating a better life and community. Dewey believes that this kind of educational goal cannot be achieved when school education is separated from the cultures, practices, and concerns of the communities to which students belong. He claims that students can develop important values and critical abilities only through their rich

interactions with real world practices and problems. When they apply and test their knowledge in solving real-life social problems, they become more critically aware of the consequences of their behaviors and the meaning of their decisions. Through this contextualized, experiential learning, Dewey believes that students become culturally knowledgeable and responsible citizens who can better serve their communities. In addition, Dewey strongly proposes that schools serve as a "social center," where learning occurs through the activities of civic engagement and service. For Dewey, democracy is not just an ultimate goal for public education, but the ground for designing and implementing educational practices.

Dewey's notion that school education is isolated from community life and practice is increasingly discussed in the U.S. There is an alarming report that young generations have become uninterested and disengaged from civic duties and public affairs (Boyte, 2004). Schools have searched for ways of enhancing civic education for young students. Moreover, in the postmodern society, which has developed a specialized system of knowledge production and dissemination, experts do not see their social system holistically and organically (Sullivan, 2000). A lack of knowledge exchange between elite and ordinary citizens and across disciplines has been recognized as a significant problem creating negative social effects. Accordingly, as Sullivan (2000) notes, the demand for interdisciplinary work and a holistic approach in training experts has rapidly increased. Institutions of higher education have begun to adopt interdisciplinary collaborations and practices of community participatory action research and service (Benson, Harkavy, & Puckett, 2007). Dewey's vision of progressive education has

underpinned these moves in the U.S. toward recreating public education to engage community practice and service.

Although an understanding of the value of Dewey's educational vision has grown, the realization of democratic education in specific contexts of teaching and learning is far from being finished. Service learning is one exemplary, pedagogical approach that has grown out of Dewey's philosophy of education. In my dissertation, which examines a case of service integration in the U.S. in postsecondary technology education, I look at how his idea of community participatory education has been carried out in a specific educational practice and what changes or other efforts need to be made for further the development of democratic education. I hope that the insights that I have gained through this journey into service learning will enlighten educators who want to adopt this pedagogy in their teaching, especially for technical training in professional development.

Searching for a New Possibility in Technology Education

It was early autumn in 2003 that I first heard about a college course named "Introduction to Networked Information Systems (INIS)." INIS is a computer technology training course that is offered mostly for graduate students who want to become public or private librarians, media specialists, and systems librarians. This course has incorporated community service as the main course project in the University of Illinois at Urbana-Champaign. With the assistance of two university non-profit organizations, the INIS course had launched community service projects in 2000 to meet student interest in learning about computer hardware and to address urban community needs for access to new information technologies. Throughout the service projects, the students enrolled in

INIS collaborated in designing and building computers and networks for disadvantaged community organizations, such as libraries, churches, and after-school programs in regional urban areas.

In 2003, I was auditing a graduate course that my advisor, Dr. Bertram Bruce, taught. This course, named "Pragmatic Technology," covered the content of Deweyan and American pragmatic philosophies in rethinking the problems of modern technology, its practices, and education. By then, I had almost finished my doctoral course work. My readings, research, and work experience had consolidated my standpoint on technology to a critique of the prevailing utilitarian and cognitive scientist visions, along with educational computing policies and programs. At that time, I continuously asked myself where I could find a workable theory or an alternative educational vision that could guide educators in transforming this technology-dominated society, which strives for efficiency and performance.

Dr. Martin Wolske, the instructor of INIS, visited the Pragmatism class as a guest speaker. In the visit, Martin focused on two community-based university organizations, the East St. Louis Action Research Project (ESLARP) and Prairienet, which have pursued the revitalization of local communities in their long-term partnerships with the university, and the community service projects that INIS students had conducted for years. While I listened to him speaking, the idea of teaching a computer technology course that incorporates community service strongly attracted me. My curiosity about Martin's class rapidly grew; what would the class look like and what would students learn in the class? After the Pragmatism class was over, I went to Martin to ask if he could let me visit his classroom in the following week.

I first visited Martin's classroom just after students returned from their first site trip to East St. Louis. I immediately sensed the atmosphere of excitement and strong energy that filled the whole classroom. Many conversations were going on among students in small groups, and between students and the instructor. These interactions continued not only during the classroom hours, but also during the break, and even after the class. The physical setting of the classroom looked very traditional. In the front were the teacher and a blackboard, and in the center of the room were students sitting in rows of desks. In spite of the classroom set-up, students and the teacher passionately interacted with each other. Most of the conversations regarded the sharing of students' experiences on their first field trip. Student service project teams individually reported on their visits to the assigned community sites. Students also discussed what they could do for the disadvantaged community they visited, such as collecting books for a public library.

When students expressed their general concerns about doing their community service, Martin told them a story about his service experience. One day, he was asked to go down to East St. Louis to give technical support. However, on that day, he and his wife had already made a plan to go on a honeymoon, which they had postponed since his graduate student days, until they could find a better time for it. After a discussion, Martin and his wife eventually decided to go down to East St. Louis together. While his wife waited for him at the site, he would finish all his work so that they could go on their honeymoon. But, after they left the site, Martin received a call every five or ten minutes from someone at the community site who nervously reported that problems were arising. Martin pacified their anxious minds over the phone and gave them directions to solve the problems. After several phone conversations like this, he finally received the last call

from the site that told him everything was settled. Martin ended his story, with this comment: "With all the difficulties you have, everything will be just fine in the end. So, don't worry!" It was memorable and deeply impressive for me to see that Martin's story of his personal service experience naturally became a valuable resource for student learning in this technology classroom.

My first visit to the INIS classroom made a strong impression on me because of the enthusiasm of the students and the amicable atmosphere. I would not have expected such a warm impression in a computer training course. I would have been less stunned if I had seen it in a social studies or an English literature course.

Once I participated in a teaching philosophy workshop and had a small group discussion on exemplary teaching practices with four graduate teaching assistants from Engineering, Biology, and Political Science. In that discussion, it was very interesting to see that these participants were divided into two groups that had distinct perspectives. Students from Engineering and Biology strongly emphasized the clarity and organization of course content delivery through an instructor's lecture as the most important factor for successful teaching. Compared to them, two other students from Political Science most valued the flexibility of curriculum and instruction that teachers contextually adjust to embrace diverse student interests and needs. I believe that their different views on teaching precisely showed the cultures of their disciplines in general. Given this prevalent stance in technology and science disciplines, I was even more impressed to see a "humanistic" classroom culture created in the INIS course.

I became increasingly curious about how such a student-active classroom culture could be created. What does it mean that students have enthusiastic conversations about

communities, people, and services within the field of technology? Why did Martin start teaching the technology course in this way? What do students actually learn from this class? From all these wonderings, I gradually started narrowing down my primary questions, by asking myself "If we educators followed Martin's model of technology training, could we intervene effectively in the technological elitism that contemporary higher education has continuously reinforced?" My heart began to beat with strong excitement at the prospect of exploring this "new possibility" for technology and its educational practices. I felt as if the excitement that I witnessed in the INIS classroom had completely inspired me.

Technological Elitism, What is the Problem?

> Cannot you see, cannot all your lecturers see, that it is we who are dying, and that down here the only thing that really lives is the Machine? We created the Machine, to do our will, but we cannot make it do our will now. It has robbed us of the sense of space and of the sense of touch, it has blurred every human relation and narrowed down love to a carnal act, it has paralyzed our bodies and our wills, and now it compels us to worship it. The Machine develops—but not on our lines. The Machine proceeds—but not to our goal. We only exist as the blood corpuscles that course through its arteries, and if it could work without us, it would let us die. (Forster, 1928, p. 23)

In Forster's (1928) scientific fiction, "The Machine Stops," the main character Kuno exclaims to his mother that people living in this modern society are blind and furthermore worshiping the machine they created. Through Kuno, what Forster prompts us to see is that the relationship between the human and the Machine—technology—has been actually reversed. He attempts to show us how we live in the reality that is separated from human spirits and wills, and subordinated to technology for its own sake. This story asks us to think about how the dominance of technology over human activities and

consciousness becomes invisible as human beings themselves deliberately surrender to technology. The story ends tragically with human death and the destruction of the world as the Machine stops functioning. It depicts the pessimistic future of human society under the monopoly of technology. Regardless of an extreme dystopian vision that Forster's fiction projects, his writing in the early 1900s still provokes critical thoughts about how we actually live in the current digital age.

The development of modern technology, in particular information and communication technology, has accelerated in recent years. Just as Foster shows, people have become more and more insensitive to the speed of these technological changes. Further, computer technology has become a primary means for upward social mobility in job markets. People voluntarily participate in the severely-competitive process of acquiring the technical skills required for entering or staying in the economic, social, and political mainstream. In this contemporary "Knowledge Society," power is not determined simply by who owns the means of production as Marxists viewed it, but is based on who can access the primary knowledge—strictly information and technology—necessary for decision making (Peters, 2003; Castells, 2000). In this technology-dominated society, it has been argued that we are losing our sensitivity, genuine humanity, creative imagination, and social connectedness (Bowers, 2000; Postman, 1992; Ellul, 1964).

Who creates this technocratic social reality? Who is responsible for what? Philosophers of technology have addressed the problems of the technocratic society and tried to find solutions for social transcendence from their distinct perspectives. However, in their discourses, most of them do not address the question of "who is responsible." It is

rather noticed as unsophisticated to identify who the creators and users of the culture are. In fact, we cannot dichotomously tell whether the technicians' visions build the reality in which we live, or their visions simply reflect the market mandated by the society. However, because of this elusiveness in identifying who is responsible, we should not simply point to technology or the created social system (the Machine in Foster's fiction) for unexpected outcomes and uncontrollable situations. Also, if we magnify the notion of technology as autonomous, then it will become more difficult to avoid a scenario that completely denies possibilities for social transcendence.

One line of philosophers' thinking is based on critiques of "technological elitism." This theoretical perspective does not profoundly answer all the questions about the technocratic society or provide the best solutions for social change. However, it offers us a critical reflection on this society in search of a recovery of human agency that would allow for social transformation. More importantly, it gives us insights into current higher education that has been driven by the logic of a labor market that simply promotes skill-based training and objective knowledge production and dissemination.

Philosophical Critiques of Technological Elitism

> The professions today do not typically seek to gain legitimacy by stressing the social importance of the knowledge they provide and the functions they perform for the community. Rather, they emphasize the specialized, expert knowledge and skills they provide in the market. (Sullivan, 2000, p. 25)

> The technocratic specialist practices mechanical forgetfulness. That is, they manage to so engross themselves in data work that they lose sight of the ability to think deeply about what it means to be a human being and to engage in social relationships outside the imperatives of the technostructure." (Kroker, 1993, p. 67)

Within the paradigm of expertise, technical specialists have become an emerging, privileged class, empowered to make decisions for the future of human society. A few

cultural and critical theorists (see Kroker, Pacey, Postman, & Feenberg), and postmodern philosophers (see Lyotard) have commonly addressed the problem with these legitimated technical specialists who often project human destiny into their positivist social visions. Reflecting on the culture of technology and professional development, these philosophers have pointed out the exclusiveness of technical specialists as the key problem in the technological elitism.

For instance, Arthur Kroker (1993), who follows the early years of Canadian media studies, harshly criticizes positivist technicians and administrators as "dead souls" who abandon their memories, spirits, and responsibilities, giving up to new "technological freedoms" and entertainment through virtual space (p. 62). He categories these technocrats into two groups: "passive nihilists" or "suicidal nihilists" (Kroker, 1993, p. 63). Passive nihilists are the people "who never learned to think deeply about themselves" and are "addicted to technological euphoria," whereas suicidal nihilists are those "who know that there is no longer any substantive purpose to their willing, but they would always prefer to go on willing than not to act" (Kroker, 1993, p. 63). Kroker contends that genuine humanity with creativity, dialogic relationships, and dynamic engagement has disappeared into negligent positivists' visions, or into technical elites' spiritless minds.

If Kroker criticizes the negligent individual mindsets in which technical elites lack reflective thinking about themselves and the society, Pacey (1983) focuses on elaborating the systematic pattern of thinking that appears in the culture of technical professionals. Pacey does not consider the problem simply as the laziness or negligence

of each individual professional, but he believes that the significance results from the deep-rooted pattern of thinking which is prevalent in the technical specialist community.

Arnold Pacey (1983), whose study interests are primarily in the history of technology and the politics of technology transformation in third world cultures, conceives of technology as a cultural practice that consists of technical, organizational, and cultural aspects. In his holistic notion of a sociotechnical practice, Pacey articulates what technical specialists systematically do not see when they design technologies. With respect to Pacey, all the invisible areas for these specialists stem from the user sphere, which is always closely related to the cultural and organizational aspects of a sociotechnical practice. He maps three main areas concerning a technology activity: technical, organizational, and cultural areas (p. 49). In this diagram, Pacey shows how easily the expert standpoint has been limited and narrowed down within the technical area alone, for example, the skills and hardware. That is, in the process of their designing, technical specialists do not count all other variables located nearby or in the user sphere, such as "prevention," "maintenance," "organization," and "end-use" (ibid, p. 38). This systematic exclusion of the user sphere in thinking and designing technology is what Pacey calls the "tunnel vision" of professionals (ibid, p. 38). Then, the product is "half technology" that technicians design without thinking through the whole implications and uses (ibid, p. 35).

Like Kroker and Pacey, Lyotard (1984) also discusses the totalitarian culture of technicians. Jean-Francois Lyotard (1984), a French postmodern philosopher, sees that current Knowledge Society moves following the rules of "language games" (p. 10). According to Lyotard, knowledge legitimation is a language game, through which we

create social realities, and meta-narratives are the rules of the game. That is, these meta-languages determine how the game works and who has the privilege to control the moves. Lyotard (1984) argues that traditional non-scientific "narratives" in which people sought absolute truth or human emancipation in the creation of knowledge, vanished as modern industrialization proceeded along with the emergence of advanced science and technology (pp. 23-37). Afterward, technology (the scientific discourse), which only concerns efficiency or performativity, has replaced the authority that the traditional and religious grand narratives possessed. Moreover, technology has become the only powerful metanarrative that legitimates and controls human knowledge of all areas other than hard science in the post-industrial society. The goal of the Knowledge Society is no longer truth, pragmatics of science, or justice, but performativity. In Lyotard's term, it is "terror" when totalitarian technology entirely discloses the engagement of other meta-languages (ibid, p. 46; p.64).

More significantly, Lyotard elaborates that higher education subjugates its system to the technology-controlling game, and henceforth "the desired goal becomes the optimal contribution of higher education to the best performativity of the social system" (ibid, p. 48). His notion of higher education articulates the trajectories of current postsecondary educational institutions, whether public or private, competing with each other to meet the needs of the labor market. Within the rationality of performativity or efficiency, the quality of education is widely evaluated in quantities, such as ranking of schools and the rate of employment. Also the applicability of knowledge is the primary goal of research, but social justice or human emancipation is not given main attention (Lyotard, 1984).

Lyotard (1984) also demonstrates that students in this higher education system are no longer the "liberal elite" who search for the emancipation of humanity (p.49). Current students mostly seek to better prepare for the competitive job markets by acquiring necessary skills. Interestingly, Kroker (1993, p. 67), from his teaching experiences, confesses that he has seen most of his students being ignorant of the technocratic society or being impassioned to make commitments for action, and rather becoming cynical about their powerlessness. Through analyzing the trajectories of higher education that pursues the best performativity to satisfy the logic of the job market, Lyotard explains how the exclusive culture of technical elites has been reinforced by the system. That is, current academic communities are not simply following the rules of the technocratic society, but as sub-systems of the society, they actively participate in reproducing the culture of technical specialists—the technocrats.

The significant problem with living in the technocratic society arises in the totality of technology. That is, technology, which concerns only efficiency or performativity, excludes any other human values and activities. This technocracy is enabled by the support of bureaucratic social systems, which empower technical specialists to decide and control the future direction of human society. These privileged elites tend to see sociotechnical practices exclusively within technical areas and project their speculative tunnel visions for the human future. Functioning as a subsystem of the technocratic society, higher education, which offers professional and technical training to these technical elites, also reproduces or reinforces the narrow-minded technician community, rather than fostering a pragmatic spirit.

I reviewed some critiques of technological elitism, which critiques form one philosophical line of thinking about current technology-dominated society. In a comparative analysis of Kroker, Pacey, and Lyotard on this view, I saw that the problem they commonly addressed is the exclusiveness of the culture of technology and its practice. One suggestion for addressing the problem of technical specialists' tunnel vision has been interdisciplinary and collaborative work, which possibly enables them to embrace diverse user views and cultures within their speculations for designing technologies. However, as Lyotard (1984) points out, these interdisciplinary collaborations have not always proved emancipatory because scholars or technical specialists engaged in interdisciplinary work still lack a developed meta-language to overcome a superficial level of communication. According to Lyotard, a naïve incorporation of interdisciplinary or team work is nothing more than a kind of instrumental rationality that is deployed for enhancing performativity in academic or educational practices. It has become a critical and emerging issue to extend our understanding of how interdisciplinary collaborations and educational practices in technology could be better designed and implemented.

Inquiring Into Current Technology Education

Personally, I experienced many computer technology training programs that were offered at a community college and a university, including computer programming and various kinds of software or Internet training workshops. Moreover, since I worked as a graduate assistant for continuing education, I observed many kinds of computer uses for asynchronous online or videoconferencing college courses. I sometimes found some

endeavors to resonate with technology users' or trainees' interests and needs, but most cases that I observed were primarily concerned with the effective transmission of skills and content knowledge. Practitioners rarely paid attention to in-depth communications, interactive relationships, and social issues and responsibilities within their practices. Learners were also prevalently treated as passive recipients of technology education. The more I experienced technology-related practices, the more I became tired of witnessing the isolated culture of a technology classroom and skill-based technical training.

Furthermore, by reading Kahn and Friedman's (1998) critique of current American technology education, I realized that my personal experiences and feelings about technical training and educational use of technology could be highly valid, as raising a critical question. Although Kahn and Friedman study looked closely at K-12 education, postsecondary education does not differ much from the younger students' learning. Kahn and Friedman primarily inquired into the kinds of citizens that current technology education produces: Does computer education lead students to be critical technology designers and users, or to be passive recipients with technology-centered minds? They claimed that the traditional type of (teacher-centered) education cannot lead students to become socially-responsible citizens in the uses of technology. Accordingly, Kahn and Friedman strongly addressed the need for alternative computer education through which students could learn technology by actively manipulating computer systems and understanding various social effects of their actions.

In contrast to the practical technology trainings or uses that I experienced, a few theoretical graduate courses provided me with insightful readings and discussions critiquing current technocratic culture and insensitive dissemination of technology into

education. From these theory-based graduate courses, I learned about different views of technology and gained many insightful thoughts and inquiries. However, the problem was that even all these experiences made me realize the presence of a huge barrier between the reality and the ideal. I found two separate dimensions of learning in technology: One focusing on the rapid integration of advanced technology and its effective applications, and the other driving me into critiques of current educational and societal trends with modern technology. These experiences have gradually led me to inquire into how we could bridge this whole discrepancy between theory and practice in technology. My journey to service-learning pedagogy and the INIS case started with these inquiries into current technology education and curriculum development.

Recent studies of technology education indicate it is in a state of transition (Sanders, 2001; Hill, Wicklein, & Daugherty, 1996). Along with discourse focused on the status of current technology education, the meaning of new "technological literacy" and related curriculum reforms have been discussed over the past few decades (Pannabecker, 2004; Sanders, 2001). Since 1980, the field of "industrial arts" was quickly renamed "technology education." A few studies have reported debates over whether this change is simply a replacement of a program name or an important paradigm shift in the field of technology education. One of the main issues in these debates regards the actual changes made in technology curriculum and pedagogy. Some scholars (see Clark, 1989) who claim the emergence of a new paradigm in the field of technology education point out that the pedagogical emphasis has apparently shifted from technical knowledge and skills to processes of technology and problem-solving abilities. This paradigm change also implies a separation of technology education from industry and vocational training, by

asking for all citizens to be literate about technology. In advocating this placement of technology education in general education, the International Technology Education Association's Technology for All Americans Project (ITEA) released "Standards of Technological Literacy" (STL) in 2000 as a representation of collected consensus on technology education that would benefit all Americans.

In this transition, statistical data (see Meade & Dugger, 2004; Volk, 1997) show that the number of graduates with technology teaching or industrial arts degrees has drastically declined since the early 1980s. Volk (1997) even estimated that "if the downward trend continued, the demise of the technology teacher preparation profession would occur near the year 2005" (p. 66). The 2004 survey, conducted by ITEA, also reports a significant decrease in the number of technology teacher education programs and teachers in the U.S. (Meade & Dugger, 2004). According to this report, standalone technology education programs have been increasingly refocused and replaced. Instead, technological literacy has been pursued as a form of general education integrated within other subjects such as science and social studies, and across different grades. Many scholars generally advocate this whole transformation of technology education into general education. However, there are also some concerns about the negative impacts of the trend on the quality of technology education and research that will be a problem in the long run. For instance, Volk (1997) contends that educational resources and research will not keep up with needs, and technology teachers will be insufficiently educated about technological literacy—possibly by providing a limited, one-time training session or program. Indeed, developing responsible technology teachers and effective curricula that ensure or further improve the quality of technology education is a critical issue, and how

to implement alternative technology programs on a larger scale is still an unsolved problem.

Regardless of the desirability of restructuring of technology education and curriculum reforms, other scholars (see Petrina & Volk, 1995) doubt that an evolutionary change took place in the field. They critically question what changes have been made in real practices of technology on a larger scale. In reviewing the research in technology education, Lewis (1999) also articulates this view of current curriculum change:

> Though curriculum has been the primary area of inquiry in technology education in the United States, little is known about the pragmatics of the curriculum change process. What the change from industrial arts to technology education entails in actual schools or school districts has been studied very little. (p. 7)

Sanders' study (2001) primarily intends to contextualize the history of technology education and reports that some changes were made in educational practices, such as a substantive increase in teaching for better technological problem-solving abilities and a decline in using teacher-planned, modular-based instructional methods. However, as Lewis points out, even if the incorporation of problem-solving activities has been recently increased in technology education, little empirical research has probed what these activities look like, what challenges and processes the instructors and curriculum designers have undergone, and what learning outcomes have been actually associated with the curriculum change.

This transitional technology education and its unresolved problems are also shown in recent discourse on interdisciplinary technology curriculum development. Along with the globalized economy and reconfigured labor market, interdisciplinary curricula or hybrid types of technology courses that combine engineering and social analysis have been demanded in the field of technology and science in order to meet new

educational requirements (Walmsley, 2003; Shumer, 2001; Bereiter, 1983). It has become crucial for students to be able to handle both social issues and technical problems to facilitate their future professional success as technology specialists. In 1983, an article in the IEEE journal reported that some colleges and universities had already begun to provide interdisciplinary technology courses (Bereiter, 1983). According to this article, some graduate programs also provided students with internship programs in industry or government in order to allow students to have authentic experiences dealing with public policy and planning designs of technology.

However, regardless of the growing demands for future workers with combined engineering, problem-solving, and social skills, in reality, there are still few implementations of interdisciplinary curricula in which students develop their critical awareness of social issues through hands-on computer design and use. Furthermore, little is known about the effectiveness of the design and implementation of these interdisciplinary technology curricula. The problem is not only a lack of knowledge about interdisciplinary curriculum development and use, but also of practitioners' perceptual understandings of technology education, which still de-emphasize the holistic development of student values through technology practices. Students' critical understanding of social and organizational issues is rarely a central criterion for the assessment of students' learning in technology. Even the statements in the "Standards of Technological Literacy" (STL) covertly perpetuate this kind of perspective on technology education. Calling for a revision of the standards, Pannabecker (2004) contends that STL simply presents technology designing as rather decontextualized and rigid work, by placing too much emphasis on the impact of technology products on human society:

> Our standards should reflect recent historical work that recognizes factors such as conflict, constraints, and contingency as well as teamwork. Designing and building technology is often a messy endeavor. Contingent aspects (chance, uncertain conditions, and accidents), conflicting human choices, and power relationships (politics) play a critical role in technological change. . . . The fixed structures, rigid divisions, and cannon of heroic inventors convey the sense that technology was a highly determined, linear, and predictable enterprise of successful inventors and artifacts. (Pannabecker, 2004, p. 4)

Pannabecker claims that the kind of technology education that STL represents does not fully acknowledge "humans' active role" in the process of technology design, use, and evaluation. In this discussion, Pannabecker emphasizes the importance of teaching the history of technology, and finally concludes that the main problem of STL is its subtle exclusion of ethics in educational practices of technology,

> Although ethics is mentioned a few times in the STL narrative of standards 8-11 (pp. 97, 98, 104, 111), it is clearly not central to the standards of design and development. This is subtle politics that isolates the discourse of social responsibility from the design and construction process, focusing social responsibility at the end use, or "effects" stage. (p. 5)

Developing interdisciplinary curricula and programs by emphasizing students' development of cross-functional skills and ethics must be a pivotal change in technology education. However, barriers exist to complete the change in real practice. Accumulating knowledge about interdisciplinary work and transforming prevailing perceptions about technology remains a difficulty to be solved.

In summary, many studies state that technology education in the U.S. is currently in a transitional phase (Sanders, 2001; Hill, Wicklein, & Daugherty, 1996). Even though it is questionable whether the transformation of technology education widely occurred in real classroom settings or not, the direction of the transformation advocates for interdisciplinary technology education with an emphasis on problem-solving and processing knowledge, instead of technical skills and contents (Sanders, 2001; Clark,

1989). In order to ensure the quality of technological literacy that is generally taught in various disciplines, public standards have been created and disseminated. However, beyond this, further efforts need to be made in conducting empirical research that contextually examines actual changes in classroom teaching and learning at large and the problems and issues emerging within interdisciplinary technology curriculum development (Lewis, 1999). One of the problems that studies address in relation to current ideas of technology education is a lack of attention to ethics and the active roles of people in designing and using technology (Pannabecker, 2004). That is, reformative action for technology education still leaves out or superficially handles student development of ethical and critical understandings of social issues.

In this politics of technology education, what kinds of new possibilities could "service integration" provide in technology practices? Could it promote redirecting current technology curriculum reform to fostering responsible technical professionals who are seriously able to consider various non-technical factors, such as local cultures, users, and sustainability issues? My dissertation study explores and discusses these questions by examining empirical findings of the reality and challenges emerging within a case of service-learning practice in current postsecondary technology education.

The Pedagogy of "Service Learning"

> When school introduces and trains each child of society into membership within such a little community, saturating him with the spirit of service, and providing him with the instruments of effective self-direction, we shall have the deepest and best guaranty of a larger society which is worthy, lovely, and harmonious. (Dewey, 1990, p. 29)

A few weeks after my first visit to the INIS class, I decided to take this case as my dissertation research. I went to ask Martin if I could conduct research on his course. I expressed to him how excited I was to study "this kind" of teaching and learning. At that time, I did not know how to describe the pedagogy that the INIS course used. Martin responded to me: "Oh, you mean *service learning*? Is that what you are interested in?" That is how I came to find out about "service learning," and started my journey to study this pedagogy.

Even though as a student of education, I was late to learn about service-learning pedagogy, I discovered it as a prevalent educational paradigm that had been advocated and implemented across diverse grades and subjects throughout the nation. In the U.S., the government has been strongly enforcing community service in public education (Zlotkowski, 1996; Kahne & Westheimer, 1996). Also, for the last two decades, a number of organizations or institutes have arisen to support the growth of community service programs on college campuses (Zlotkowski, 1996; Levine, 1994). Even while I was studying this case, the university in which the INIS course was situated had been rapidly evolving with strong advocacy of service adoption into academic courses by providing workshops to faculty members and instructors on campus.

As a form of experiential learning, service-learning pedagogy is used to enable students to learn subject knowledge through community service experience. Like school-to-work plans, cognitive apprenticeships, and internships, service learning is also known as an alternative pedagogy that intends to connect formal school settings and the real world. Some researchers (see Burr, 2001; Gamson, 1995; Resnick, 1987) have continuously asserted that service learning has its potential value in changing traditional,

teacher-centered school education, which is taught in isolation from real social contexts. Also the advocates of service integration in academia have strongly believed that this curriculum reform can help educating students with important civic values and ethical codes.

But beyond these theories or all the educational promises projected, what does community service or service learning mean to current postsecondary education and furthermore to our society? Can it really promise us social transformation and democracy? If it is such an "innovative" pedagogy, why is it not much more widely used in public education? Along these lines, especially in modern society in which technology plays a significant role as a main social capital, what does service learning mean to technology education? What kind of teaching and learning can possibly be realized in an actual technical training course when it implements community service as the main class activity?

Shaped by all these questions, my research began to look deeply into this INIS computer training course in a public Midwestern American university. In a holistic and contextual understanding of what kind of teaching and learning occurred within INIS, I began to explore the meaning of this service learning to postsecondary technology education. That is, was this service learning implemented as an "innovative" pedagogy for postsecondary technology education in terms of fostering responsible technology professionals and critical users? If so, how? If not, why?

To explore this issue of alternative technology curriculum development and its enactment in higher education, I asked the following research questions:

1. What kinds of shared educational beliefs and perceptions about technical training have driven and shaped this service-learning practice? What was the instructional

goal of the teacher?

2. What kinds of discourse and learning did and did not take place in the course?
3. What kinds of problems or challenges did the teacher face in designing and implementing the course, and how did he manage the difficulties?

Significance of the Study

Not surprisingly, I have found a rich and large body of literature on community service and its integration into education. Most of the literature, however, has been dedicated to proving all the intrinsic benefits of community service or service learning. On the one hand, the social and political demands for civic duties and democracy have strongly advocated for community service, and on the other hand, from the educational standpoint, Dewey's experiential learning and democratic education underpins the promotion of integrating a service component into teaching and learning. In contrast, few studies have conducted empirical research dealing with content-related issues (Morton, 1996; Zlotkowski, 1996). Also, few of them evaluated the effectiveness of current service-learning programs by understanding the situated contexts. In fact, most of these empirical studies simply relied on survey results, and concluded with a few suggestions for effective instruction in general. There is very little literature that critically discusses the problems and challenges that teachers and students face while they are engaged in a practice of community service or service learning.

Furthermore, compared to research on social studies, few empirical studies have been conducted to evaluate college technology courses incorporating community service. The more significant problem is that almost none of the research has critically evaluated existing practices of service learning for technical training. Instead, most of the research

simply describes the curricula or activities of service-learning programs as "innovative," assuming that such student experiences in service guarantee authentic learning and great benefits to students as well as to local communities (Freeman, Field, & Dyrenfurth, 2001; Michael, 2001; Senior, 1999). None of the research that I found shows the trajectories of teaching and learning within existing practice, nor asks how this learning environment can actually promote student development of ethics and holistic understanding of technology. Hence, I believe that my ethnographic research of INIS focusing on student learning will enable educators to understand problems and issues that they may encounter in their designs and implementations of community service learning in postsecondary technology education. This case study will offer these benefits not simply by providing general suggestions for improvement, but rather by having teachers vicariously experience teaching a course incorporating service projects. I also hope my research helps promote further discourse on developing alternative pedagogies that enhance students' critical inquiries and perspectives about technology in higher education.

Organization of the Next Chapters

This dissertation includes six chapters. In the first chapter, I have explained why this case study of service learning is important in the field of technology education. I have described not only the basic theories, but also my personal experiences and inquiries that drove me to this journey.

Chapter two provides a further description of the INIS case that I studied, in terms of the participants and the course curriculum. I also discuss the reason that I chose an ethnographic inquiry as my research methodology to conduct a situated evaluation of the

service-learning course. Later in this chapter, I describe specific research methods that I used for data collection and analysis.

In the following three chapters (Chapters three, four, and five), my research findings and interpretations are discussed in depth. I do not include a separate literature review chapter, but add necessary theoretical explanations to each chapter along with my data interpretations.

Chapter three shows my investigation into the participants' perceptions of technology/technology education and the rationales behind the incorporation of community service into the technology course. The prevalent student perceptions about technology education are discussed in comparison with the teacher's pragmatic perspective versus the utilitarian standpoint. Dewey's vision of pragmatic technology and experiential education for social democracy is also comparatively juxtaposed with those participants' views of technology education.

In Chapter four, I address the limitations that I discovered in the INIS course design through my observation of student learning and a curriculum analysis. By elaborating how INIS students engage in service projects throughout a semester, I discuss three educational limitations that I found in the INIS service-learning design and implementation for technology practice.

Chapter five deals with the issue of designing activities for student values development and critical reflection on service experience. In this chapter, I return to address the main theme of this study regarding the possibility of student values development in technology education through community service experience. Juxtaposing this with the valuable literature on service learning (especially on an ethic of

care), the INIS course's strengths and weaknesses are reviewed in terms of student development of moral sensibilities.

The last chapter (Chapter six) discusses the reality, challenges, and the future direction of service integration in technology practice at three levels (course, program, and institutional levels) in pursuit of fostering social responsibility for technology professionals and users. In this chapter, I particularly introduce my last interview with the INIS course instructor on ideal service learning and its enactment in technology education, in relation to his ideas for future curriculum reform. Through revealing my growing etic understanding of INIS, interwoven with the course instructor's feedback, I propose a venue for reconstructing the meaning of innovative service learning at large and its potential directions for reform in technology education.

CHAPTER 2

A SITUATED EVALUATION OF SERVICE LEARNING

> Addressing the question "What does it mean?" is fundamental to the evaluation process and requires a systematic approach to the gathering and the interpretation of data. . . . While this can be an arduous task, it is an essential means of uncovering all of the dimensions of a program, including mission, processes, relational influences and impact. (Jackson, 1993, p. 129)

What kind of truth or solution we discover is not isolated from how we approach the questions that we pose. Furthermore, the selection of a methodology cannot be made without considering the type of research questions that we ask. In my exploration of the INIS case, I do not simply intend to determine whether a case of service integration is a success or a failure or to generalize the benefits and weaknesses of service learning in technology education at large. Rather, I try to take a holistic approach in evaluating this service-learning course in terms of its situated contexts, the rationales behind the service integration, and the actual patterns of teaching and learning that occur. The purpose of my study is not to advocate or oppose the prevalent adoption of service-learning pedagogy, but rather to find out the conditions and key concepts for creating alternative technology education through community service experience. That is, the focus of this situated evaluation of the INIS case is an in-depth understanding of "a mechanism for capturing the desirable dynamic interplay between teachers, students, and community educators" (Jackson, 1993, p. 129).

The INIS Case and Its Participants

INIS, which Dr. Martin Wolske has taught since 1997, is a college credit course that has introduced mainly Library and Information Science (LIS) master's students to

basic concepts about computer-networked information systems. At the invitation of a non-profit university organization, Martin integrated a service-learning component to the course in the fall semester of 2000. After the first successful semester implementation, community service projects have become the main course requirement. Over the past several years, INIS has consolidated its position at the university as a computer training course, which allows college students to apply their technical skill acquisition for serving the needs of real community organizations. Every year, forty to seventy university students and more than ten community organizations benefit from this INIS course's service projects.

The participants in this research consist of four groups: the INIS instructor group (Martin and one teaching assistant), enrolled college students, site coordinators of each community organization, and external project coordinators, such as Prairienet Community Network and the East St. Louis Action Research Project (ESLARP). As the instructor of the course, Martin is the main contributor to the community service project and curriculum design. He is also an experienced teacher who has a solid philosophy of teaching technology in coordination with service projects. During the first semester of implementing community service, Martin supervised all the student learning activities in the lab as well as the classroom, but now he has one graduate teaching assistant who helps INIS students with hands-on work during lab hours and site implementations.

Students in this INIS course are mostly Library and Information Science master's students who will pursue their careers as public or private librarians after graduation, and some of them expect their future work to be related to systems management or the use of computer technology. Just a few undergraduate and graduate students from other

departments are enrolled in the course with the instructor's permission. In regard to age, gender, ethnicity, and technical experience, the profiles of INIS students varied across semesters.

In order to conduct the service projects, INIS students communicate with site coordinators who are generally the representatives of community organizations (such as the pastor of a church or the president of a school) selected by Prairienet for the semester of student service. These community organizations include churches, after-school or summer programs, senior centers, daycares, and libraries, which play central roles in fostering diverse activities for the residents of underrepresented communities. East St. Louis has been the target community for INIS service projects since a service component was first incorporated into the course. In fact, this community has attracted many nearby public and private universities, and maintained long-term partnerships with those universities in a variety of research projects. A number of community-based, university projects have been dedicated to the revitalization of East St. Louis' economy, culture, and environment.

Although the primary focus of my research is to examine INIS students' learning through their interaction with the instructor as well as with the site coordinators, to fully understand the case, the contributions that external project coordinators (Prairienet and ESLARP) make to the implementation of the service-learning practice should not be ignored. First, Prairienet, a non-profit community network organization, was founded in 1993 by the junior faculty of the LIS department. As a unit of LIS and the university, Prairienet has provided disadvantaged community organizations and low-income families with computer hardware, free or low-cost network services, and technical training. One

of Prairienet's projects is to refurbish and distribute donated computers to local communities in need. In these missions, the director of Prairienet, Mr. Paul Adams, listened to the East St. Louis community's request to help them resolve its need for public computer services, and initiated the incorporation of community service in INIS by inviting Martin to redesign the course curriculum. Since then, Prairienet has played the central role in supporting INIS with most of the equipment and technical resources required for the service, and more importantly with site selections. Prairienet also takes charge of maintaining the relationships with East St. Louis community organizations after student semester-long projects are completed. That is, it provides basic computer training, technical assistance, and sometimes new arrangements for system upgrading to the community organizations that participated in INIS service projects.

East St. Louis Action Research Project (ESLARP), another coordinator of the INIS course, is a university-level, community-based research project. Since 1987, through this project, university faculty, staff, and students have worked with community organizations in disadvantaged urban areas in East St. Louis, such as Alorton, Brooklyn, Centerville, and Washington Park. The project has mainly focused on urban planning and landscape architecture in order to revitalize the marginalized urban areas that have undergone drastic decreases of economy as well as population since 1960. In addition, 98 percent of the residents in 1990 were African American; this ethnic group has remained dominant in these urban areas. The key concept of ESLARP is that through their collaborative partnerships with the university, community residents identify and challenge the social, environmental, economic, and technical problems emerging within the community. This action research project is based on the belief that the residents

themselves have more intimate and extensive knowledge of their own community than outsiders have, and their active participation is vital for success in addressing those problems. ESLARP helped Martin when he first designed the INIS course curriculum with community service. After the first INIS service projects were successfully accomplished, ESLARP has limited its support to INIS to the coordination of university students' site trips to East St. Louis.

The Course Curriculum: Structure and Content

The INIS course syllabus in the fall semester of 2004 includes Martin's statement of the instructional objectives for INIS as follows:

> The overall objective of the course is to both provide a clear conceptual understanding of the computer hardware, operating systems, and networks that make up networked information systems and also to prepare students to take a lead as information technology managers.

He continues to clarify these two main objectives with the specified student abilities to be acquired from the course:

1. Skills that enable them to design systems that will not only serve today's needs but setup an infrastructure for tomorrow's needs by anticipating tomorrow's technologies;

2. Insights into the strengths and weaknesses of computers and networks as tools used to meet the needs of "the community" in which they find themselves;

3. Skills that allow them to effectively assess and manage the "total cost of ownership" by looking at the planning, implementation, and maintenance phases of different network information system models;

4. A basic knowledge of computer hardware, operating systems, and networks through hands-on training.

INIS provides students with various learning activities in two different time blocks throughout a semester. During the first eight weeks, students learn about basic

concepts regarding computer hardware and networks, while for the second half of the course, they actually implement community service projects. The topics that the INIS course curriculum covers throughout a semester are shown in below[1]:

Table 1

The INIS Course's Weekly Topics

Week	Lecture topics	Lab topics
1	General concepts and terms	Introduction to lab facilities
	Course overview	Comparing the computer to a Lego set
2	Hardware overview	Bios/CMOS information
		Inventorying computer innards
3	More on hardware (memory, storage, and troubleshooting)	Additional inventorying of computers
		Adding memory and storage
		Troubleshooting
4	Operating systems: Overview	Install Windows 2000
		Install Lynux
		Create a dual boot system
		Review some best practices when installing an OS
5	Networks: Overview (types of networks, overview of LANs)	Install & configure a network interface card
		Add/remove protocols

(*table continues*)

[1] This is shown in the course syllabus of the fall semester of 2004. I reorganized and put the weekly topics into a table in order to enable readers to overview them conveniently.

Table 1 (*continued*)

Week	Lecture topics	Lab topics
		Troubleshoot
		Built a small LAN
6	Networks: WANs	Setup Windows NT & Linux for networking
		Put workstations on the Internet
		Use diagnostic tools (traceroute)
		Setup a router to create a private network with shared Internet access
7	Networks: Connecting to the Internet	Revisit traceroute on a PC
	Movie: *Warriors of the Net*	Touring the LIS networks
		Diagram some network scenarios
8	Trip preparation (Outside classroom activity: TAP)	Community service and site survey
9	Presentation by teams	Inventorying donated computers
	Review of common issues	Making cables
	Summarizing computer needs for sites	Imaging computers faced by each site
10	Networks: Clients & servers	Open lab
11	Networks: Security	Open lab
12	Wireless details	Open lab
	Guest speakers: System administration in LIS	
13	Guest panel of former LIS students working in techie areas	Open lab

(*table continues*)

Table 1 (*continued*)

Week	Lecture topics	Lab topics
14	Computer delivery	Open lab
15	Movie: *Revolution OS* Networked information systems: What's the future look like	Open lab
16	Final presentation	Open lab

The course syllabus also indicates weekly readings, based on the textbooks that Martin listed:

Hardware

1. Ron Gilster (2001) PC Hardware: A Beginnner's Guide, Berkeley, CA: Osborne/McGraw-Hill, or
2. Thompson & Thompson (2002) PC Hardware in a Nutshell, 2nd Edition, O'Reilly, or
3. Keogh (2002) Essential Guide to Computer Hardware, Prentice Hall, or
4. Charles M. Kozierok (2001) The PC Guide Online.

Networking

1. Bruce Hallberg (2003) Networking: A Beginner's Guide, 3rd edition, Berkley, CA: Osborne/McGraw-Hill.
2. Douglas E. Comer (2000) The Internet Book: Everything You Need To Know About Computer Networking And How the Internet Works, 3rd edition, Upper Saddle River, NJ: Prentice-Hall.

However, in INIS, these weekly readings and textbooks are not required, but rather supplied as a reference to help students with each week's content. That is, INIS students can deliberately choose their textbook, from which they can learn the weekly topics. They can also decide when to do the readings; they do not need to read the textbook

before the class. Such decisions all rely on individual students and their learning styles. This is indicated in the instructor's introduction to the course on the first day.

In general, INIS students have a two-hour classroom meeting and a two-hour lab every week. During the first hour of the classroom meeting, Martin responds to student questions and concerns. Students can raise their questions in the classroom, but most often, Martin starts with his prepared answers to the questions that were posted in students' online weekly reflections. After a break, Martin continues to lead the second session of the class by lecturing on key concepts, terms, and procedures that are required to understand each week's lab topics.

The INIS lab hours are provided in three different time sections every week, such as Thursday 10am to noon and 1 to 3pm, and Friday 10am to noon. INIS students can each select one of the lab sections, which is required for the whole semester. These lab sections often become the main criterion for dividing students into work groups for community service projects. During the work lab, Martin guides his students through a specific hands-on activity that covers the week's course content. Also, one teaching assistant helps these students with their hands-on work in the lab. This kind of instructor-guided lab work continues throughout the first half of the semester. In the latter half of a semester, when students work on their own within groups doing their service projects, the lab opens extended work hours in addition to the regular lab sections.

INIS students also submit two different kinds of weekly assignments: "One-minute" paper and "Concept" paper. In their "one-minute" papers, students write their brief comments, concerns, or questions as they reflect on their learning from each week's class. This assignment is similar to writing a short version of a personal journal, and it is

submitted through an existing Web form by the early morning of the day before the next classroom meeting is held. The main purpose of this assignment is for the instructor to check the process of student learning. Martin also gives his feedback on students' reflections and questions during the classroom meeting. For this assignment, INIS students have to write eight one-minute papers throughout the semester.

Compared to one-minute papers, students' "concept" papers discuss specific concepts about computer hardware, networks, and technical troubleshooting. They have to write their answers to the instructor's questions after each week's work lab. For instance, in the first concept paper, Martin asks students to clarify the key concepts of troubleshooting in their own words, thinking through the lessons they learned from the lab. Martin wants his students to describe such key steps as "observation," "thinking," and "trying a possible solution once at a time," in their papers. Looking up the key answers Martin provides, the INIS teaching assistant grades students' concept papers.

For the second half of a semester, INIS students participate in community service-learning activities: they conduct site surveys, plan system designs, establish computer labs to meet the needs of community organizations, and document their group projects of community service. Every semester, the director of Prairienet (Paul) selects several service recipients among the community organizations that cannot afford to buy computers and networks, which would be useful for their own goals of serving the rest of the communities. Mostly, community organizations who know about this opportunity from other sites deliberately contact Paul to notify him of their interest in the project. Then Paul visits the sites and makes initial contracts with them before an academic semester begins. One of the main purposes of his initial contacts with these site

coordinators is to let the community service recipients understand their responsibilities as well as the general procedures for the projects. Also during the process, Paul asks them to define their visions of use of computer labs in advance, before they actually meet university students.[2]

Once community sites are chosen, INIS students who have already undergone initial course requirements in preparation for community service projects form groups of four to six to be assigned to their sites. During the semester, students take two site trips to their assigned community organizations. In their first field trip, students conduct site surveys in order to learn about the community organizations and their needs for networked information systems. After finding out the sites' interests, needs, and their cultures, groups of students collaborate in planning, designing, and implementing site computer labs. Students refurbish or upgrade donated computers (which are provided through Prairienet) for creating adequate labs for the sites. At their last visit near the end of the semester, students actually deliver and install the refurbished computers and networks in their sites.

Students also document their community service projects and present their results to the class on the last day of instruction. In their final presentations and documentations, students report the needs of their assigned community organizations, their groups' initial plans of service, the services they actually provided, the challenges they encountered, and the lessons they learned. As indicated in the 2004 course syllabus, student groups' final reports should specifically include:

1. A description of the site;
2. A digest of major internal and external group communications, including a review

[2] The site contract form, called "Memorandum of Understanding" (2006), is attached (Appendix D).

of the initial site survey interview, subsequent communications with the recipient site, minutes from group planning sessions, and a review of any other relevant communications;

3. A synopsis of the implementation plan and rejected alternatives;

4. An inventory of equipment and software placed in the community technology center;

5. A schematic of the final floor plan implemented;

6. A summary of major problems encountered, solutions tried, and solutions implemented; and

7. A review of lessons learned by the group and by individuals within the group throughout the course of the final project.

Overall, INIS students' learning is evaluated on the following criteria:

1. One Minute Papers (8% of total grade)

2. Concept Papers (40% of total grade)

3. Final Project Evaluation (47% of total grade)

4. Student Evaluation (5% of total grade)

Student evaluation is INIS students' anonymous rating of "the involvement of fellow final project group members on a 0-5 scale." The course syllabus also clarifies that this student evaluation is "not a rating of a [fellow] student's technical ability, but a rating of [his or her] overall contribution to the project."

Ethnographic Inquiry

Service learning has been widely advocated in public education because of its democratic characteristics. A rich body of literature has discussed the benefits of service learning, but without deep consideration of the specific conditions and contexts in which the pedagogy is adopted (such as discipline, grade level, and the type of educational

institution). Few studies have evaluated and probed current practices by asking the meaning of service learning in its situated contexts. Criticizing such prevalent, decontextualized studies of service learning, Fleda Jackson (1993), in a guidebook published by Campus Compact, points out the emerging need for "ecological" evaluations of service-learning practices. Using this term, she continues to assert that an evaluator should identify not only strengths, but also weaknesses of the practice, and its cultural contexts and conditions for successful implementations.

In recognizing this critical request for ecological evaluations of service learning, I began to study INIS in order to analyze the complexity of an actual practice that is particularly implemented for technical training in the postsecondary educational context. My research does not advocate a ready-to-use program in various settings simply by highlighting the inherent benefits of a service-learning curriculum, its limitations, and influential factors for success. Instead, it pursues creating a shared space for educators to reflect on the teaching and learning of an existing technology course. Reading this report of my personal journey for understanding the INIS course, technology educators and administrators (including the INIS instructor and any influential others related to this research) will, I hope, ask themselves about the meaning of the technological literacy they have envisioned. I also want them to continuously reflect on, and creatively change their teaching practices. For this reason, my research uses ethnographic inquiry and a situated (or ecological) evaluation, instead of summative and formative evaluation methods that have been widely adopted in the field of educational research.

The effects of a new educational program have been often generalized in the form of summative or formative evaluation without understanding the specific classroom

settings and the process of change (Bruce & Peyton, 1993). In contrast, the "situated evaluation" that Bruce and Peyton suggest is an "ethnographic approach," understanding the reasons for, and the process of, changes within a specific educational practice. Hence, a report of situated evaluation describes the whole process of design, implementation, and evaluation of a practice, including initial visions, the reasons for change, differences in the setting, and changes made throughout time. In this sense, situated evaluation is a continuum of contribution to change or a step forward to the holistic understanding of a new implementation, rather than a context-insensitive construct or a deterministic application of findings.

Ethnographic research methodologically applies "long-term participant observation with in-depth interviewing" (Miller, Hengst, & Wang, 2003). The "sustained and engaged nature" of ethnography is based on the conceptualization that the researcher-participant relationships can significantly shape the researcher's emic understanding (Miller, Hengst, & Wang, 2003). In ethnographic research, what enables scientific inquiry is not the arbitrary elimination of subjective errors or biases, but the researcher's on-going, self-reflexive learning to understand the multiplicity and complexity of postmodern social reality by carefully watching and listening to indigenous people.

In fact, how we legitimate knowledge in empirical social science is not merely a methodological question, but an epistemological issue, which is deeply rooted in our conceptualization of human knowledge, language, and science. Erickson (1986) defines and analyzes a set of related research methods, named as qualitative, ethnographic, interpretive, case study, symbolic interactionist, and constructivist. According to him, their main methodological emphases differ slightly, but all these approaches stem from

the same epistemological ground. Becker (1996) distinguishes this epistemology for qualitative research from quantitative research epistemology in terms of how credible knowledge is generated in describing social reality. He claims that if quantitative researchers ask the questions of "validity," "reliability," and "hypothesis testing," qualitative inquirers consider "accuracy," "precision," and "breadth" for judging the quality and credibility of their results. That is, one finds its epistemological ground in gaining substantive "objectivity" and "generalizability" by controlling empirical settings, whereas the other relies on the "inter-subjectivity" between the researcher and the participants in order to excavate difference, and to understand the complexity of social reality *in situ*.

Moreover, as shown in Jean Briggs' (1970) statement regarding the role of postmodernist ethnography, researchers in ethnographic inquiry can only provide a weave of possible interpretations about actors and actions on the basis of what they hear and observe. In this sense, doing research is a constructivist and historical process of learning for ethnographic researchers to make meaningful knowledge. Researchers can develop a meaningful construct of knowledge through their continuous, self-reflexive hermeneutic efforts to embrace the complexity of social reality.

Projecting my study into this epistemology of ethnographic research, I plan to provide readers with "thick descriptions" that enable them to walk through my experiential understanding of the case. I also believe that "subjectivity is not seen as a failing needing to be eliminated but as an essential element of understanding" (Stake, 1995, p.45). Hence, the report of my research not only portrays my observations—participants, activities, discourses, and the context—but also describes how my

understanding of the INIS service-learning practice grew as time passed. My personal journey to grasping the meaning of the case was a continuous struggle for me because I could not easily distinguish my perspective (especially on technology education) as a researcher from that of the insiders, such as the teacher, students, and other influential persons. The "difference" between me and the participants has become the theme that I want to discuss in this writing. Therefore, I want to render readers a full description of the tensions that I experienced between what I first wanted to see from this service-learning practice and what I actually saw in INIS. For this reason, Chapter One explains why and how I came to choose this case for my dissertation research. In the previous chapter, I also show the theories that shaped my researcher perspective on technology and its educational practice. In the next three chapters, I will portray and discuss what I found in INIS, similar or dissimilar to my theoretical framework—precisely, my conceptualized ideal of service learning in light of Dewey's vision of democratic education.

Ethnographic inquiry is valuable when it gives voice to underrepresented groups, when it finds new genres of the indigenous cultural discourse, and when it reveals rejected perspectives in weaving our "perceived" social reality. Hence, in Becker's (1996) metaphorical expression, qualitative research is like finding "holes in clothes." My research of INIS does not find a new paradigm or concept for technology education, but pursues revealing what is missing in a real practice in terms of relevant theories, and why this happens.

A researcher's continuous and meaningful construction of knowledge in both microscopic and holistic views demands his or her sensitive uses of multiple methods—observation, interview, surveys, artifact collection, and audio and videotaping. The

methodological emphasis is placed on how a qualitative researcher continuously creates dialectical hermeneutics interplaying between the "contextual" and "narrated" worlds in order to generate credible results throughout data collection, analysis, and reporting. The concept of triangulation emerges from this methodological demand to make a sensitive use of multiple research methods. Triangulation is a crucial methodological approach in this study. For instance, interview data (listening to indigenous people's narratives of experience) are triangulated by other data sources, such as participant observation (watching their actions). I also have diverse interview sources by taking triangulated procedures of selection. In addition, a member check with the INIS course instructor is used for another triangulation of data and interpretations.

Overall, I believe that as an ethnographic inquirer, my sustained, self-reflexive interpretations of the case guided my development of emic understanding and my research writing. In this report, I select and address only one possible interpretation of the case that I studied on the basis of my understanding of it. However, as I provide rich descriptions of the contexts that led me to this interpretation, I will give readers opportunities to think through this service-learning practice. My interpretation of this technology education practice naturally stemmed from my continuous struggle for defining what aspect of technology education was missing in this real practice of service learning. I believe that my finding and naming of this gap between the real and the ideal will be the main contribution of this research to a future move for bringing "innovative" technology education to real practices in higher education.

Data Collection Methods

My data collection from classroom observation started in the spring semester of 2004, and I continued this as my primary research in the following semester. In the fall semester of 2004, the main sources of data stemmed from participant class observation, collection of artifacts, pre- and post-course student surveys, and formal and informal in-depth interviews.

First, I observed students' weekly face-to-face classroom interactions and lab meetings, as well as their two field trips to their assigned community organizations. These observations were videotaped or audiotaped for the later analysis. I also wrote notes of field observations throughout the whole period of the research in order to keep track of the research progress.

Second, along with the field observations, I collected artifacts including the course syllabus, individual students' assignments (one-minute and conceptual papers), documentations about their service projects, final presentation materials, and grade records. I also collected student groups' shared resources through WebFTP or web bulletin board, and archived messages from their e-mail exchanges with their classmates, the instructor, and site coordinators. Photos of community sites were taken before and after INIS students built computer labs. My documentary collection also included any printed materials or web resources regarding the INIS course, Prairienet, and ESLARP.

Third, during the first week of the semester, I had students fill out a web-based pre-course survey for gathering information on student profiles, class expectations, prior experience with computers, conceptions about computer technology, and experiences of group work or service to communities (see Appendix A). At the end of the semester, in

addition to the ICES course evaluation, I also conducted a survey to ask students about their evaluations of the overall learning from the course, service projects, and any conceptual changes about computer technology (see Appendix B).

Finally, I conducted formal and informal in-depth interviews with the instructor and two or three individual INIS students from each student work group. My two interviews with the instructor focused on understanding his view of technology, teaching philosophy, expectations for students, reasons for specific curriculum designs or teaching strategies, and his own course evaluation. Later, in spring 2008, I included another interview with the INIS course instructor for a member check on my research report. Interviews with students were designed for collecting individual participants' narratives about their learning experiences through the course as well as the projects. Twelve INIS students were selected for the focused interviews by considering their gender types, engaged service project teams, and prior technology experiences. Student participants were interviewed before their first site trip, during the time of planning and preparing for service, and after their final site trip. In 2007, I also interviewed the director of Prairienet in order to understand the historical context of INIS and the organizational supports to the course projects.

Table 2

Data Collection Methods

Method	Who	When	Where	What/How
Participant observation	Students/ Teacher/Site coordinators	Spring/Fall semester, 2004	Classroom/Labs/ Site trips to East St. Louis	Videotape/Field notes

(*table continues*)

Table 2 (*continued*)

Method	Who	When	Where	What/How
Pre-course survey	Students (18 out of 23 responded)	First week of fall semester, 2004	Internet	Web-based (see Appendix A)
Post-course survey	Students (23 out of 23 responded)	Last day of course, fall semester, 2004	Classroom	Paper-based (see Appendix B)
Focused interviews	Teacher	Three (one in early fall semester, 2004; one after semester ended; one in spring 2008)/ An hour- to an hour and half- interview	Teacher's room	Audiotape
	12 Students (2 Male & 10 Female)	Three in fall semester, 2004 (before first site trip; before final site trip; after final stie trip) /Thirty- to fifty-minute interview	Varied	Audiotape
	Project coordinator (the director of Pariri enet	One during spring semester, 2007/ Thirty-minute interview	Office of Prairienet	Audiotape

Note. Collection of artifacts includes:

- Weekly assignments (Concept and one-minute papers)
- Student final project documents
- Communication archives (e-mails, Web bulletin board)
- Photos taken during two site trips
- Other documents (i.e., Memorandum of Understanding, brochures from East St. Louis, ESLARP/Prairienet/INIS course web pages)

Analysis Methods

This case study included three main analyses: the historical and organizational context of the case, the instructional design and implementation, and student interaction and learning pattern. First, I analyzed the history of the INIS course and the organizational context in which the case was situated. By analyzing the narratives of the instructor and of the director of Prairienet, along with other resources on Prairienet and ESLARP, I examined the educational context in which this course had begun and evolved over time.

Second, I also analyzed the instructor's roles and specific instructional designs and strategies that he used for supporting student service learning. Based on a curriculum analysis and interviews with the instructor, this analysis asked the following questions: (a) What kind of student learning did the instructor aim to teach with the course curriculum?, (b) What was the instructor's view of technology that drove his teaching of the course?, (c) What kinds of problems or challenges did the teacher face in the design and implementation of this service-learning course?, and (d) How did the teacher resolve problems he faced, if any?

Finally, the patterns of student learning were analyzed in terms of students' conceptual changes or inquiries about computer technology and technological design and use. The specific questions for the analysis included: (a) What kinds of preconceptions and experiences about technology did students bring to the class?, (b) What kinds of inquiries about technology did students raise in the process of learning?, (c) What kinds of conceptual conflicts or learning trajectories did INIS students encounter through service experiences?, (d) In what ways did students change their perceptions of

technology, if any?, and (e) What kinds of relationships did students as computer network designers build within their own classroom, and between their classroom and the communities they served? For answering these questions, I analyzed thematic episodes from participants' observed interactions and discourses, and also looked at changes across students' narratives of their own experiences throughout the semester—before, during, and after the community service.

These analyses overall helped me understand the complexity of teaching and service learning in INIS, and my growth of understanding the case eventually led me to a critical curriculum analysis for a constructive meaning making. In the following three chapters, these analyses will be discussed in depth. Next, I will specifically portray my journey in understanding the rationales behind the course curriculum design and implementation.

CHAPTER 3

UTILITARIAN VERSUS PRAGMATIC PERSPECTIVES ON TECHNOLOGY EDUCATION

> To learn about computers as they are part of our lives both personally and professionally. (A male INIS student, technology-experienced, from the first student survey, Fall 2004)

> I have seen through prior work that technology is very important, no matter what job you have. I wanted to learn more about computer systems and how to put them together and work on them, and felt this course would give me a hands-on way to learn that. (A female INIS student, technology novice, from the first student survey, Fall 2004)

> He [My advisor] said that it is good to have a broad-based background in library and information science, and so taking a technology course early is a good idea. From my conversations with people in the profession, I have also learned the importance of technology in the field today. (A male INIS student, technology-experienced, from the first student survey, Fall 2004)

One of the most dramatic changes that the advancement of computer technology has made is librarianship. Many electronic resources have replaced paper books, and physical library buildings have gradually given way to the virtual space on the Internet in terms of its traditional roles in providing information and resources. Even in this rapid restructuring, the "old bottle" may be never obsolete, but a certain negotiation is inevitable to enable both the "old" and "new" frames to coexist. Also, this structural change has surely impacted the pattern of professional development in librarianship. Future librarians cannot insist on their competency in the job market without being highly trained about computer technology—specifically, a networked information system.

Student Profiles and Course Expectations

The INIS class that I observed in the fall semester of 2004 consisted of five male and fifteen female students. Two female students were in their fifties, whereas others

were about twenty-five to thirty-five. In this class, all the students came from the Graduate School of Library and Information Science (GSLIS).[3] Most of the students did not have many experiences with computer hardware although they were familiar with popular software, the Internet, e-mail, and some web design programs. Compared to the student profiles from other semesters, this INIS class showed relatively less student diversity. It was also unusual to include a high number of students who were involved in certain kinds of service work outside the classroom. Four female students worked as graduate assistants at Prairienet or for user service in GSLIS.

During the first and second weeks of the semester, I conducted a student survey, and as a part of it, investigated INIS students' preconceptions about a networked information system and designing.[4] The survey results, based on fourteen out of twenty INIS student responses, showed two distinct categories of student perceptions. One category defined a networked information system as computers/machines connected to each other:

Student 3a (Caucasian, Female, Technology Novice)

> Answer to Q 3: A system of computers with Internet access that are on the same LAN.
>
> Answer to Q 4: Physically creating a network in a computer lab so that people in a certain community can have internet access.

Student 3b (Caucasian, Female, Technology Novice)

> Answer to Q 3: A group of computers that work together and share resources and information.

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[3] Occasionally from semester to semester, a small percentage of students who were enrolled in the INIS course were undergraduate or graduate students from other departments. For instance, in Spring 2004, two undergraduates who majored in Computer Science were enrolled in the course.

[4] Questions 3 & 4 in the first student survey (see Appendix A).

> Answer to Q 4: Putting together computers and allowing them to function together by doing things like installing appropriate software and hardware, setting up a server, and making writing connections.

The second category referred to the system as users' needs/communities operating behind the machines:

Student 3c (Asian American, Male, Highly Technology-Experienced)

> Answer to Q 3: Network system can be described as computers, printers, servers, routers and switches all together connected efficiently with a user-friendly environment where users are secured.
>
> Answer to Q 4: Designing a user-friendly network information where users are comfortable using technology and are secured with the usage of technology.

Student 3d (Caucasian, Female, Moderately Technology-Experienced)

> Answer to Q 3: In the context of computers, a networked information system allows computers to talk to one another over varying distances, and to share peripherals like printers. However, I also feel that a networked information system could be used to describe a community of people who work to share information with one another, regardless of whether or not computers are involved.
>
> Answer to Q 4: Designing networked information systems means working with a group of persons and helping to determine their information needs and goals. Then, my job is to design a system (for class purposes, a computer lab) that, to the extent possible, meets all of those needs and goals.

Interestingly, female students who had little experience in computer hardware mostly perceived a networked information system simply as a machine-to-machine combination, whereas more technology-experienced students showed their further considerations of users, or of community needs and goals. A technology expert who said he studied sociology, history, and economics as an undergraduate deeply discussed the flexibility of a system as the most essential component for designing it:

Student 3e (Caucasian, Male, Moderately Technology-Experienced, Undergraduate in History and Sociology)

> "Designing networked information systems" means determining the needs of those who will be using the system, deciding how best to accommodate those needs with the available resources, adapting those needs and resources to the environment in which the system will be installed, putting into place the physical infrastructure of the system (hardware, software, wiring, and all other maintenance), educating those who will be using the system about maintaining and modifying it, and checking after the system has been installed to make sure that it is working as planned. The design should adapt to any changes or trends in networking and those institutions or individuals it serves, and so it should reflect these trends and not be a "rigid, unchangeable" system.

INIS students' preconceptions about technology and designing a networked system slightly varied depending on their personal and educational backgrounds and prior experiences with technology. However, their course expectations or perceptions about technology education were considerably similar to each other.

Some of the INIS students were required to take this course to complete their study or the course was strongly recommended by their advisors. However, most of the students decided to take this course mainly because they believed that learning about computer technology would be necessary for their future careers in librarianship and even for their current work as graduate assistants. Only two out of fourteen pre-course survey respondents talked about the chance to learn about herself/himself and community service from the course. In addition, most INIS students primarily expected to have rich hands-on activities for the course in order to acquire solid computer skills and technical confidence. Apparently to these students, community service was an additional "exciting" experience that they could have besides their main goal of acquiring computer training.

However, Dr. Martin Wolske, the INIS teacher, asserts an opinion on technology education different from this student expectation, by responding to my interview question, "What did you want or expect students to learn from this course?":

> They [students] see it [the INIS course] as too much a training course, and not really something that is um...an intellectually challenging course, I mean. It's more of, um... you know, superficially maybe looked at, as more of a kind of course [that] can be offered in part, or you know, a course that it is just meant to teach basic computer skills. But if that would be the case, I wouldn't spend a lot of time teaching binary math. And I spend more time teaching about what a graphic card is. I spend less time trying to develop troubleshooting skills and I spend more time going through cookbook examples. The course, the students I believe are some times frustrated. What else can be done? I'm trying to [inaudible] let people know if that's the case. I think they're frustrated because, what else can be done, they don't come out being able to do more technically. They still have a lot of gaps of knowledge. They don't have an easy cheat sheet to say "oh, quick here do this and do that. Now it should be fixed." The course is really more helping students to learn how to think through the issues. It really is meant to...in part get them to use some of the troubleshooting skills that they use to get through their courses and to get through their degrees.

In this statement, Martin strongly refused to teach the INIS course as skill-based training, which he knew that his students expected. Instead, through the course learning, Martin wanted his students to acquire more general academic or cognitive abilities they could apply in real-life situations, especially problem-solving skills and basic conceptual learning, rather than specific technical skills and subject knowledge. He believed that students could learn as they undergo a painful time with much trial and error, rather than by being told answers or kindly guided to solutions.

The Teacher

Dr. Martin Wolske is a Caucasian American male who currently works as a lecturer in GSLIS. Martin's educational background is in psychology. Although he did not formerly study computer science, Martin trained himself to gain expertise in

computers and networked systems by serving people in real situations. Because of his rich knowledge and practical experience, Martin had worked as the director of Prairienet before teaching the INIS course. He is also currently involved in the technical support and services that are provided to students and faculty members in GSLIS.

Martin is a cheerful and optimistic person who enjoys chatting and sharing jokes with people. In his classroom, he is also good at story-telling in a bright tone of voice. Martin is generally a considerate and caring teacher to his students. When his students work in groups, especially during the first few weeks of a semester, Martin carefully observes their group dynamics, and sensitively detects any personality or emotional conflicts. By doing this, he decides on how to form student work groups for community service projects, and sometimes intervenes in the groups to balance each individual student's participation.

For example, during a lab session, there was a student group that included a male, technology-experienced student and a female student who lacked confidence in asserting herself. After listening to the group's conversations on a technical problem for a while, Martin asked a few key questions to the group, and especially urged the female student to express her thoughts. When she answered Martin's questions well, he encouraged her with praise, and asked her to confidently speak up. After the lab, Martin told me that he had to intervene in that group because the female student could not tell her thoughts to other people even though she had a good understanding of the computer problem, whereas the male student overconfidently talked about his ideas. When I heard about Martin's psychology background, I immediately understood his teaching style and personal characteristics when he works with people. Two weeks after observing that lab

session, I conducted my first interview with the female student. She deliberately mentioned how much she appreciated Martin's encouragement that helped her overcome her fear to make mistakes in the class.

The History of INIS and Community Service

One day, after my class observation, I was filled with whole-hearted wonder. Martin had just finished with one of his difficult lab sessions, and his students had left the room. I confessed to him that from my observation of his teaching, I could tell that not many teachers would make this service learning successful because it demanded many things from the teachers. Throughout the lab sessions, Martin was enormously busy dealing with many kinds of emerging problems, such as hardware troubles, individual students' learning difficulties, and interpersonal conflicts in student work groups. I asked him how he was able to manage all these complex and difficult tasks. Martin acknowledged that implementing service-learning pedagogy would never be an easy way of teaching a course. He also agreed that teachers have to take care of too many things, both technical and non-technical. Then Martin said that if he manages all of these tasks, it is because he enjoys taking such challenges. Just as he continued mountain climbing as a personal hobby regardless of the dangers, he was used to facing and working on diverse professional challenges. While listening to him, I imagined the people who climb Mount Everest every year although they know that this activity could endanger their lives. Then I thought about the critical meaning of a teacher's courage and endeavor to realize his or her vision of education in actual teaching practices. I wondered how many teachers would be willing to challenge themselves by reflecting on their teaching practices and

making continuous changes. Moreover, in what context or support will these teachers make such an attempt to change their teaching practices, if they do? Very curious, I wondered what theory or rationale in the field of technology they would resonate with and put into practice.

The current director of Prairienet, Mr. Paul Adams, told me a story about how the idea of integrating community service into the INIS course first emerged:

> About six or seven years ago, I was approached by a small group of individuals from East St. Louis who were interested in addressing what is known as digital divide. And at that time, they invited me to come down to East St. Louis. We had a focus session, we sat down to discuss different issues. And my question then was "where in East St. Louis can we go and have access to a computer, as connected to the Internet, and it doesn't cost you anything like that?" And they said there was no opportunity like that. Whereas here in [this town], you come to Prairienet, we have a computer lab, we have full access to computers at the lobby. Anybody can walk in the door, they can use computers, and there is no charge. And there are other places like that in [another town]. Like libraries, you can go and use computers there. No charge. But in East St. Louis, there's no opportunity. So I suggested there are three things you need to do. First was we need to set up a computer lab, public access to computer labs, people from the community can use them. And second was we will have to provide training because if you set up a lab, but people don't know how to use it, they won't use it. So you need training. That's the second component. Third component is you need to be connected to the Internet. Because there is so much information on the Web, if you have a computer, you only have half of the usage of the computer if you are not hooked up to the Internet. So, you need the Internet connection. Those are the three things, computer lab, training, and Internet connection, of which they had none.

When Paul found out about the emerging community need for computers and networks in East St. Louis, and looked for a computer training course that could implement community service projects, Martin was teaching a college course named "Introduction to Networked Information Systems" (INIS) in GSLIS.

In fact, since Martin took the instructor position in 1997, the INIS course curriculum had undergone a few changes. Martin had a retrospect on the history of INIS in the first interview:

I: Would you tell me about the history of this course—how you started teaching this course and how this service-learning component was incorporated?

Martin: Okay, I actually first started teaching the course back in...um...some time around 1998 [sic][5] maybe...When I first started teaching the course, it was mostly um. . . .The course itself I took over was primarily a lecture course. There were three lab exercises. The students signed up for time to go perform the lab exercises. They then went into a room by themselves, no guidance whatsoever, to get some written instruction that they get through a couple of different processes. And so, they went through those steps and wrote their observations as they went through it [instruction].

I: What did they do?

Martin: One of them was adding memory and a hard drive, I believe. Another was installing operating systems, I believe. The third was making two computers talk to each other.

I: Was the course name the same as the current one?

Martin: Yeah, it was still an "Introduction to Networked Information Systems." Beyond those basic labs though, there was a lot more discussion about software [inaudible], some discussions on the digitalization of images. A lot of discussions about OPAC or Online Public Access Catalogue, if that is what it stands for. But it's an online cataloguing system. Mostly it was a lecture and some readings. And I believe that even in that first semester, I added a final project where students set up a lab and make a LEEP [online] library. And they worked with consultants, so they had to do all the research to figure out what kinds of computers they would use and how much would cost, those expenses. I taught it in that way two or three semesters.

In the INIS course, which had originally provided a lecture-based instruction alone, Martin made strong efforts to integrate hands-on lab activities and student projects along with basic lectures. Throughout the years of teaching INIS, Martin continuously redesigned and experimented with the course curriculum, reflecting student interests in hands-on practice and learning about technology, and using the resources available at the university.[6]

[5] Martin actually started teaching the course in 1997.
[6] He also mentioned that this course has been once experimentally taught in an online format as well.

In the fall semester of 2000, Martin finally incorporated community service projects in the course curriculum, accepting the invitation offered by the director of Prairienet. The first INIS service projects were designed to provide networked computers to three selected community organizations in East St. Louis urban areas. During that semester, some of the INIS students selected this community service as an alternative course project, and traveled down to East St. Louis in order to install computer labs at the sites. Martin continues to recall his first implementation of community service projects as a big success by gaining popularity from many INIS students:

> In fall 2000, Paul [the director of Prairienet] approached me and said he would be thinking of working with East St. Louis, setting computer labs, and what it would be [like], by the way, if we make it happen. So what I said [was] "Yeah, we already have [inaudible] students." So, we decided to go ahead and add the service-learning component to the course. The first semester was an alternative final project, so I had maybe fifteen or eighteen students who chose that final project, and another six or ten students, like that, chose to do the more traditional, at that time, final project, [which] was [to] make a LEEP [online] library with consultants. It [service-learning component] was very successful, very popular in fall 2000. So, in the fall 2001, we didn't teach this course [in] spring 2001, so in fall 2001, we implemented the final project for everyone.

Prairienet, as an important university resource, initiated and practically coordinated the process of bridging between this INIS computer training course and community service. With this significant assistance by Prairienet, the INIS course successfully integrated the first community service projects in the course curriculum, and gained student popularity, by meeting the academic needs of these INIS students in the discipline.

The integration of community service in the INIS course originally had two primary purposes. One of them was to reduce the "digital divide" in low income urban neighborhoods that had no free public access to computers and the Internet. The other purpose was to enhance student acquisition of computer hardware skills by generating

rich hands-on technical activities. For Paul[7], especially, student development of hardware skills through rich hands-on work would be the most important outcome of incorporating community service into INIS. He also believes that the free computer labs offered to marginalized communities will be highly beneficial to these communities and their group activities and be helpful for bridging the digital divide. Moreover, in the interview, Paul shows his recent interest in distributing computers to individual homes, rather than public spaces, through a new student service project. He explains that he read some recent literature showing that youths who have computers at home score higher.

However, these rationales represent a preliminary level of understanding modern technology. For instance, digital infrastructure is fundamental for providing equal access to information and technology, but the more problematic and lasting digital divide results from content that is covertly discriminatory against non-dominant cultures (Horton, 2004). Regardless of this lack of depth in understanding technology, the utilitarian approach, which narrowly focuses on the improvement of physical computer access and student mastery of technical skills, prevails in current educational computing policies and practices on the larger scale (Selfe, 1999; Bromley, 1998). It is true that technology teachers, administrators, policy makers, as well as students, have not much changed their perceptions about technology and education and remain tied to this utilitarian point of view.

[7] Mr. Paul Adams, the current director of Prairienet, is not an expert in either education or computer technology. His educational background and experience is in community development and urban planning. He earned a Master's degree in Geography with specialization in Urban Planning. Before coming to Prairienet, he also worked for city planning in Urbana, Illinois. Paul believes that community revitalization should result from the indigenous community's cultural knowledge and communicative action, but not from the outsider's top-down control and intervention.

The Teacher's Philosophy of Teaching
Technology Through Community Service

In contemporary society and education, the utilitarian view prevails (Selfe, 1999; Bromley, 1998). In this view, the creation and dissemination of the super highway to information and communication technology is recognized as the primary means for society to advance. Technology is also known as the key solution for diverse social problems, such as poverty, inequity, and lack of democratic participation. The technical elite, so-called "modern technicians," have led society with their projected vision of modern technology as an instrument for solving problems of human society as well as for realizing social innovation.

For instance, Wiener (1954) conceives social control with technological systems as an inevitable process for increasing the stability of performance against the chaotic and unpredictable nature of human society. He positively considers technological advancement the same as social innovation. Negroponte (1995) has a similar optimistic vision of digital technology, theorizing that intelligent computer interfaces come to perform the roles of human beings more efficiently. He also claims that the Internet creates a new social space for democratic and decentralized communication, and that the space supports not only information transmission, but also community building. He considers the advancement of digital bandwidth and compression technology as purposeful changes.

Marxist social theories are categorized as another branch of the utilitarian view that sees technology as a means for an end. Traditional Marxist theories of technology as the means of production naively conceptualize the capitalistic social values embedded in technological designs (Balbus, 1982). Karl Marx (1959) contends that changing the

capitalistic relations of production—the ownership of the means of production—is the key for social transformation to socialism, but he does not critically question whether the existing technology can be transferable to the new social structure. In this sense, Balbus (1982) generates a valid argument about the Marxist instrumental view of technology. Modern technicians and traditional Marxists align along the same axis since they do not perceive the "transactional" relationship between technology and society. These theories envision technology either as an innovative tool for social change, or as a value-neutral medium in social relations.

In this instrumental conception of technology, technological improvement can be either a solution for social problems, or a value-neutral product of society. This view of technology supports traditional ways of vocational training centering on student acquisition of technological skills. Traditional technology courses may provide students with hands-on activities for technical drills and practices, but they do not emphasize fostering students' ownership with technology and their critical understanding of social and cultural issues in relation to technology design and use.

Compared with this utilitarian stance, the INIS instructor's position toward teaching technology needs to be discussed to understand what rationale is behind the course design. On the first day of the class, Martin talked about his philosophy of technology:

> Technology is not a solution. It is just a tool, which is not different from a hammer. . . . First, think what your end goals are. Then, you should think how technology can help you get to the end goals. Think when it works and it does not. Technology also has significant costs. So, you should think where technology is appropriate and where not.

In reading his statement that technology is "just a tool" to be specifically chosen for an end goal, Martin's perception of technology is noticeably instrumental. However, this instrumentalism also needs to be distinguished from Marxist or other social theorist utilitarian perspectives that conceptualize and treat technology as value-neutral objects. It is because Martin recognizes two critical concepts: "Technology cannot be the solution for every human problem" and "A technology choice has both benefits and costs."

Whereas modern technicians and traditional Marxists are both indifferent to value-laden forms of technology, Martin Heidegger (1977) is one of the representative philosophers who view technology as a cultural artifact or reproduction. He is a German philosopher who provided an early philosophical foundation for understanding modern technology, and his main idea is that the instrumental concept of technology in the means-and-end relationship should be reanalyzed and rejected. He warns us that the relationship between the human and the technological has been actually reversed, but the dominance of modern technology over human activities and consciousness becomes invisible as human beings themselves deliberately surrender to technology.

Inquiring into the essence of technology, Heidegger argues that technology is at first "a way of revealing truth," but after it "comes to presence," it is the "Being" that rearranges nature and human society in order to make it immediately accessible and powerfully useful (Heidegger, 1977, pp. 12-35). By cooperatively working for the "saving power" of technology, human beings are in danger of being shaped and confined by the created technology (ibid, pp. 36-49). Heidegger is most concerned about the possibility that "the frenziedness of technology may entrench itself everywhere to such an extent that someday, throughout everything technological, the essence of technology may

come to presence in the coming-to-pass of truth" (ibid, p. 35). In this cyclic technological replication, the original purpose of technology—the revealing of truth—gives way to the "saving power." Heidegger's philosophical analysis reveals that modern technology can systematically threaten the ontological position of human beings by framing reality into its own mode of order.

Later other theorists (i.e., Ellul, Postman, & Feenberg) have further developed Heidegger's notion of the power of modern technology, contending that to live in a technocratic society means to get accustomed to think and act in favor of technology without questioning the embedded, technological value systems. Along this line, Chet Bowers, a critical philosopher of technology as well as a recent American educational scholar, points out the problems arising within modern technology, which mediates all our experiences by reinforcing certain cultural values, and reducing others (1988, p. 32). Bowers especially warns us that computer technology and its educational applications "involve the amplification of certain cultural values and ways of thinking and that this process will, by necessity, lead to the omission of other aspects of culture" (ibid, p. 35). He also specifically criticizes this modern technology, which enforces the individualistic and anthropocentric Western culture, destroying the eco-system of Nature. By strongly rejecting the idea of neutrality of technology, these critical theorists accordingly emphasize the importance of "politicizing activities" and "creating human resistance" through educational practices.

Compared with critical theories and Heidegger's notion of technology, it is questionable how seriously Martin conceptualizes the problem with the reversed relationship between technology and society, and advocates political resistance against

technocracy. However, in his own way, Martin also rejects the totality of computer technology that will take over all humanity. Martin often explains that through his long-term commitment to technical service, he found that most human problems cannot be solved by technology because they are non-technical problems, primarily caused by communication, social relationships, and psychology. I have once asked Martin what he thinks about the INIS service practice of delivering computers to such marginalized communities. He answers:

> I think that in some, meaningful, but often times, minor [inaudible]. I don't think computers in East St. Louis make, you know, a dramatic [change]. . . . As much as anything, the problems they're [community sites are] facing are still social issues. Those take a lot more time. You know, our site coordinators early on didn't have any e-mails, you know, by large. Now they have e-mail, cellular phones, they have, you know, [inaudible], multiple avenues to communicate. And the fact is we still don't communicate with them very much. There's still a breakdown between, you know, the students working on the projects and the site coordinators who have to make [inaudible] decisions. And those breakdowns happen not because there isn't a fine way of communication, but it's just because of the social problems. People are busy. Or people are not understanding the relevance or the importance of answering quickly. Or people are overwhelmed by the question itself. It's not asked in an effective way. Or there is a hierarchy that has to be followed. That just takes a lot of extra time.

Obviously, Martin does not believe in the utopian vision of modern technology. He even states that he is "extraordinary pessimistic" about the possible impacts of technology on human society. According to him, computer (or advanced communication) technology may initiate some social interactions and discourses, but cannot solve the deep-rooted, social problems in a local community.

Throughout the INIS course, Martin repeatedly tells his students that they should understand both strengths and weaknesses of a technology in its situated contexts. He considers that student ability to properly evaluate not only the benefits, but also the costs of a technology choice *in situ* is the primary learning goal of the course. He wants to raise

his students to become social leaders who can make effective and responsible decisions within future practices of technology. In the later interview, he confirms this idea, by stating that:

> My goal is also to get them to get over this idea that a computer will solve everybody's problems, but really start being able to more critically appreciate where computers can help and where computers can't.

In the course syllabus, Martin also states one of his goals of designing INIS learning activities is to provide students with "skills that allow them to effectively assess and manage the 'total cost of ownership' by looking at the planning, implementation, and maintenance phases of different network information system models."

This perspective on teaching technology is projected into Martin's specific purposes for incorporating community service in the course curriculum. "To be prepared for service-learning projects" during the first eight-week training, Martin believes INIS students need to go through "basic processes" and build up a "basic comfort level" of dealing with computer technology. But then, regarding the service-learning experience, he states,

> The service-learning projects really give them an opportunity to, um...first of all, understand applying technology to community settings, and it takes out of [sic] their normal understanding of a community. So, this is something that they can't make, or easily for most part pull [draw] on their comfort levels, their backgrounds. Most of the students aren't involved in this sort of disadvantaged community, so they have to learn how to do with [community service] in the community that isn't theirs. So they have to learn how to be a partner with the community members, and learn what the community member knows to understand the community, [inaudible] take what they know about technology and find ways to marry the two effectively. So, that in itself is one aspect of learning, about the community. The second aspect of that is in applying technology to the communities. By actually setting up a lab, they have a much more realistic understanding of the costs, total costs in [inaudible] implementation. So often you look at "Oh, I found [inaudible] at home. I'm just getting a computer that I [inaudible] because a few things are not working any more." But when it comes to putting computers in a community center, and especially when it comes to

> networking in a bunch of computers in a community center, so many more issues come into play about how to do the set-up, how to make it sustainable in a long term as much as possible. The additional cost of that is really starting to appear. . . . So, really getting understanding what it means to build computer labs and what their cost is. And the third aspect of that is to really help them understand technology itself isn't the, um...it is a possible tool. By working with technology, they [INIS students] start gaining clear understanding when the tool is helpful and when the tool isn't so helpful.

Martin deploys community service projects to allow his students to have at least three big lessons: (a) Understanding a community different from theirs, (b) Understanding how to apply technology to real community settings, and (c) Understanding both strengths and weaknesses of a technology choice/design. One of his instructional goals written in the course syllabus is also to foster student "insights into the strengths and weaknesses of computers and networks as tools used to meet the needs of 'the community' in which they find themselves." For Martin, community service is a contextual, problem-solving activity. Through their engagement in community service, Martin expects his students to think through various issues emerging within the practice and to learn how they can better coordinate a technology design with the needs of the community they serve.

Dewey's Pragmatic View of Technology and Progressive Education

There is still hope for human emancipation in technology theorists' criticisms of the technocratic society. This hope is reached differently depending on the theorists' views of technology, but crucial for creating real practices, especially in education. Within his notion of the power of technology, Heidegger (1977) also tells that "what is dangerous is not technology. There is not demonry of technology, but rather there is the mystery of its essence" (p. 28). For Martin, this hope for transcending technocracy is not

his primary concern. However, he envisions technology education for leaders as developing creative thinking skills to dynamically connect a technology choice to a human purpose by recognizing both benefits and costs of that choice in the context. In this respect, Martin's vision of technology and pedagogical approach resembles Dewey's pragmatic view of technology.

For Dewey, technology is not merely a fixed "object," but it can be an "idea" or a situated, cultural "practice." According to his theory, "pragmatic" or new technology emerges within a community of inquiry in which participants articulate their ordinary experiences with existing technologies in their shared, reflective, pluralistic inquiries (Capps, 2002; Stuhr, 2002). As Hickman (1990) points out, Dewey found the problem of cultural framing of technology, not in technology itself, but in the breakdown of dynamic connections between ordinary human experiences and epistemology, between science and psychology, and between the means and the end. Hickman (1990) summarizes:

> Dewey was never tired of arguing against acquiescence to fixed and final values or ends, and against default to unconditional or supernaturally transcendent goals. He proposed instead that goals be treated as "end-in-view"—ends that are alive and active only as they exhibit continuous interplay with the means that are devised and tested in order to secure them (p. 12)

Dewey believes that by building a community embracing multiple perspectives and inquiries within a practice, the ecological relationships between technology and human society will be reconstructed. In this way, he finds the possibility of recovering human ownership of technology to transcend the technocratic society.

Extending pragmatism to his progressive education, Dewey also strongly emphasizes the educational value of deductive scientific inquiry and problem-solving, which will complete the inductive meaning making by "testing, confirming, refuting,

modifying it [a binding principle] on the basis of its capacity to interpret isolated details into a unified experience" (Dewey, 1910, p. 82). For Dewey, it is a significant concern that classroom learning often isolates or excludes deductive methods from the whole, complete thinking process. With deductive activities excluded, students come to acquire skills and memorize theories rather than understanding them, and more significantly they value the efficient attainment of legitimated knowledge rather than an appreciation of diversity through collaborative interaction with others.

In his teaching of the INIS course, Martin also focuses on problem-solving as well as student conceptual learning. He basically believes that problem-solving is the most important ability required not only for technicians, but for everyone in everyday life situations. Martin also tells his students that recipe-like guidance will not help them learn about computer technology or provide technology services. He always encourages his students to think creatively beyond "cookbook recipes." For instance, in the lab, instead of giving direct answers to students' questions, Martin usually led them to think through the problems by asking questions back to them. Furthermore, he often asked his students not to read texts before their lab work, but to go over basic concepts from their specific needs after hands-on activities or troubleshooting experiences. Conducting community service projects—designing and installing computer labs to meet the needs/interests of real community organizations—is another kind of problem-based, situated learning, as Martin believes. Overall, concerning technology education, he highly values problem-solving activities that can promote student deductive and creative thinking.

In reviewing Dewey's progressive education, which is also concretized in his concept of experiential learning, we educators should not forget that the essence of his

philosophy lies in critical human inquiry that is essentially pluralistic and contextual, evolving within a community. The term of problem-based or inquiry-based learning, or experiential learning, is often used as representing Dewey's philosophy of democratic education. However, educators who attempt to implement this pedagogy should first recognize that Dewey's goals for problem-solving and deductive learning activities were neither the isolated development of students' cognitive thinking skills, nor the passive internalization of dominant, cultural values. Instead, he expected to see that the most meaningful learning outcomes, from situated, problem-solving experience, would be student perceptual change and holistic, moral development by embracing marginalized views. Hence, for him, problem-solving, or hands-on learning environments can never be separated from the situated context, and also from a community of inquiry, which exposes its participants to multiple perspectives. Dewey envisions democratic education through these concrete experiences that can confront and change learners' undesirable habits and biased perceptions.

A Reflection on the Educational Promises With Community Service

Students are not simply passive constituents of an educational system, but they are rather active consumers of academic institutes. The system can be maintained as students buy into the promise that they will be well trained through higher education so that they can have a better life, more specifically a better job. They pursue high-paid careers and social privileges. Educators cannot ignore this "text" that students bring into their learning expectations. But then, instead of training liberal spirits, higher education also rushes into providing such programs that can meet these individual students' market-

oriented desires, and it even reinforces the value system by vigorously advertising its ability to satisfy these consumers.

Most INIS students, who especially lacked experience and confidence with computer technology, approached technology education from a highly utilitarian perspective. For these students, developing technical skills and specific content knowledge was their primary goal of learning from the course in order to adapt themselves to the highly technological job market. To meet these students' desires as well as the needs of marginalized communities for a free supply of computers and networks, service-learning pedagogy was originally introduced to the INIS course. In this coordination, this college credit course also gained high popularity from students at the university. However, for the student participants who only looked for the development of technical skills or the mastery of content knowledge, conducting community service projects simply could be a way of enriching their hands-on, technical experiences. Serving disadvantaged communities was an additional student experience in social work, which might be added to their resumes, but it did not truly mean to develop student critical thinking and understanding about technology and its practice.

As the INIS teacher, Martin is highly concerned about his students' job-related needs and interests, but he also rejects this rationale that, in a deeper sense, disconnects technology education from the meaning of implementing community service. Even though his vision of technology education is not rooted in Dewey's philosophy, Martin's idea for teaching the INIS course incorporating community service projects considerably resembles Dewey's pragmatic view. Martin contends that this INIS course should not mainly pursue skill-based computer technology training, but more importantly, student

development of creativity, problem-solving skills, and important values through authentic and contextual learning.

To develop future technology professionals and users, Martin considers that technology education should guide students in overcoming the prevalent, utopian view of technology. According to him, students should be taught to appropriately evaluate a technology practice (selection, design, dissemination, or use) in terms of its costs—not only the benefits. In this sense, Martin believes that his incorporation of community service projects will help students practice such ability through contextual and situated learning. Through community service, Martin hopes his students will think through various issues while looking for better ways to support marginalized communities with their technology designs.

In this chapter, I illustrated how the constituents of the INIS course—students and the teacher—perceived technology and technology education in relation to service integration in learning. Then I discussed how their perceptions and beliefs could be located in comparison with a range of different philosophical lines of thinking about technology, such as utilitarian, critical (and Heideggerian), and pragmatic stances. In the next chapter, I will further discuss my investigation into the classroom reality—how this, Martin's rather pragmatic vision of technology education, was (or was not) put into practice and realized in INIS students' service learning.

CHAPTER 4

STUDENTS' SERVICE-LEARNING EXPERIENCE

> The primary focus of this [social] theory [of learning] is on learning as social participation. Participation here refers not just to local events of engagement in certain activities with certain people, but to a more encompassing process of being active participants in the practices of social communities and constructing identities in relation to these communities. (Wenger, 1998, p. 4)

Wenger (1998) develops a social theory of learning based on the concept of a "community of practice." He defines this as a social, historical, and cultural group activity that reflects its members' mutual social relationships, identities, and shared learning through knowledge transfer processes as well as through shared products. In the social theories of learning initiated by Vygotsky (1978), learning is not an isolated individual cognitive process, but a dynamic and complex intrapsychological transformation of dialogues and social relations among the members of a community. Individual students' perceptions, interests, attitudes, and beliefs cannot be separated from the cultural dialogues and social relationships in which they are situated. These social theories of learning also emphasize students' meaningful learning through formal academic learning activities tied to the actual practices of the communities in which they live.

Within the framework of social theories of learning, Cross (1998) also contends that "service learning is the ultimate learning community" (p. 10). In this respect, service-learning practice provides an educational activity space that breaks down the boundaries between school and community. Through students' reflective engagements in the community practices, both students and other community members build a history of mutual experiences and develop their identities. Hence, students not only acquire required

skills, but also can explore values, identities, and new social roles through their contextual experiences of learning.

However, in reality, we too often name learning activity groups as "learning communities" or "communities of practice," but later find out that they are actually not. It is not easy to build such strong, genuine, and mutual relationships among students and their community partners. The problem is that a true community will not automatically emerge simply because a teacher integrates an alternative learning activity, such as service learning, in his academic course.

It was a late afternoon in early January, shortly after the fall semester of 2004 was over. I had the last, formal interview with the INIS teacher. In the latter part of the interview, Martin was explaining that it would be an "outstanding" semester for him if he heard from his students that they had obtained valuable lessons from the course, ones that helped their real lives and future careers. Then, reflecting on fall of 2004, Martin commented,

> This year [semester] didn't have quite the same impact, which is [was] not a bad year [semester], but which just wasn't an outstanding year [semester]. You know, HIGH [a student group that worked for an after-school program] did a good job with good relationships [with their community partner]. It's [building good relationships with community organizations] sometimes, not always the students' [responsibility]. You know, the students at SUN [a church], where Stacy, Pastor, and Pastor's wife [SUN church representatives] had some strife. Students can't control that [relationship problems arising inside the community]. Stacy wasn't even there during the [final lab] set-up. So, some of it [building good relationships] isn't students' doing. Some of it, you know, the students can invest themselves into [it] as much as [they can] for the whole year [semester].

Through the service learning, Martin's highest expectations for his students were to build genuine relationships with the community people they served and to have this community-based experience influence their real lives. With these expectations, Martin

evaluated the INIS students' learning for the fall semester of 2004, not giving the best grade, but certainly a moderate one on the scale. He reached this conclusion because some student groups could not build successful relationships with their community organizations, while he believed others, such as the HIGH group, could. The difficulty that he recognized in implementing successful service learning is that such student learning outcomes did not necessarily depend on student efforts, but also on those of the community, which students and even project coordinators, Martin and Paul, were unable to change.

Implementing service learning was highly challenging. The teacher could not set a specified track of learning and guide students through the whole process. Moreover, the real-life situations that students face in community-based learning are highly complex and can even be disorienting for educational purposes. However, this pedagogical difficulty does not mean that teachers can do nothing to facilitate better student learning from community service experience. Instead, educators can learn from a reflective analysis of this INIS course that actually had both strengths and weaknesses in its curriculum design and implementation. By closely looking at what these INIS students did or did not learn with specific course activities, we can think through what could be done differently for designing and implementing more successful service-learning practices in technology. Hence, in this chapter, which is based on my semester observation of the INIS learning activities and a curriculum analysis, I discuss the pattern of student learning and discourse that occurred throughout the course in relation to its specific instructional goals and course designs.

Eight-Week Training to Build Technical Confidence

Each semester, the INIS course offers both types of classroom-based and community-based learning environments. Before students are assigned to community service projects, they have to undergo an eight-week computer training session, which provides them intensive and guided instruction. The course curriculum during the first eight weeks is primarily designed to prepare students for conducting actual, technical service projects. Accordingly, the main instructional goals of the curriculum during this time are to help students become confident in dealing with computers, to develop their troubleshooting skills, as well as to learn basic concepts about computer hardware. The course includes rich hands-on lab activities along with weekly lectures on computer hardware.

This eight-week service preparation was the educational practice that most influenced the INIS students throughout the semester. Students considered this training session the most beneficial to their learning. For instance, during the first week's lab activity, INIS students worked in pairs to disassemble and reassemble computers.

> The work lab is located in the basement of an old, three-story house, called "Little House," across the street from the main GSLIS building. This house is leased for Prairienet. If you bend over while stepping down a set of narrow stairs, you will arrive in a low-ceilinged, crowded workroom in the basement. The whole room is packed with wooden tables against the walls, with piles of computers in corners, and many tools and instruments on fixed shelves. Although it is not a spacious, modern place, you will feel cozy, soon fitting yourself into it as if you were in your old playhouse.
>
> It is Thursday 10am. Ten students, two male and eight females, are in this first lab section. Martin gives them a brief introduction about himself, the teaching assistants, Prairienet, the lab facilities, and certain lab rules. Right after the course introduction, students are asked to pair themselves up for the week's lab activity. They all look thrilled and excited about what they are just about to do. Each pair of students is asked to disassemble a computer in front of them while listening to Martin's detailed instruction. As students carefully take apart a

> whole computer, Martin explains the name and function of each detached piece of hardware. Students attentively listen to his explanations and look inside their computers. Occasionally Martin asks questions that provoke students to think about how the parts of a computer function to make the whole machine work. After the disassembling work is finished, students are asked to reassemble the computers that they took apart. They check to see if their reassembled computers work properly by listening to the beeps during booting, and by reading the screen messages.

During the two-hour lab, the disassembling work took more than an hour whereas students finished reassembling their computers in only about fifteen minutes. No one in all three lab sections, including this one, failed to complete the task. Rather, student work groups sped up and almost competed with each other to finish the work.

Shortly afterwards, in their one-minute paper assignments, many students showed their positive responses to the course—especially to the first week's lab work:

> Student 4a: I can't stress enough how wonderful the lst lab was for me. I called my parents and my fiancé beaming about how I took apart and put back together a computer. I'm still nervous in general concerning what all this course has in store, but I no longer feel nervous that I will be UNABLE to do everything necessary to succeed in the class. Yeah for me!!!! :)

> Student 4b: By taking a computer apart, looking at its basic components, and then putting it all back together again I realized that computers are not really so frightening. It is a comfort to know that I could take a computer apart and then successfully reassemble it.

> Student 4c: Computers aren't scary! I really enjoyed physically touching the parts of the computer, and knowing that they weren't magical things.

Students described how they became comfortable with touching computers after the first lab activity. The excitement these students experienced with this first lab activity also remained throughout the semester. Later, in the course evaluations, students rated the activities of the first eight weeks—particularly the first week—as most beneficial for their learning.

The second and third week's labs were designed to inventory donated computers. In previous semesters, this lab activity was assigned after students came back from their first site trip. However, during the semester that I observed, Martin decided to put it in the beginning because Prairienet was able to provide computers earlier in the semester:

> Students work in pairs to disassemble computers they bring from a pile. They look around the computers and find out information on the hardware, such as computer type, speed, hard disk size, memory size, and ports available. Students also mark the computers with all the information they found out so that they can use them for their service projects later. After all this work is completed, they reassemble and check whether the computers work properly.

In fact, it was not easy for these students to find all the right hardware information and to solve technical problems they faced in the first place. However, as they repeated the task, student work quickly sped up. To finish the task with a chosen computer, one student group spent more than an hour, whereas another took only ten to fifteen minutes. However, students were never asked to speed up to finish certain amounts of work. Rather, the unspoken, basic line was that the more troubles students faced, the more interesting and challenging experiences they would have with computers, and the more skilled they could be. Often, more than one student group in a lab session encountered the same or similar technical problems. As time went by, students began cross-group communication and sharing of information.

With this activity, students could review the first week's lesson and more importantly do troubleshooting because they often encountered various technical problems with the donated and used computers. Later in the semester, Martin evaluated this instructional change as an excellent decision. After the second and third week's labs were finished, Martin told his students that they had been well-trained for service

projects because they had had much richer troubleshooting experiences with the inventorying activity than students in the previous semesters.

Throughout the first few weeks, the INIS students continued to learn different topics about computer hardware and networks, and learned to deal with new technical challenges. For instance, students learned to install operating systems in week four, and a network card and device drivers in week five. In the sixth week, students learned to set up a router for networking. Then in week seven, students toured the "Little House" (where the computer lab was located) and the "Big House" (where the Prairienet server was located), almost as if they traveled the same path as the electronic "packets" of information. In reviewing the tour, they learned about diagramming network scenarios. With all these weekly lab activities and lectures during the first eight weeks, Martin made relentless efforts to help his students build their confidence in technical troubleshooting. He believed that such student confidence in dealing with technical problems would be the most important requirement in preparing INIS students for their service projects.

Indeed, throughout the semester, INIS students kept reporting that they were gaining great confidence in dealing with computer hardware. It is noteworthy that female technology novices often showed improved self-efficacy, as their confidence in technical troubleshooting was enhanced. For instance, a female INIS student wrote in a one-minute reflection assignment: "I've always liked to date guys with computer experience because I have so little, so when I am done with this class, why will I ever need men? ;)" In fact, students' confidence levels and self-efficacy did not stay stable throughout the semester as they evaluated their knowledge and abilities to handle various technical problems each

week. However, through experiencing such unstable, emotional struggles, these students became more and more confident in taking ownership of their learning about computer technology.

Enhancing student confidence in troubleshooting or dealing with computer hardware is unquestionably valuable in technical training. However, it is also pedagogically important to ask what other learning values such training might leave out while fostering student confidence in technical skills. For instance, one could consider if this training simply promotes selfishness and competitiveness among students in acquiring desirable technical skills. Regarding this question, I found that the INIS labs and the teacher both encouraged dynamic and frequent collaboration among student groups as well as individual students. However, my other observations of INIS classroom learning raise another critical question about implementing this technical training. Female students, who were the majority of the INIS class, assumed that there are gender differences with computer work; such gender perceptions did not seem to easily disappear. After a lab activity, one of the female INIS students wrote,

> In my experience, one difference between the sexes is that men are fiddlers—if something is wrong, men will play around with things, trying to make them work. In the process, they often learn a lot about how things work. Women are more likely to worry that they'll break it even worse. Troubleshooting is just taking that basic male instinct and systematizing it—which is great for women, because they can feel comfortable playing around with things, too. . . .Once again, a really fun lab! I'm really starting to feel comfortable around all of the parts.

This kind of dichotomous perception about gender in relation to computer technology had not been considered a critical learning issue to address in this course. The instructor offered neither a class discussion nor serious response to this or other student's writing. Instead, such student reflections were simply treated as another indication of the need to

build technical confidence, which was believed to be most crucial for student implementation of service projects. I will further discuss this in the next chapter, which closely examines INIS students' engagement in social or political discourses on technology.

Seeking Relationship Building Through Community Service

The second half of the semester was spent on the actual implementation of community service projects. The course consists of two field trips, open lab work, and classroom sessions covering various topics related to networking and user service. By allowing INIS students to be engaged in real world practice, the instructor's primary expectation is for them to understand the importance of building relationships (or communications) with community users for success in their technology designs, and to develop their abilities to handle both technical and non-technical challenges emerging within the practice.

Two or three weeks before taking the first site trip, INIS students are usually divided into small groups assigned to community service projects. For fall of 2004, five community sites[8] were selected: Top academic association (TOP), Community Church daycare (CC), Sunshine church (SUN), and two after-school programs, including Higher Motivation (HIGH) and Eastern Academy (EAST). For this semester, all INIS students went to East St. Louis for their service projects.[9] Martin formed five student groups according to individual students' lab schedules and personalities, group dynamics, and the scope of each project. Each group consisted of three to five members. Martin also asked

[8] All site names are pseudonyms.
[9] In other semesters, some students who did not want to take field trips to East St. Louis were able to work for a community that is geographically closer to campus.

each group to have a meeting prior to the first field trip in order to discuss site survey questions and individual members' roles in their service projects. Each student group could also take a Team Action Plan (TAP) session for building up teamwork. TAP is a two-hour program for team training, provided by the office of student conflict resolution at the university. Each student group meets with a professional team trainer. This training is intended to help students get to know each other better, find out any potential team problems or personality conflicts, and learn about good strategies for successful teamwork on their projects. However, because of students' time conflicts, none of the groups in fall of 2004 were able to take advantage of this opportunity.

Right before taking the trip to East St. Louis, Martin gave a classroom lecture in the eighth week of class to prepare his students for conducting site surveys. During the lecture, he also included a classroom activity on "imagining a blind date":

> He turns the lights down in the room, and plays peaceful music on a cassette. Students are now asked to close their eyes, and to imagine a place to meet their first blind date. Martin softly tells students to keep imagining what their conversations on their first dates will be like, how they will find connections and passion as their dates move on, and how they will come to deeply appreciate each other. Then he reminds students to imagine those feelings and intentions that they might have on a blind date when they meet their community partners. Students are now asked to open their eyes. The lights are turned on, and the music is turned off.

With this activity, Martin tried to convey the message that students' first site trip would be the first important step in building relationships with the community people they would serve.

When I first interviewed twelve INIS students, they expressed mixed feelings about their first site visits. Students were extremely excited about getting to know the East St. Louis community, but also very anxious about meeting people from a

considerably different community from theirs. In particular, one female student told me about her slight fear of conducting a site survey because she thought she might unintentionally offend the community people during their conversation. Before the first trip, a male student wrote in a one-minute paper, "Learning about the community and their needs will be as important as or more important than the hardware aspects." INIS students mostly seemed to recognize how important the first site trip would be for beginning their relationships with the community people whom they would serve.

During the first eight weeks of preparation for community service, if Martin strongly emphasized building student confidence in technical troubleshooting, during the second half of the semester, he then attempted to foster student development of mutual relationships and communication with their community partners. However, his attempts to build relationships between students and community groups were not always successful. As stated in the beginning of this chapter, I do not necessarily attribute such unsuccessful outcomes to uncontrollable, real-world situations in the service-learning environment. Instead, I identify limitations in the design of INIS community-based activities meant to promote the instructional goal of community building. I will begin my exploration of this issue with INIS students' first site trip, followed by their project implementation, and then the final lab installation and evaluation.

The First Site Trip

With both concerns and excitement, the INIS students' first trip to East St. Louis took place on Friday and Saturday in the third week of October 2004. My field notes rekindle my memory of this trip, which starts as follows:

It is still dark outside, occasionally drizzling. I leave my place at 6:30 a.m. under scattered showers. Around 7:10 a.m., most of the INIS students and Martin seem to be in front of "Little House." Standing and waiting, people talk in groups and break the silence of the early morning. All three vans and drivers have arrived. Everyone loads computers, instruments, and food into the vehicles. Around 7:30 a.m., we finally leave campus. We expect to drive for approximately three hours. In the van I am in, a student group plans their site survey. Another student group tells me that they already had a half-hour meeting in a café yesterday to create their site survey questionnaire and to decide on each person's role in the service project. After an hour of driving, some still chat, while others nap.

It is around 10:40am when we arrive at the center for East St. Louis Action Research Project (ESLARP). In this area, it is not raining, but a little windy. Along local roads off the highway, we saw nothing much from the van windows, except for a few houses left empty. The ESLARP community center is in a big, old, white house, which has a large front terrace, white columns, a wide stairs, and a backyard. Inside the house, we are welcomed by a shelf full of brochures and booklets with community information and resources inside.

Other university students who work for different projects have arrived at the ESLARP community center. They are mostly from architecture, landscape architecture, and urban planning. Shortly after their arrival, all students are asked to get on a bus for a tour of the town.[10] Martin and Paul stay at the community center in order to schedule student site visits for the day. The big bus is full of university students. In front of us on the bus, two graduates, who are also residents of the community, explain about the changing economy, landscape, population, transportation, education, and religious affiliations of East St. Louis. Listening to the guide, students look at the streets, buildings, and people out of the bus window.

After an hour's bus tour, students come back to the community center for lunch. They mingle around and eat pizza together, sitting at the tables in the backyard or inside the house. After the lunch is over, students leave the center for their projects or community service. Martin assigns some of his students to do general service work at the ESLARP community center, such as cleaning rooms and moving computers.[11] Having those INIS students do general service at the community center, Martin and a student group (TOP) leave for their site visit at 1: 35 p.m.

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[10] In other semesters, INIS students had a library or museum tour as the whole student activity if other university students did not join.

[11] During the first trip, INIS students are usually required to participate in general community service in addition to their main service projects. Mostly they have been assigned to clean a community site, such as a church or library. However, Paul explains that this general service work has been recently changed to more technology-related service work for INIS students.

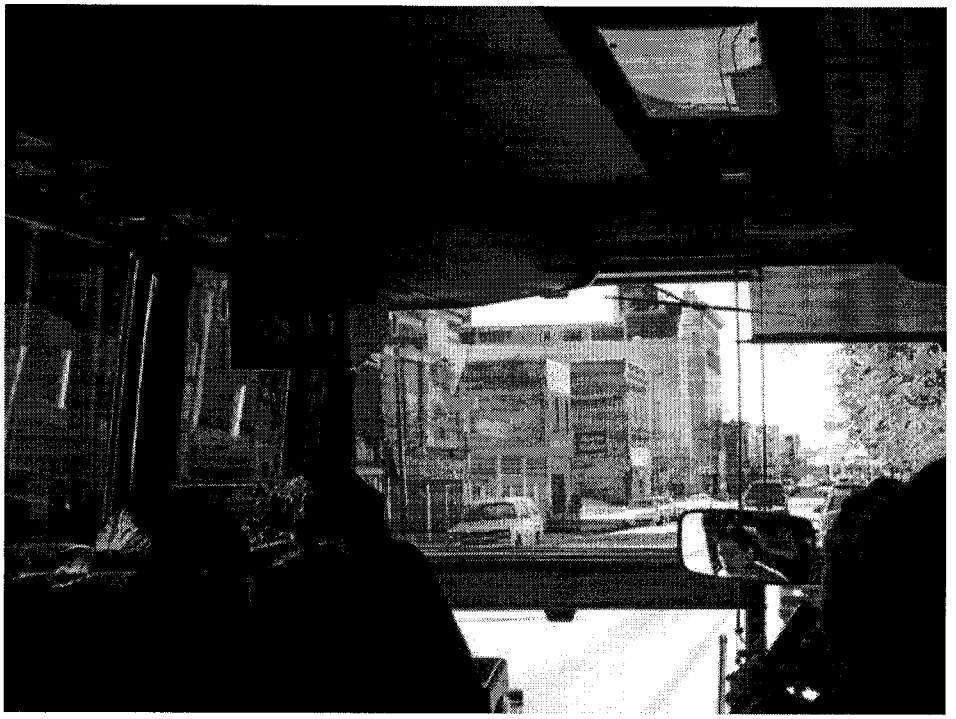

Figure 1. Bus tour.



Figure 2. A view of East St. Louis from the bus window.

The first day of the trip started with a bus tour of East St. Louis, followed by students' general community service or site visits for conducting their site surveys. TOP was the first student group that visited their assigned community organization on that day. Their visit proceeded in the following sequence: a site tour, a site survey, and specific technical work including measuring the room that was to become a computer lab:

> Martin and the student group walk a few blocks down the street to go to the Top Academy (TOP) association. This association provides training and support to East St. Louis high school students in their search for colleges and scholarships. TOP also helps these students develop computer skills and good study habits. Because it is a Friday afternoon when they visit, there is no high school student found at the site. Ms. Daisy, the site contact person, and another female office worker welcome the INIS students. Ms. Daisy briefly explains the organization and its goals for the local community to them.[12] She then says that, until her supervisor comes back from his trip late in October, no questions regarding the site budget can be answered. Daisy leads Martin and the students to a room upstairs, which will become the future computer lab. The empty (unfurnished), spacious room looks beautiful in the sunlight coming in although it has some cracks and damages on its outside walls. After a few minutes of walking and looking around, everyone decides to sit on the floor to discuss their project.
>
> Ellie, the representative for the student group, starts asking some survey questions, and Daisy answers them. Ellie's first few questions are mostly intended to determine computer hardware and software needs. Daisy tries to explain the kinds of programs (i.e., literacy programs) that may be useful for their high school students. Martin interrupts to explain the process of this university student project to Daisy, and politely requests that she send a list of devices and programs needed before his students come to install the computer lab later in the semester. Then Martin also asks, "What could you envision with this computer lab?" Daisy tries to clarify the site's vision for the lab. In a while, the student group continues to ask Daisy other survey questions. When the discussion is about to end, Martin walks around the room and suggests a less expensive way of networking. He also tells his students what may be important to consider for networking computers in this room, which the students start measuring. Martin and his students continue to measure and examine the room for the next twenty minutes. Then Martin asks Daisy, "any picture [of a lab] in your mind?" Daisy tells him her image of the physical look for the computer lab. Martin makes other suggestions to her about electrical work, work space, cooling in the summer, and security. Marie, a student of the TOP group, comes to Martin for help with measuring. As soon as students

[12] Ms. Daisy studied educational technology in a master's program and wanted to pursue a doctoral degree next year (2005).

finish recording their measurements of the room, they leave the site. It is 3:20 p.m. This site visit took approximately an hour and a half.

Most student groups' first site visits and implementations of site surveys were considerably similar to the TOP's. At this site visit, Martin rather unusually offered many technical suggestions for the project, primarily because this computer lab would be used not only for the TOP association, but also for Prairienet to train computer trainers for the whole community. At other community sites, he made much fewer interruptions in students' conversations with community representatives and gave less direct advice on technical specifications, unless he thought it would be crucial for his students to consider.

The only significant difference appeared when the HIGH group visited their assigned community organization after the TOP's site visit on the same day:

> Martin picks up another student group (HIGH) at the ESLARP community center. After a short talk with Paul to check the day's schedule, Martin takes two student groups (HIGH and TOP) with him to the next community site. It is around 3:40pm when INIS students arrive at HIGH, an after-school program, which is located far south in East St. Louis. In the van he drives, Martin briefly explains to students the recent trend of geographical expansion in the East St. Louis community.
>
> HIGH owns an old and terribly worn-out building next to a cemetery. Since it was founded in 1987, HIGH has supported a large number of children (more than a hundred per summer), primarily through its summer programs. HIGH has already had a computer lab installed by students from the first semester of the INIS service project implementation. The project for this semester is to upgrade this existing computer lab.
>
> Schoen, the site representative for HIGH, is a retired volunteer worker who is used to working in drug abuse prevention programs for a school district in East St. Louis. He has a strong passion about the community work he does. He also proudly introduces himself as a representative of the historic East St. Louis community. After a talk with Schoen, Martin asks the TOP group to clean and check HIGH's old computers and then move them to his van. While other students are doing the general service work, the HIGH group conducts a site survey with Schoen.

> When the site survey is almost finished, we are asked to get into the vans. Once inside, we find out that Schoen is taking us to a park where his granddaughter and other high school students do field and track competitions. Though windy on the grass next to a small river, it is still a fine day. I felt strange earlier when I did not see many people in the streets or at any of the community sites. But now I see many high school students and their families running or looking on in the park. Schoen introduces his family to Martin and the INIS students. The students take pictures, stroll around, and talk with each other in groups. After spending some time in the park, the INIS students go back to HIGH to finish up the rest of the day's work. The HIGH group also finishes taking measurements of two computer rooms.

Schoen, the site representative of the HIGH after-school program, was a very passionate community worker, who knew the history and culture of the whole community well. He was willing to share his insights about the community with the students and invited them to an event at which they could meet with community people. For the most part, the students and the community people did not talk to each other much, bur rather stayed within their own groups. Nonetheless, this was an extraordinary experience, which other INIS students did not have during their site visits. I will discuss this further in the section on student final presentations after their second site trip was taken.

In fact, this problem of lack of student exposure to the community's culture, events, and residents was frequently visible throughout the first site trip. One of the representative examples was the Friday night when the INIS students and Martin stayed at a hotel outside the East St. Louis community:

> As the student work is finished, Martin and the INIS students leave the site for the Ramada Inn. The hotel is about a twenty-minute-drive north from HIGH. It is not actually in East St. Louis. Other INIS students have already checked into their rooms when we arrive at the hotel. It is 5:40 p.m.
>
> Anne and Rita (both from the CC daycare group) are already lying on their beds when I enter the hotel room. They tell me that they are extremely tired. Anne is also suffering from a minor headache, so she phones Teresa (another student in the same project group) to ask if she has some Tylenol with her. Rita and Teresa think that the polluted air in East St. Louis might have caused Anne's headache.

> Anne and Rita also tell me that they went to an old library for their community service today, but they waited for a long time, and eventually did nothing for the day. They are also curious about how I saw other student groups doing. I talked about some student groups' visit to high school students' field and track.
>
> Anne, Rita, and I go down to the hotel dinning room. Around 6:30 p.m., university students, staff, and instructors gather in the room for dinner. INIS students sit together at a few round tables. The dinner served by the hotel includes lasagna, salads, bread, mashed potatoes, and some desserts. While people eat, an architecture student stands up and suggests that each project team tells the others about their work today. All who are having dinner listen to each team's informal presentation, after which people continue their personal conversations at each table. When dinner is finished, T-shirts are distributed by ESLARP to all students in the room.
>
> After the dinner is over, a few INIS students, Martin, and Paul go to TGI Friday's next to the hotel. Students socialize in small groups at the bar. One group sits and chats about the upcoming presidential campaign and election, TV shows, and the LIS courses they are taking. They leave the bar around 8:40 p.m., but I see other INIS students, Martin, and Paul still sitting and talking at the corner of the bar. The first day of the trip closes with the night.

That Friday night, INIS and other university students mingled within their own groups away from the East St. Louis community, with which they were meant to get better acquainted.

The second day of the first site trip ended with the final student activity of writing a site contract, which served each student group's documentation summarizing their survey results and future project plans. The contract also included a statement of both students' and the site coordinators' responsibilities and contact information:

> All the site visits are completed by the late afternoon on the second day of the trip. INIS students are all back at the ESLARP community center. Each student group produces a site contract, documenting the findings from their site visit and the design of their project. Once a student group finishes writing a draft, it is shown to Martin for his review. Martin sometimes asks students about the rationale for their plans and suggests specific technical aspects, which they need to take into consideration. Student groups who have finished their documentation play word puzzles together for fun. Before leaving East St. Louis, students drop off their photocopied contracts, including their contact information, at their community sites.

> On the way back to campus, students have dinner at Wendy's. Holly, who works as a graduate assistant for Prairienet, tells others in the car about her visit to an old library. Holly says how sorry she is to know that this library must soon close and give away its books to other community centers. She continues to talk about her previous visit to an impressive community museum.[13] Holly also proudly explains that she learned a lot about East St. Louis during this trip from a woman she met at the ESLARP community center. She says how surprised she was to learn that the residents of East St. Louis are the third best-educated in the whole country. We get back to town at 9:10 p.m. Students unload their stuff from the vans. A full two-day site trip ends.

In their next classroom meeting right after the trip, the INIS students were asked to give an oral debriefing regarding the results of their site surveys. This follow-up student group presentation was mainly designed for Martin and his students to decide together on which donated computers should go to which community sites. Another purpose of adding this rather informal, group presentation to the course was to have students reflect on the trip for a few minutes and learn from others' projects. Less structured, the format and content of their presentations depended entirely on the students' decisions. During the break, students prepared for their presentations in groups, speaking for five to ten-minutes and focusing on the needs and interests of their assigned community organizations.

A few individual INIS students reflected generally on the first site trip in their one-minute paper assignments. They appreciated the opportunity to learn about a community different from theirs, but they also expressed some disappointments about the schedule of the trip. One student, reflecting on her experience with ESLARP while doing general service work, wrote:

> I learned a lot about the community of East St. Louis. I was impressed by all the great work being done by ESLARP. It seems like the people there do a little bit of

[13] I later figure out that this museum is the "Katherine Dunham Centers for Arts and Humanities" in East St. Louis. The INIS students of spring of 2004 visited this museum during their first site trip.

everything to make their community a better place. It was a lot of fun helping out for the weekend.

Another female student shows her mixed feelings—an appreciation of her group's site visit and a complaint about the general community service she did:

> Most Important Lesson: I learned that while I really enjoy learning about the group that my group will be helping, but it is very frustrating at times to deal with the pace of life in the community. We seemed to spend a lot of time sitting around and waiting.
>
> Biggest Question: Is the "sit and wait" situation something that others have noticed? Are we reacting to this because the pace of life in graduate school is more frenetic?
>
> Comments: I sincerely wish we could have spent more time exploring the community (like the museum, the old library, some of the schools, the model home, etc.).

At the end, this student suggested that students be provided a rich itinerary for better getting to know the community. INIS students usually did not have complaints about their groups' site visits, but rather about general community service, the community tour, and the accommodations. Another male student specifically complained about the choice of accommodations for the trip:

> Comments: Service at Ramada was terrible. Food was bad, ice tea kept awake all night, bed hard, shower head did not work, and bath tub took forever to drain. . . . Why couldn't we just stay in one of those renovated Victorian mansions in East St. Louis? They have a lot of character, and we would be pumping money directly into the local economy, rather than that of a floosy [sic] suburb. It seems a bit hypocritical that we are supposed to help the East St. Louis community itself but go elsewhere for room and board on the trip.

Regarding the first site trip, this student actually wrote a much longer reflection than a one-minute paper is meant to be. He was also one of the students who showed strong interest in learning about the East St. Louis community when I interviewed them before the site trip. After coming back from East St. Louis, his one-minute reflection showed

that he strongly cared about the community and had further concerns about the following service project implementation. To me, however, it is questionable whether this first site trip helped INIS students understand "how the concerns and goals of that [each] organization meshed with those of the entire East St. Louis community," as this student commented in his reflection. The guided bus tour of the town might have given students a sense of the whole community, but does that experience mean that INIS students were sufficiently exposed to the community so as to be able to deeply understand its culture? Would it allow them to relate their understanding of the community to their specific project implementations? Moreover, the critical question that arises from these student reflections along with my observation of the whole trip is: "Was this trip adequately designed to support the development of mutual relationships between students and their community partners?"

The Implementation of the Service Projects

Based on the results of their site visits, the INIS students started implementing their service projects. They prepared computers, software, network cables, and other equipment for their final installations of computer labs during their second site trip. While doing the projects, students communicated with their site coordinators through phone calls, e-mail, or fax to learn about budgets or decide on specific devices and programs to be installed before they delivered computers to the sites in six weeks.

Compared to the relatively-guided structure of the lab work, students faced diverse and unexpected problems—both technical and non-technical—as they worked on their final service projects. Communicating with their site coordinators was one of the

non-technical problems that INIS students faced during their projects. In a one-minute paper assignment, Ross, a student from the TOP group, asked for the instructor's advice on the communication problem that his group had with the organization:

> Contact person has been somewhat slow in responding because has to report to supervisor who is also slow in getting back to her. If this problem persists, should contact supervisor directly (with contact person's permission)?

Martin suggested that he find other ways to urge the site coordinator to respond instead of contacting the supervisor directly. After the second site trip was over, Ross complained even more that the site coordinator had not been there while his group was installing the computers and networks at the site. CC daycare was another project group that had a similar communication problem in finding out their site's budget for the project on time. The problem with the delay in communication between the student group and the CC daycare site was mainly caused by the hierarchical structure of that organization, which these students could not change. To communicate with their site coordinator, this student group tried various channels of communication and eventually found out that phone conversations would work better than e-mails for continuing their conversations with the site coordinator. Martin and Paul acknowledged this kind of communication problem and both agreed that, in most cases, they and INIS students could not do anything except wait until site coordinators responded. Once the service projects began, INIS students had to depend on limited interactions with their community partners through mediated communication channels.

During the service projects, not only was communication with community sites problematic, but so too was student group collaboration. During the semester that I observed, one student group faced serious personality conflicts between two of its

members. This student group resolved the problem by having each person take a different responsibility for the work. Another example is Marie who was the technology person in a student group (TOP). She wanted to learn how to collaborate better with non-technology people throughout the project. However, in another interview, Marie stated how disappointed she was in communicating with her group members. Marie said she explained several times to her group what to do, but they could not understand and kept asking her the same questions. In fact, her group faced significant unexpected technical problems regarding networking before and during the final installation. Consequently, the TOP group could not finish the project on time, and Marie decided to participate in the follow-up project for the next semester as a teaching assistant. In the later interview, Martin told me that although he could not tell for sure the effects of TAP sessions on student team work, he definitely saw more problems arising with the student groups during the fall of 2004 than in other semesters. For the fall semester of 2004, none of the INIS student groups did have a TAP session.

Another very common difficulty that INIS students faced was a lack of time to actually fix and upgrade donated computers. The main role of Martin, as the instructor, during the time of service projects was to keep encouraging students to complete their projects on schedule. He repeatedly reminded them of key strategies, such as prioritizing their work in terms of the users' needs and interests. Overall, Martin thought that his students were qualified enough to complete their service projects given the troubleshooting skills they had gained from their previous lab work. Accordingly as final projects proceeded, Martin refocused his time and effort from working with individual

students to managing the whole class.[14] Usually, he let students work out technical problems themselves with their project group members and expected them to get most of their technical help from a teaching assistant or student technology experts. In fact, it was impossible for him to take care of all the problems each individual student or group faced throughout the whole semester.

As a result, by the end of the semester, INIS students often reported that they had had insufficient technical support while preparing computers for their projects, especially during their open labs:

> Second Survey Question #2: What do you suggest to improve this course?
>
> Student 4d: More guidance during open labs. Have a way to uniformly let teams know crucial instructions. Distribute workarounds for known problems to avoid lost time and increased frustration.
>
> Student 4e: More time for putting together the lab component of the class—we should have more supervision and assistance in the labs while we are preparing the computers and equipment for our community lab projects.
>
> Student 4f: More coordination on the aspect of Martin and the TA's in terms of software problems and teaching of hardware troubleshooting.

Some of the donated or used computers constantly generated unexpected technical problems even up to the last minute of the site delivery. During the Thanksgiving break, when only a week was left before taking their second site trip, some student groups still had to come in to prepare their computers.

In the interviews conducted during the time of project implementation, some students commented that they did not usually have sufficient time to think through all the technical problems while preparing computers for their projects. To complete their tasks within the limited time, students had to ask anyone who was more experienced with

[14] As the course moved toward the end of the semester, one student told me she experienced having gradually lost the emotional connections she had had with the instructor in the beginning of the semester.

technology to solve various technical problems. For instance, in one student project group (HIGH), there was a highly experienced technology person (Bob) who almost rivaled the instructor in expertise. Bob naturally came to take charge of all the technical problems in his group. He listed all the possible problems his group could have and prepared for them ahead of time. He also solved any kind of technical problem his group members (and even other groups') brought to him. With Bob's and other members' hard work, the HIGH group was able to get computers ready for final installation much earlier than other groups. HIGH was the most successful group to finish their project in the semester. Other student groups talked about how fortunate the HIGH group was to have Bob. In contrast, Bob's group members complained that they often missed out on chances to learn because he would fix all the technical problems for them, usually without explaining what he had done and why. Since these students relied on experienced technology people during the open lab time, they expressed a loss of confidence to some extent in their troubleshooting skills.

It was challenging to provide an adequate balance of technical work and assistance so that students could build up their troubleshooting skills, while at the same time ensuring that they would complete their projects on schedule. Some questions to consider in designing service learning for technical training include the following: (a) "If students spend too much time doing routine, detailed technical work, will they be able to pay adequate attention to bigger-picture issues of evaluating their technology designs and successfully building their mutual relationships with their community partners?" (b) Will INIS students really have time to critically inquire into alternative technology choices in relation to the goals of the communities they have found? (c) If the main educational

objective for service learning is the development of students' ability to design futuristic technology (a computer lab) based on the relationships they build with their community partners, will the technical workload and methods of instructional support need to be reconsidered?

The Second Site Trip, Final Presentation, and Evaluation

In the first week of December, 2004, INIS students took their second site trip to East St. Louis in order to install computer labs at their assigned community sites. Students delivered their prepared computers to their sites and set up computer labs following their designs. INIS students spent the most time at their sites installing computers, cabling for networks, and solving the technical problems that arose:

> It is around 11:20 a.m. when INIS students, Martin, Paul, and the teaching assistant arrive at the SUN church in East St. Louis. They quickly unload some of the computers and equipment from the vans at the site. After having lunch provided by the church, other student groups leave for their assigned community sites, and the SUN group starts working on their final lab installation at the church. The future computer room on the second floor of the church was newly set up with two lines of wooden tables against the walls. The students of the SUN project group hear that the pastor of the church has stayed up all night to make the tables by himself. Students appreciate him for his hard work and cooperation.
>
> Shortly after their work begins, the SUN group finds out that one computer is suddenly not functioning, and they have forgotten to unload another one from the van. Sue, a student of SUN, immediately calls to notify Martin about their problems. Meanwhile, Sharon and Anita[15] install other computers on the tables, run down cables, and set up the systems for file sharing. They soon realize that file sharing among the computers does not work. While letting Sue work alone on this technical problem, two other students begin to copy basic and educational programs separately on each computer.
>
> A teaching assistant who has gone to another community site with some of the other INIS people returns to the church to drop off the computer that was omitted in the prior delivery. Afterward, he stays at the site for the rest of the day,

[15] Two other students of the group. Another student, Cindy, could not make this trip because of a personal reason.

helping the SUN group with network set-up problems. All of them start working on the network, but become more and more frustrated with the hopeless situation. After a couple of hours of struggle, Sue almost shouts, "Turn off the zone alarm [a free application for a network security]. I don't care!" But then, they are surprised to find that this decision has actually solved the annoying problem. All of them beam with joy for a while and celebrate having found a solution.

Shortly afterwards, they hurry to finish up the rest of their work for the day. The pastor's wife and another woman stop by the place a couple of times to check and provide any needed materials for students. The students ask them for more power strips. The pastor comes in thirty minutes before the students leave, looks around the room, and says a prayer.

The INIS students, Martin, and all the other INIS project participants stay at the same hotel where they were on their first site trip. But this time, there are only INIS students, not other university students who work for different projects. They have dinner around 6:30 p.m. When dinner is almost over, Martin asks his students to report how each group's work went for the day. He has spent the whole afternoon at the TOP association, so he does not know how the other project groups have done their work. Students take turns reporting their progress and the problems they encountered. While listening to each group's work report, students soon notice that some problems, such as the SUN group's network set-up, were common across all groups. The EAST student group asks the SUN group to inform everyone about how they solved the network problem. After the SUN group talks about their solution, the HIGH group suggests a different approach to solve the same problem. Then the TOP group reports that they have had a print server break, and asks if any group has an extra. HIGH suggests that TOP use one of theirs. The CC daycare also asks if any group can provide them a CD burner tomorrow. A few students raise their hands and Martin suggests they use his if it will help. For a few minutes, students have an in-depth discussion on the networking problem that the CC daycare group encountered. Martin checks which group will need cabling and drilling kits for tomorrow and if any other devices or equipment need to be purchased. He also makes a short announcement about tomorrow's schedule. The first day ends.

The next day of the second site trip did not differ much from the first. INIS students worked on their projects on site the whole day. During the second site trip, INIS students collaborated interactively with fellow students in their own groups and across different project groups by sharing information and resources, but again they did not interact richly with the community people they served. Only at two sites, HIGH and CC daycare, did INIS students meet with some of the community residents. For instance, Schoen, the site

coordinator of HIGH, invited his group to a graduation ceremony on the second day of the trip after the lab installation was finished. The site coordinator of CC daycare also brought a few chidren and office workers to the newly built computer labs at the site and allowed them to try out the computers and printers. Both student groups happily discussed these experiences during their final presentations, describing how rewarding such opportunities were for them after all the hard work they had done.

Two weeks after the final lab set-ups, INIS students gave their twenty-minute group presentations on their service projects and submitted final documentation summarizing the processes, results, and lessons learned during the projects. The final project presentation and documentation comprised the largest percentage (47%) of the student's final grade, followed by the student concept papers (40%). On the day of the final group presentations, Martin asked his students to fill out group rating sheets, in which they rate group members' participation in contributing to their team project. He told them not to rate their fellow students in regard to their technical abilities. Five percent of the total grade was assigned based on these student evaluations of fellow group members.

An almost three-hour session of students' final project presentations started with a short speech by Martin:

> What I am really hoping from the culture of this classroom is that each one of us gives a better appreciation for the full scope of types of issues we thought through. That means we need to know what those issues are. . . . This is a time of reflection, where we started, where we got to and how we got there. It's a real need, [an] opportunity to give a full understanding of what it means to work with community sites and to serve with others and to do it with technology and understanding what those strengths and weaknesses are. As much as anything else, that's the point of this course. Yes it is to learn technology to an end, blah, blah, but the really exciting part is to really learn about what we get here [from the community service experience].

In this introduction, Martin restated that the primary goal of this course would not be mere technical skill acquisition, but students' development of critical thinking and problem-solving skills through their shared reflections on their service project experiences. For this reason, after students' oral debriefings, Martin frequently asked what they would do differently in order to better accomplish a similar project next time. He did not ask what they did technically for their project. In the evaluation of student learning, his main focus was on the process of learning, not on the productivity.

Despite Martin's intentions, INIS students often spent most of the time during their presentations explaining their technical products and lessons. The following dialogue occurred right after the HIGH group's presentation:

> Martin: If you do that all over again, what would you do differently?
>
> Wong: I like our people, and I like what we did.
>
> Martin: You like all you did. Okay.
>
> Tracy: We did our imaging[16] a little bit earlier than probably we should have. So, we ended up having to go back in and solve individually on all fifteen computers, several things. . . .So, I'd rather wait a little longer to actually image. [Through the projector, Bill shows the photos that he took during the final site trip. All students in the class start to laugh, seeing a picture in which Wong stands next to a clown at a graduation ceremony. Brief chatting about the picture went on in the class.]
>
> Bob: I wanna make sure, like Tracy said, yeah we had to decide on, to not image until we got everything ready. Again we did the same, we did a sort of half way there, so we were really, not a lot off in terms of software . . . .
>
> Bill: I just wanna point out . . . as we were already mentioning, when we first got there, there was a mass clutter, computers all over. [Pointing to a photo of five computers aligned] These are sixteen, old computers that we checked out [to] make sure they were working, and we were gonna be donating. So these computers ended up being donated to the graduating class that we went to. . . .

[16] A technical method of making two separate systems identical in their content, such as basic set-ups and applications.

> Martin: I got another question. [laugh] Can you describe what most important lessons you learned from the community partner, from Schoen, for my sake? What sorts of things did you get non-technical from this experience?
>
> Tracy: One thing he talked about a lot was how, he didn't really see the lab as an end. He saw it as a means to bringing in attention to his organization. . . . So, for him, it wasn't really, um he wasn't so much concerned about what programs run, anything like that. He was a lot more concerned about how this is gonna make our organization bigger and the community [bigger], [and] how can we help more people by this lab. I think that helped give us a focus [inaudible].
>
> Bill: . . . The organization Main CT and HIGH joined together and worked towards educating community members training them on basic computer skills. Beth [the Main CT leader] is just an amazing woman. She and Schoen both had such strong passions and goals for the community and see [saw] such a benefit for what we were doing. And I thought it was very important we were there at the graduation. And they really appreciated us, meaning that the graduation is a symbolic effort together and working with them from the technology standpoint, and helping them gain better skills with technology. . . .

Through this time of final reflection, Martin wanted his students to look at the meaning of serving local communities with technology and the non-technical lessons gained from their service experience. Because the HIGH project group was unusually able to build a good relationship with the community partner, Schoen, Martin tried to draw his students' attention to this group's statement of non-technical lessons that presumably resulted from that successful relationship. Tracy, a student of the HIGH group, tried to explain how the project focus was closely tied to understanding the community partner's vision of computer technology. However, following her rather vague closing, the next student respondent, Bill, simply romanticized the implications of the service work his group did. None of the students in this project group showed critical thinking about the consequences of their community work in terms of its weaknesses.

In their previous presentation, one student in the HIGH group mentioned their concern with whether or not the wireless network would function properly since they

were not able to check it before they left the site. After hearing this, one of the students who worked for Prairienet told them that she had heard the wireless network at their site was later tested and reported on as in good condition. Then the HIGH group students celebrated their complete success in their service project.

In fact, the HIGH and CC daycare groups finished most of the work that they had planned, ahead of time, whereas other student groups were not able to. The student groups who were unable to complete their projects often asked Martin how follow-up service or maintenance of the computer labs at their community sites would be handled. For instance, Sue from the SUN group wrote a one-minute reflection paper asking Martin how her group should handle a newly encountered problem, since their community partner contacted them after their final lab installation:

> Somehow after all the communicating we have done with SUN before and during our project, issues arose after we came home. I think they are disappointed about only having one computer with dial up internet even though that was the plan all along since at one point they didn't even have a phone line. What can we do about above? Can they get another computer with a modem so at least there are two computers online?

Ross from the TOP group also asked about post-project technical service to the community:

> I know that we are no longer responsible for ESL [East St. Louis] lab we set up, but what if we are contacted for problems they may encounter now, should we send the questions to you [Martin]? Prairienet?

INIS students all hoped to provide their community sites with computer labs in good working order. As long as the computer labs they installed functioned properly, students considered their projects successful. They were concerned about the maintenance of the sites' computer labs, which would be out of their hands after their final installations, but all their concerns were the technical aspects.

One student group reported in their final presentation: "There weren't really a lot of rejected alternatives because when we got to the site, there wasn't [any] real ambiguities [sic] about what we were going to do and where." As this group explained, designing computer labs with donated computers and networks for these disadvantaged communities could be straightforward and simple, especially if their concerns were only the physical performance of the free or least-costly computer labs. While considering how to meet the community goals with their technology designs, the issues raised and reported by students were highly superficial and /or limited by the technical sphere. They did not concretely think through the weaknesses of their technology designs or any potential problems and issues related to the future activities of the community. In their project evaluations, any educational, social, or political concerns about the computer networks at these marginalized communities were not raised.

Most community sites had not budgeted for the projects. Hence, free educational games and programs were downloaded from the Internet and given to their community sites without any critical consideration about the educational meanings and limitations of such uses. Students hardly discussed with their community partners how to better handle security issues or youth use of the Internet in their computer lab installations. If students do not critically think through various non-technical issues of technology and alternative designs, this service project would amount to nothing more than giving a free computer lab to a marginalized community.

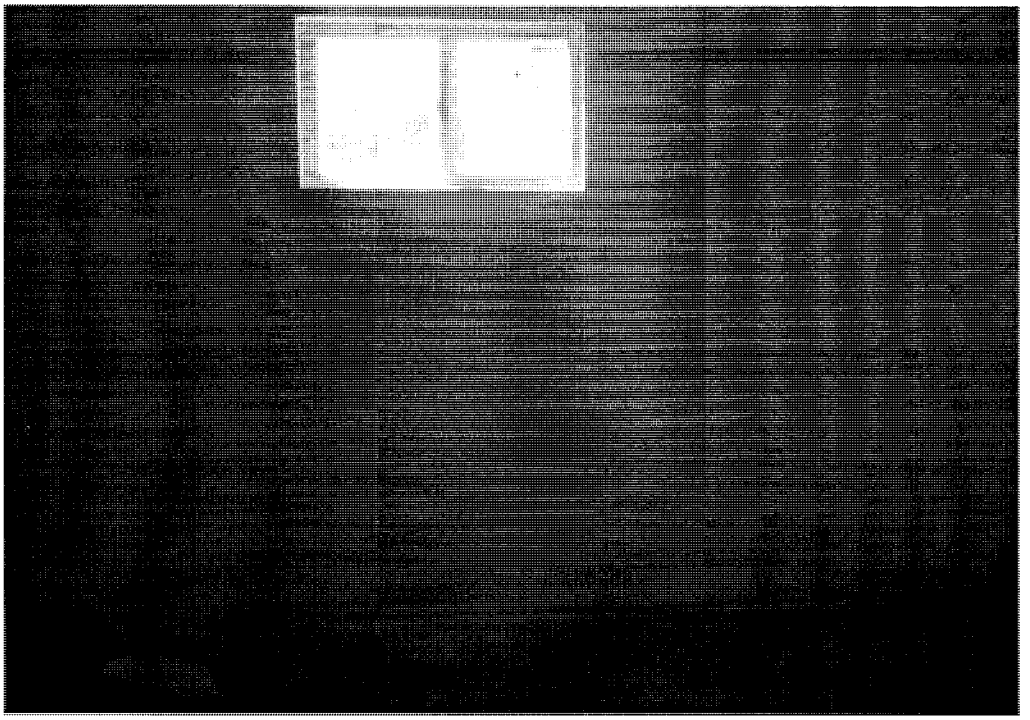

Figure 3. Before the lab set-up at the SUN church.

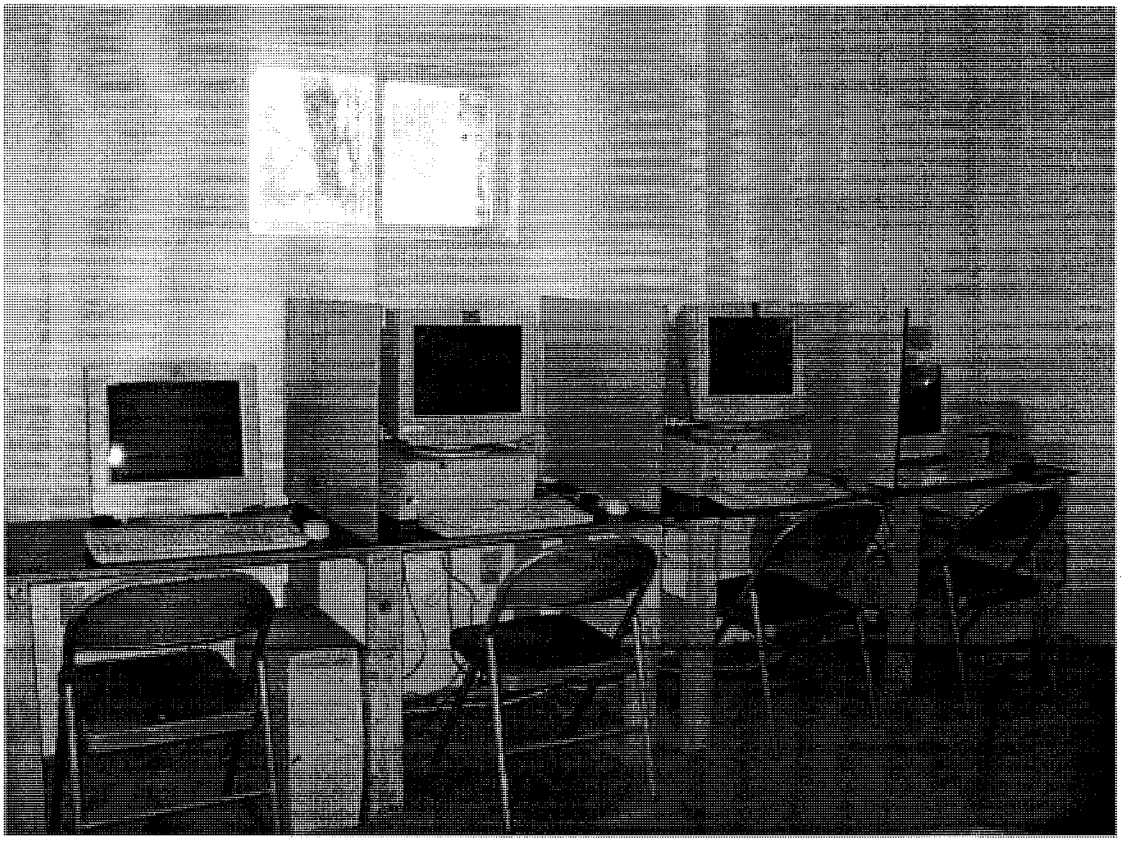

Figure 4. Final lab set-up at the SUN church.

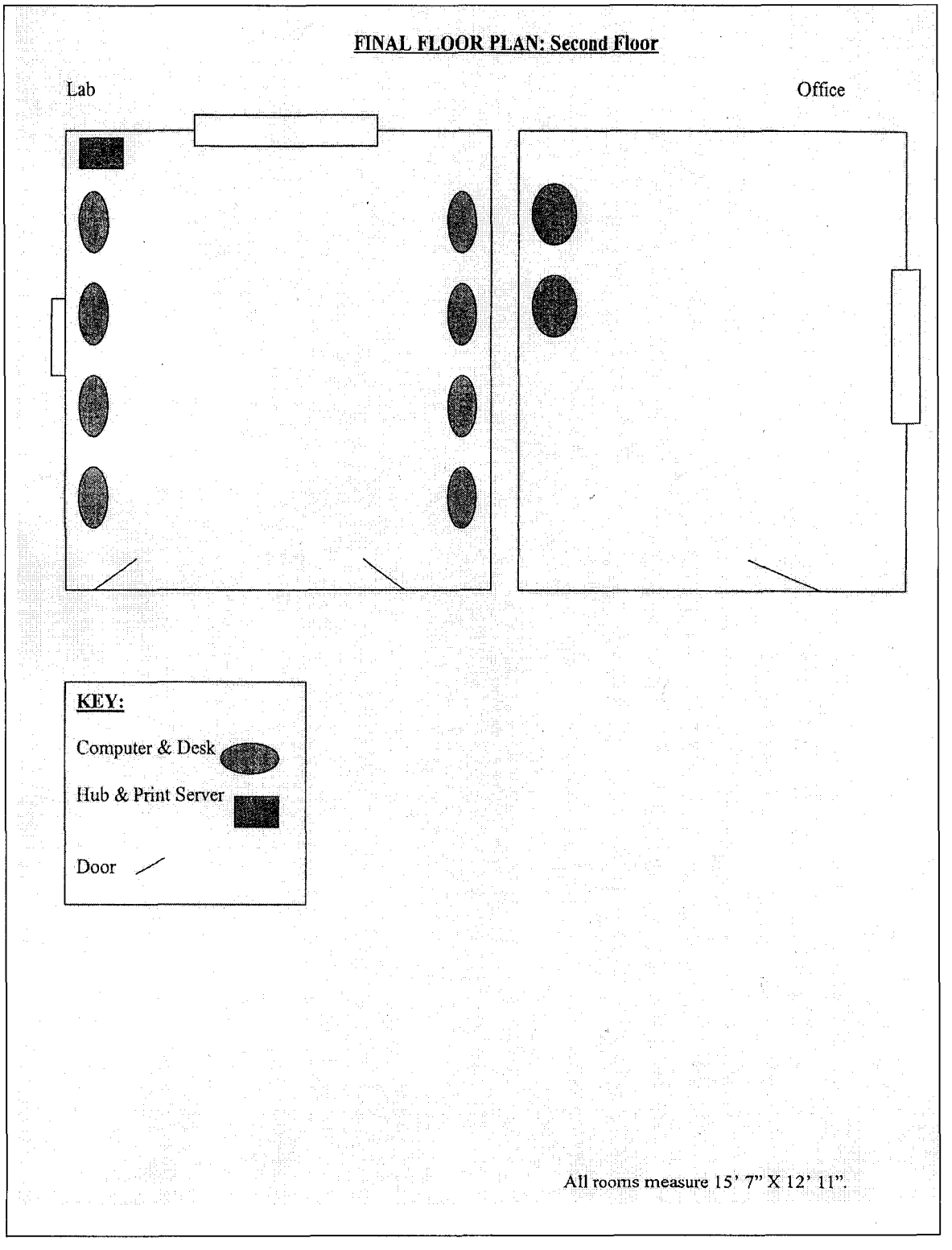

Figure 5. SUN project group's final floor plan.

A Reflection on the INIS Students' Learning

The INIS course provided rich experiential learning about computer technology through its incorporation of hands-on lab activities along with classroom-based instruction. INIS students learned to develop their technical confidence by actively and collaboratively participating in solving various technical problems. Accordingly, they developed strong in-class relationships and gained ownership in their learning about technology. As a result, female students also showed enhanced self-efficacy with technology.

However, compared to this first eight-week training session, the course design for actual student service learning revealed a few educational limitations with regard to the instructional goals set. Even though Martin emphasized the development of mutual relationships between students and their community partners, the designed activities were limited in promoting such community building in technology practice. Regarding the INIS course design for service learning, I will point out three main limitations.

First of all, the first site trip was inadequately designed to allow students to develop relationships with their community partners and to understand a marginalized community. Both site trips were made on Friday afternoon and Saturday when most community organization buildings were empty, so INIS students were not actually able to meet and talk with the community people who would be the future users of the computer labs. Instead, students spent a lot of time during the trips mingling within their own groups. They had lunch at the ESLARP community center, sometimes with other university students who came for different projects. Also, they slept at the Ramada Inn, about a twenty-minute drive from East St. Louis. Hence, it was a rather rare and lucky

case that some INIS student groups, following their community site coordinator, got to see the field and track competitions in which the community high school students and their families participated.

Second, without building strong ties with their community partners during the first site trip, INIS students spent most of their time and energy dealing with too many specific technical tasks and problems in preparing computers for their service projects. Moreover, during the time of project implementation, the long distance between the university and the urban community disabled face-to-face interactions between students and community residents. Rather, their interactions in providing service were limited to a few conversations over the phone. On top of their communication problems with the community representatives and sometimes even within their own student groups, INIS students experienced a significant lack of time to devote to their technical work. Students frequently requested further technical assistance during the time they had. While doing their technical work, students were not able to think through their technology designs, either in relation to the visions of the community organizations, or to various social issues surrounding technology. To complete their project priorities on time, INIS students were rarely able to engage in discourse or critical reflection on the meaning of their community service and the use of technology in marginalized communities.

Finally, these service projects did not reflect a holistic view of technology design, use, and evaluation. Since this course had to fit into a semester, service projects could not include any systematic process in which students would evaluate and redesign their products based on community user feedback. That is, students' designs of computer labs were not adequately evaluated in terms of their responsibility or in-depth consideration of

the consequences. Rather, the maintenance of their products remained the task of others—Prairienet. In this evaluation process, students mostly focused on whether or not they completed their projects by providing community sites with free computer labs that work. Beyond the technical aspects surrounding the performativity of the products, students did not thoroughly think through other educational, ethical, or social issues related to their computer network designs. They did not critically reflect on the weaknesses or potential problems of their products, but rather emphasized the benefits with relation to the community activities and uses.

Every semester, twenty to forty students register for this INIS course even though it requires a considerable commitment of time and energy. The popularity of the course is mainly attributed to great student satisfaction with the course learning, especially in terms of their improved technical confidence. However, if this course is not simply meant to meet individual students' self-interest in gaining privileged social status through technical skill development, it will be crucial to reflect on the course curriculum design and ask where each activity actually leads these students. In the next chapter, I will discuss further the educational implications of this INIS service learning, specifically in terms of student values development in technology design and use.

CHAPTER 5

AN ETHIC OF CARE IN TECHNOLOGY EDUCATION

> Making meaning out of lived experiences is an ongoing dynamic within one's spiritual or "faith" development. (Swezey, 1990, p.77)
>
> An engaged pedagogy involves caring for students as whole persons and models for students the kind of moral and ethical attitudes we hope to see reflected back to us and throughout our society. (Rhoads, 1997, p. 214)
>
> The higher levels of moral development are characterized by an increasing concern for justice and for social transformation. (Schultz, 1990, p. 97)

In "Community Service and Higher Learning," Rhoads (1997) introduces Gilligan's classification of two different, female- and male-oriented ethical approaches—an "ethic of care" and an "ethic of justice." Kohlberg conceives of ethics as one's rational actions concerning what is right and just based on one's cognitive problem-solving abilities. According to the Gilligan's feminist perspective, Kohlberg's concept of ethics is highly male-oriented, whereas women's ethics are grounded in their sense of attachments, relationships, and caring for others. Building on this feminist line of thinking about ethics, Nel Noddings (2005), an American educational scholar, has presented her famous idea about "caring in education." She proposes a new plan for school reform that supports building and maintaining caring relations—not only between teachers and students, but all around them, and even with ideas. Noddings does not intend to reject all the efforts made to improve academic excellence or achievement in disciplines. However, she wants us to see how desperately we need to enact this kind of moral education and discourse in modern schools that have for a long time overlooked student motivation, affective relationships, trust, and responsibility. Noddings enthusiastically addresses the

problem of current school education in teaching children only for academic achievement, but not caring for them as whole human beings.

Likewise, in postsecondary education, contemporary academic discourse has perpetuated the maintenance of scientific objectivity in knowledge production and dissemination. Moreover, the teaching and learning practices in this mainstream of higher education have been long isolated from individual senses of caring, social relationships, and real community concerns. Based on criticisms of an individualistic and competitive academic culture that pursues objective knowledge disconnected from a social self, recent scholars, such as Boyte (2004) and Sullivan (2000), have been making new demands on higher education to foster relational knowledge and community building. These calls for reform seek to bring educational practices that build on civic education and ethics into higher learning environments. They also promote a new direction for teaching that cares about student identity formation and social relationships built through learning, instead of only addressing how to achieve student skill development and content mastery in academic disciplines.

In this context, service integration has been suggested, and politically advocated, as one of the specific remedies aimed at fostering students' development of civic values and responsibilities in their professional development. Robert Rhoads (1997), one of the main advocates for the use of academic service learning, asserts that current postsecondary education, in its dominant, masculine culture, should begin to "reconsider the development of students as caring and community-oriented citizens" (p. 35). Rhoads believes community service will play a vital role in providing students with a unique experience that allows them to develop an ethic of caring. For him, students' enhanced

sense of care for others naturally lead them to understand differences, marginalities, and inequities that exist within a community.

Obviously, the development of student values is conceived as one of the primary educational goals in academic service learning. The basic assumption is that, while engaging in the service experience, both students and community partners will acquire relevant knowledge and values through their developed senses of a related self and a shared community. However, my project raises another critical question related to this promise: Is this vital meaning of service learning, which has mostly been applied to social work and civic education, also sustainable in the field of technology education? Service learning advocates believe that students' development of ethics and civic values is important in any discipline or grade level, and that service integration can be used for this purpose (Morton, 1996; Zlotkowski, 1996). However, there has been little empirical research on how this connection works in different disciplines—in particular, in technology education.

In this chapter, my analysis of the INIS students' service learning shows what kinds of discourses and learning occur, especially in terms of student values development related to technology design and use. I also discuss emerging issues about the course design and implementation in supporting students' critical and pluralistic inquiry. My case study develops a discourse on service learning that describes the problems and issues in applying an ethic of care in postsecondary technology education through this pedagogical approach.

The Link Between Service and Technology Education

The recent political drive to adopt service learning on college campuses has contributed to motivating educational practitioners in various disciplines to follow this trend (Folkestad, Senior, DeMiranda, 2002). Because of rising interest in service integration in American higher education, a number of organizations and institutes have emerged to support and implement a variety of community-based projects and academic programs. The university where the INIS course has been taught is not exceptional in this trend. Prairienet and the East St. Louis Action Research Project (ESLARP) are some of the university organizations that have taken roles in developing and maintaining community projects and partnerships with local communities.

In fall 2000, Martin first incorporated community service projects in his existing INIS course that was mainly designed to introduce basic concepts about computer networked systems to Library and Information Science (LIS) master's students. Before this service integration was implemented, East St. Louis community representatives had approached Paul, the director of Prairienet, through ESLARP, and asked for help in breaking a digital divide in this marginalized community. By connecting this community's request for free public access to computers and students' desires for technical training, Paul and Martin worked together to rebuild the INIS course as a service-learning course in the LIS department. Since this pedagogical change took place, Prairienet has been deeply engaged in implementing service projects into the INIS course, especially in helping with the computer supply and site selection, the scheduling for two field trips, and in providing additional technical training and service to the community sites where the students worked.

With strong assistance from Prairienet, Martin primarily took charge of the INIS course curriculum design. In fact, based on his long-term commitment to user service in technology, he was one of the best positioned faculty members to work on this curriculum change with community service. He himself learned about computer technology by engaging in many technical service experiences. Through these experiences of service and learning, Martin was able to consolidate his pragmatic perspective on technology and its practice. Through it all, he worked passionately at developing his own way of teaching technology through service projects.

The INIS course curriculum has been modified to various degrees over the past few years, and it is still evolving in light of Martin's reflective evaluation of his teaching and student learning. The primary educational goal Martin emphasized in teaching technology alongside service adoption was providing a contextual and active problem-based learning environment to students. Through the community service experience, Martin expected his students to apply their technical skills and knowledge in real community situations. INIS students were encouraged to design and build computer labs based on their developed understanding of the community partners' interests and needs. Martin's rationales for designing and implementing his service-learning course are noteworthy, especially in the context of current technology education in the U.S.

Postsecondary technology education in the U.S. has undergone a critical transition by restructuring the main pedagogical framework that describes its educational purposes and approaches (see Chapter 1). In the recent call for curriculum reform in technology education, one of the main issues that have arisen is curriculum development and enactment to promote problem-solving activities and interdisciplinary practices in

technology. Some teachers began to adopt experiential learning pedagogy, including service learning, in technology education in order to help students understand more about processes of technology and to develop cross-functional skills, such as problem-solving and communication skills. However, as Senior (1999) points out, when technology educators adopt service integration, the link they build between service learning and technology education is still weak:

> The first challenge to service-learning comes from the recentness of its application to technical fields such as construction management. In areas of study such as social work, students are expected to gain a deeper understanding of their community. There is an evident link between service-learning and their educational goals. This is not the case in construction education. An instructor trying to implement service-learning in a course has the burden of the proof to convince others of the merits of this approach. (p. 21)

Unlike social studies, the field of technology education is still lacking in how it relates the subject content to student moral development and a sense of a caring community. As Senior points out, this problem emerges partly because of the novelty of service integration in technology education, but more seriously, because of the shared meaning of technological literacy that still needs to be developed. The meaning of technological literacy that teachers, administrators, and policy makers are currently pursuing needs to embrace a holistic sense of viewing human development as a process of producing social agents for change.

Herein, Martin's setting of educational goals for the INIS course enlightens us with one way of thinking about a connection between technology education and student values development through community service. The connection that the INIS teacher made between community service and technology education can be seen in the course's focus on student development of insights into future technology choices and decisions

(also see Chapter 3). In doing this, Martin wanted his students to refuse the idea that a technology can solve all social problems, and to evaluate any design or choice in terms of both its strengths and weaknesses. He attempted to teach his students to learn about the active roles that humans would play in the process of designing and building a technology. INIS students were continuously encouraged to be flexible and creative about their decisions within technical activities. Through these instructional emphases, Martin believes his students will be able to learn how to evaluate and wisely select technologies for their own and community purposes. In this service learning that Martin envisions, students are fully empowered to choose, use, and design technologies to meet the needs and interests of other people and communities they care for. He hopes that this kind of learning will eventually lead to students' development of insights and values important for their responsible engagement in future sociotechnical activities.

The Enhanced Sense of Caring Through Service Experience

Participating in service projects, INIS students had to understand their community partners' needs, interests, and visions for computer labs in order to design and build computers and networks for community sites. The first site trip was particularly designed for students' observations of their assigned community sites. After the trip, students briefly documented their findings about their community partners and designed computer labs based on their site survey results.

During the fall semester of 2004, the INIS students often showed their concerns for the results of their service projects. In their one-minute paper assignments, a few students asked about the possibilities of what would happen if they could not successfully

complete their projects on time. In particular, one student asked questions to clarify the scope of the responsibilities that his project group was expected to bring to the project: "What if we get down there and find that our best laid plans stink? Or how much on-the-fly are we allowed to do?"

INIS students naturally felt responsible for their technical designs, so they wanted to be clearer about the line between their responsibilities and others'. One of the most common concerns that INIS students also showed while doing their service projects was over the consequences of their work when they would not be there for the community:

> What happens if the network in East St. Louis works okay upon installation, then starts acting up or crashes completely a few weeks later? Once the semester is officially over, is maintaining the network no longer the responsibility of class members? What if the network crashes before the end of the semester? Will the group responsible have to travel down there again?

Because of their predicted absence in the maintenance of community computer labs after the semester was over, students came to ask questions about the kinds of post-course service that would be offered to the community sites.

In all these emotional engagements with the service projects, INIS students willingly worked hard to complete their projects on time, even giving up their holiday hours for their lab work. They did so, not because of the grade pressure, but because of their promises made to real people. One student told me that unlike other academic courses she was taking, INIS made her feel special because she did not do the course work "to get a good grade," but "to help real people."

After the end of the INIS final trip to install computer labs in East St. Louis, another female student regrettably explained that her group was not able to complete their work during the trip. The community site that her group was assigned for the project kept

record and beautifully displayed many historical keepsakes and pictures. Hence, during their first site visit, her group gladly volunteered to find and install a donated scanner and printer for their community partner to be able to digitalize the archive. However, her group was not able to see these machines and networks properly working at the site before they had to leave on the last day of their second trip to East St. Louis. According to her, her group tended to underestimate the amount of work and was not able to fully prepare for the final trip. She said that her feeling of regret would not disappear until she heard that her group's assigned community partner was able to run the computer lab they wanted.

INIS students' emotional reactions and enhanced moral sense must be the lessons that cannot be easily taught, or even pursued, in any other technology course. By participating in service projects, INIS students naturally came to develop a sense of caring for their assigned community organizations. Nevertheless, some questions still remain regarding the relationships that students and their community partners built throughout the course. How strong and genuine are the relationships that they built? How long will their relationships last? In what ways will the relationships affect these students' lives in the future?

In this section, I discussed how the INIS service-learning course was able to enhance students' sense of caring for others. However, the development of a sense of care is not the ultimate goal of service learning. As current scholarly discourse maintains, successful service integration should be able to transfer students' sense of care to another level of moral development that allows their critical thinking and long-term civic engagement for social justice.

The Keys to Effective Service Learning

> Without reflection, even effective community undertakings may never rise to the level of truly civic action or public problem-solving. Instead, they may well remain isolated "technical" interventions that arise solely out of exclusive expert knowledge and have no implications for how we can begin to work together across social sectors to reclaim our public life. (Zlotkowski, 2000, p. 320)

As I explained in a previous section, the main educational goal of implementing academic service-learning program in general has been to develop students' moral sense and care for others in order to challenge the dominant practices of higher education that have long perpetuated individualistic and competitive learning about specific content. However, if educational practices of community service do not foster student critical reflection or inquiry about related social issues and social justice, as well as a sense of caring, these practices will lose their other vital educational meaning, and merely serve an altruistic purpose. A recent notion of conditions for effective service learning has increasingly captured both concepts of caring and social justice. Rhoads (1997) especially names this kind of balanced practice of service learning as "critical community service."

Service learning implementation had once flourished on college campuses during the 1960s and 1970s (Jacoby, 1996). However, this movement eventually failed as the number of service-learning courses or programs gradually declined. In the 1990s, the popularity of integrating community service into academic courses began to resurge. This new trend accompanied the grounded efforts to identify the key elements for implementing sustainable and effective service-learning practices. According to Kendell's analysis, the service-learning programs of the 1960s failed to sustain themselves primarily due to their weak coordination in supporting both effective community service and student learning (Kendell, 1990). The previous service-learning programs ran on a

highly charity-based model. Through such reflective analyses of earlier failures in the service integration movement, two concepts were commonly highlighted as the most essential elements for effective service learning: reciprocity in the relationships between the student and community partners, and reflection on the student service experience as well as the larger social and political issues related to academic disciplines (Jacoby, 1996; Kendell, 1990). That is, through service experience, students need to learn that they are not only providers of service to disadvantaged communities, but also recipients of lessons from forming relationships with these communities. Ideally, student development of relational knowledge and values also needs to be furthered in critical reflection on their service to marginalized communities and through engagement in social and political discourses.

Students' Engagement in Social and Political Discourses on Technology

In the later sessions of the course, Martin offered a special guest lecture on "user service as an emerging realm of technology" and a video on the "open source movement[17] and its leaders" to inspire his students to think about the future of computer technology and their relevant careers. Sometimes Martin informally discussed with his students some emerging issues of technology, such as open source software and

[17] In an online encyclopedia (Wikipedia), "open source" is defined as "a set of principles and practices that promote access to the production and design process for various goods, products, resources and technical conclusions or advice." It also particularly means a public access to the "source code of software" without strict restrictions in supporting the legal rights for intellectual property. Accordingly, not only the first inventor but also many technology users can contribute to, or collaborate on designing and improving software for their own purposes. Within this meaning of open source, the open source movement is viewed as a political and pragmatic act in the technology culture that promotes the prevalent dissemination and use of open source software.

Microsoft antitrust issues. However, these were additional and informal conversations in his course.

One of the INIS lab activities in particular brought students and Martin to a rich informal discussion on a critical issue of computer technology. The main topic of the lab for the fourth week was to install operating systems—both Microsoft Windows 2000 and open-source Linux. INIS students first reflected on how this activity helped demystify their view of the open source software in that it was unfamiliar to them:

> I have only ever used Windows before. But, I thought it was great to fiddle around with Linux. I thought that it was important to note that from the GUI [Graphic User Interface] perspective, they are not that different. I feel like I could use Linux without a problem and I am not that computer savvy.

Afterward, some INIS students started asking further questions about the social implications of the dissemination of open source software:

> The most amazing thing I learned was that Linux is not a geek-based system anymore. . . . Do you see a more wide-spread movement towards use and expansion of open source software in the future? How does this [affect] the software industry? . . . It was very informative for me as you answered a lot of random Linux questions after lab. I'll be very curious to see to what extent Linux takes off and becomes more widely used.

Also, students sometimes developed their ideas and further inquiries on the open source movement or the antitrust suit against Microsoft:

> Although it doesn't have any relevance to lab, the most important thing I learned is that I must be a cautious consumer. When Martin talked about many of the major negatives Internet Explorer has compared to Netscape, Mozilla, etc. I began thinking: there's more than just Microsoft out there? I also realized that marketers and others are not looking out for my best interest and so I need to pay more attention with what I do and where I use my money. I'm ever so slowly breaking out of this naïve little world I've been living. Ohh, by the way I downloaded Mozilla and love it. It is so much faster and virtually no pop-ups. Thanks for enlightening me.

Such student reflective thoughts about the open source movement had a precious educational value in that through their discourses, students were able to realize the importance of their active roles and responsibilities in their technology designs and uses. However, INIS students' discourses were rarely guided to a higher level of critical reflection and inquiry by promoting students' sense of social justice. Rather, individual students who came up with certain thoughts on the issue often ended up examining open source software only in terms of how it served their individual needs. A student wrote, for example:

> I understand better now why geeks like Linux—because it gives them more control of their options. I also learned that I like DOS. I like the simplicity of the command line interface. However, I'll probably stick with Bill for most of my computer interactions.

Throughout the course, INIS students hardly engaged in in-depth and serious discussions to develop further critical thoughts about the social and political implications of the open source movement at large.

Most INIS students' reflective thoughts and discourses about the open source movement arose when they presumed that they could install Red Hat[18] on the computers given to community organizations. Later, however, these students gradually lost their interest in further inquiries into the issue, as they automatically dropped the option for using Red Hat for their projects when Prairienet bought copies of Windows 2000 for all of the service projects for fall 2004. Prairienet decided to install the Windows operating system because the community sites in East St. Louis did not want to have open-source programs for their computer labs. Unfortunately, the community sites' technical decision

[18] One of the representative and commercialized open-source operating systems.

turned out to be less beneficial to student learning in terms of developing critical reflection and discourse on the open source movement issue.

A week before the INIS course was over, Martin also offered a whole classroom session for students to watch a video regarding the open source movement. In the video, people who were involved in the open source movement came and talked about the philosophies at work behind their political and collective action. However, only few INIS students came to the class. Students showed little interest in this session. In the second student survey, INIS students rated this session of watching a video as one of the least beneficial class activities for them.[19] One of the INIS student respondents specified that he did not like this session because he thought that it would be better to watch the video individually and then have a whole class discussion on it. In their last interviews, most INIS students also expressed little interest in any further political discussions about technology. Among twelve student interview participants, Nick was the only student who stated that he had increasingly realized the importance of political action in the field of technology at the end of the semester. Nick had majored in both sociology and history as an undergraduate, and particularly focused on environmental study in sociology.

Zlotkowski (1999), who has a great deal of experience teaching with community service, narrates his notion of students' utilitarian minds toward education:

> Like many instructors, I do not have the luxury of taking student intellectual engagement for granted. In fact, most of my students approach their education from a decidedly utilitarian point of view. While I am, in fact, deeply sympathetic to their practical concerns, I am too committed to the value of liberal learning not to be troubled by what many of them sacrifice in their quest for marketable skills. (pp. 116-117)

[19] But in the last interview, Martin comments that this result seems somewhat odd to him because INIS students in later semesters responded in ICES by saying that the Revolutionary OS video session would be one of the course activities that "must be kept."

If students do not critically reflect on their experience and learning on their own, as Zlotkowski states, what will be the best way of leading students to be engaged in related social and political issues in a technology course like INIS? How could technology teachers open their students' minds to multiple perspectives?

The INIS teacher chose to provide students with resources for thinking and let them think on their own, rather than offering guided activities to promote their critical reflection. The INIS course curriculum did not involve any formal class discussions regarding social, political, and ethical issues surrounding computer technology. In fact, as a one semester-long technology course, INIS was already too over scheduled to include other activities for student critical reflection and in-depth class discussion on the social issues of technology. How could Martin differently design the course to guide INIS students' discourses to develop critical reflection and inquiry and to promote their ethical sense of social justice? Would it be necessary to add structured course activities for student reflection? Herein, I also want to ask if an individual teacher's effort and one service-learning course will be sufficient to accomplish these educational goals. If not, what other assistance or what levels of support would be needed?

Further pedagogical discussions about the effective implementation of service learning in terms of student values development should include a clear understanding of students' preconceptions and habits and the ways that they start changing their perceptions. Who are the INIS students? What kinds of perceptions do they have regarding technology? Are they able to develop new values and critical thoughts about technology throughout the course? If so, how? In the next section, my analysis focuses on

addressing the questions about INIS students' existing perceptions about technology and their perceptual changes throughout the course.

Students' Perceptual Changes About Technology

Utilitarian and Cultural Views of Technology

> Question[20]: Have your thoughts and feelings about computer technology changed since you've taken this course?
>
> Student 5a: Not really, other than having a much greater understanding for it. Personally, I just believe that some people are more geered [geared] to think in a way that works with well with technical needs, and other people are not. Although I do not work well with technology as it just does not come easy for me, I am in fact much more comfortable with working with and using technology. (Male, Technology novice)[21]
>
> Student 5b: In the beginning, I was interested enough in assembling/disassembling computers and working with community groups that I was considering making a career out of this. However, as time went on I discovered that I have neither sufficient *patience* nor the spatial mind-set to design networks and labs. I have more confidence in my ability to troubleshoot, but I'm also aware that I am NOT an expert. (Female, Technology-experienced)

These are two exemplary student responses to a student survey question, which asked students about any changes in their perceptions and feelings about computer technology after they took the INIS course. The first student (Student 5a) stated that he had acquired a better understanding of computer hardware and reduced his fear or discomfort about handling it. But he did not see himself as a technology person because he was not good at doing technical manipulations. Still for him, the qualification for becoming a technology expert is based on technical skills and a mastery of content knowledge. My survey analysis shows that similar to this male respondent, three-fourths

[20] Question #6 in the second student survey.

[21] The identification information on these two survey respondents was not directly found in the results of the second student survey, but deduced through my other personal connections with the INIS students for the purpose of this study.

of the INIS students had not significantly changed their thoughts about technology and computer education from a utilitarian standpoint. These students commonly stressed their enhanced confidence in troubleshooting or working with computers as the only significant change they experienced through the course:

> Student 5c: I no longer feel computer technology is something to fear. Changes now make me excited instead of anxious.
>
> Student 5d: Ok, they've [my thoughts or feelings about computer technology] changed a bit. I'm less afraid—especially of the hardware. I could replace just about any component in the box—except the motherboard or CPU.

Interestingly enough, these respondents were mostly technology novices before taking the INIS course, students who did not expect or want their future careers directly to be related to computer technology.

In contrast, the second survey respondent (Student 5b) revealed her rather complex thoughts about technology or a technology-related career. She viewed not only technical skills, but also the ability to work well with community groups as essential requirements for being a technology expert. For her, both concepts of technology and community all come together. This student also wrote, in answering another survey question that asked students to describe what they learned about the process of "designing" or "building" a networked information system in doing the service project[22]:

> Technology is a TOOL used to meet goals of an organization. It isn't a miracle cure for all problems. A designer needs to keep the goals of the organization foremost in mind when making ANY decisions about the network.

In fact, her response significantly resembles Martin's standpoint on technology (see Chapter 3). There were a few INIS students (about a quarter of the class) who similarly,

[22] Question #5 in the second student survey.

or in a more critical manner, mentioned their perceptions about computer technology in relation to communities and social visions:

> Student 5e: Yes, [my current perception about computer technology is] that technology is only one tool in the vast part of trying to help a community.
>
> Student 5f: It's [computer technology is] beneficial from vocational standpoint, but computers still have too much control over society and harm inter-personal relationships.

Some INIS students changed their thoughts from the utilitarian perspective and started developing their views of computer technology and its practices as being situated within a social or cultural context. Most of these students were either moderately technology-experienced students or ones who hoped to work as systems administrators after graduation.

Meanings of Patience

My other finding from the second survey results shows that regardless of their different ways of perceiving technology, INIS students frequently discussed and valued two concepts: "confidence" and "patience." Students commonly conceived of both "confidence" and "patience" as the key abilities to be acquired through technology education. If "confidence" in troubleshooting or working with technology was the most frequently used word by INIS students, the next one was "patience." However, INIS students showed slightly different meanings in their uses of the word "patience," whereas they almost consistently used the word "confidence" in the same way.

Being "patient" could refer to two different student abilities in terms of students' views on technology practices. Student 5b (in the previous section) pointed out the value of "patience" as an important qualification for a technology expert. Other students

mentioned the need for fostering an attitude of "patience" in handling continuously arising technical problems:

> Student 5g: I learned that I do have the ability to fix and troubleshoot computers. It made me realize that I do have the *patience*.
>
> Student 5h: *Patience*—computers can be unpredictable and irritating but I can master them. Positive attitude—not all thing [sic] or everyone will perform "perfect" all the time—but in the end—it all come [sic] together.

If these two students above valued "patience" from a goal-oriented perspective—the ability to endure the tedious process of solving problems until the final goal is accomplished, the following student respondent (as well as student 5b above) tended to emphasize the importance of "patience" in having a rather open-minded approach and continuously relating technology decisions to community goals:

> I learned that there are always going to be a lot of problems with setting up networks, and it's important to stay *patient*, and be willing to think about problems with different perspectives.

The question I have is what this service-learning course was more likely to help students come away with. Did it help students learn to be patient and to simply be able to effectively conduct technical work, or did it help them think through different views and alternatives in their technology designs?

Herein, Zlotkowski (1999), one of the representative scholars and practitioners of service learning, points out the importance of pluralism in the meaning of critical reflection:

> What is distinctive about reflection in a service learning context is its multilayered quality: what students reflect on results not just in greater technical mastery (i.e., course content) but also in an expanded appreciation of the contextual and social significance of the discipline in question and, most broadly of all, in "an enhanced sense of civic responsibility. (p. 99)

Technology teachers who use service-learning pedagogy will need to ask what they want their students to learn. At the end of the semester, an INIS student wrote about what she had gained from her service experience:

> I learned a lot about being patient with computers. They are impervious to being yelled at, glared at, or shaken. We had to be calmly methodological and allow enough time to go through the steps of figuring out why something wouldn't work. We also learned that we had to be continuously vigilant about troubleshooting. In some cases, this meant re-testing applications/machines that we knew had worked before, because on several occasions a computer that had been functional the day before was suddenly on the fritz.

First, note that this student's reflection does not represent all INIS students' service learning. With this example, I point out rather that this student, in fact, might have learned a lot about a marginalized community, the need for community empowerment, and social responsibility. However, if a technology course emphasizes learning computer skills, who would not focus on this kind of lesson in their reflections? Is this what we teachers want to hear from students reflecting on their learning about technology through a service experience? If not, what kind of reflection would be more productive?

Changing Student Perceptions

Students' perceptual changes did not seem to result from a single influencing factor, such as an eight-week service experience. Rather, I realized that students' personal experience, prior knowledge, self-identity, and career choice all came together to shape the pattern of service learning. Students' comfort levels with handling technical challenges also seemed pre-conditional to an educational practice of broadening their views on technology and its practice.

For instance, Marie was the technology person in an INIS student service group (TOP). She studied English rhetoric in her undergraduate program, and later applied for a

master's level study in GSLIS. When I fist met her in the fall of 2004, it was her first year of graduate study. Marie grew up in a small town, which is one-hour away from East St. Louis. Her father did work related to computer networks for a college in her hometown, so Marie naturally could have many opportunities playing around with computers at home. Her childhood experience with technology has affected her school life and even her current career plan. Wherever she went, she often started to help people with computer problems. Marie considered two possible future jobs: a librarian focus and information specialist working with computer technology and networking. Marie explained me that she had fun with the INIS course although she more likely relearned about what she had heard before from her father and known from her prior technical experiences. She also worked as a graduate assistant in user services with Martin in GSLIS.

When I first interviewed her before taking the first site trip, Marie told me about her special expectation to learn how to collaborate better with non-technology people (especially with her fellow students) throughout the INIS service project. However, in the third interview, Marie stated how disappointed she was in the communications with her group members. Marie said she explained what to do several times to her group, but they could not understand and kept asking her the same questions. In fact, her group faced significant unexpected technical problems regarding networking before and during the final installation. Consequently, the TOP group could not finish the project on time, and Marie decided to participate in the follow-up project for the next semester as a teaching assistant. With all the difficulties she faced with her work group, Marie stressed that technology professionals should be qualified not simply by their technical skills, but

more importantly by their abilities to handle social problems. She claimed that current technology designers do not pay great attention to users.

For Marie, it was not the INIS course alone, but rather her various experiences in user service that helped her gradually understand technology practice as another type of social interaction and discourse. Moreover, her graduate assistant position that allowed her frequent talks with Martin seemed to inspire her to adopt his pragmatic perspective on technology. Students' past and various daily experiences with computers could not be ignored, but rather, thoughtfully considered in shaping their working perceptions about technology. Without understanding these "texts" that students bring into a classroom, teachers would not be able to make their service learning an "innovative" educational practice for change.

Curriculum Development and Enactment for an Ethic of Care

In bringing experiential learning into public education, educators should be careful and critical concerning what is educationally meaningful and what is not. Dewey (1939), a philosophical founder of experiential learning, also maintains that education requires a careful organization of conditions of experience to guide learners to acquire desired attitudes and values. At the same time, Dewey argues that "it is more important to keep alive a creative and constructive attitude than to secure an external perfection by engaging the pupil's action in too minute and too closely regulated pieces of work" (1939, p. 197). Clearly, in his idea of experiential learning, Dewey does not aim at a mastery of skills or memorization of rules and subject content. He rather envisions a holistic development of human beings who actively and creatively engage in decision-

making processes. Service-learning pedagogy builds on this concept of experiential learning in general by stressing community building, a sense of caring, and civic responsibility. Theoretically, the primary purpose of service integration in postsecondary education is to produce socially responsible professionals who care and work for the larger society bringing open-minded and critical perspectives to their professional environments. In this sense, the ideal of service learning straightly aligns with Noddings' educational reform idea and all other advocates for the development of an ethic of care.

However, when I observed the INIS students' learning and discourses that occurred throughout the course, it seemed remarkably difficult to create such a service-learning environment that would effectively result in students' development of an ethic of care. INIS students often showed their developed sense of caring and responsibility while they were engaged in service projects. However, most of the students did not seem to extend their moral sense of caring further to develop their interest and long-term engagement in community action for social justice. Moreover, they were not much able to change their utilitarian perspectives on technology and its practices.

It is still not clearly understood how a service-learning course can wisely guide students in changing from a utilitarian perspective to become more responsible, social agents. The pedagogical issue lies in how to build a strong link between technology education and an ethic of care, not simply theoretically, but through specific course designs for service learning. For instance, the weakness of the INIS course in terms of student values development might have resulted from the fact that the instructor did not include any formal class activities for students' critical and in-depth reflections on larger social and political issues of technology. However, since INIS was already an extremely

intensive, semester-long course fully scheduled with lab activities and service projects, it was difficult for the instructor to include other activities for student critical reflection. INIS students spent much more time working on their service projects than they usually do on assignments for other academic courses. Moreover, including structured class activities and assignments for student critical reflection may not even effectively bring such learning outcomes to the course if students do not have strong motivation and sufficient time to think through the issues of technology. In considering all these factors in context, it seems reasonable that Martin decided to provide his students with rich food for thought while they were engaged in service projects, but did not necessarily lead them to develop a sense of social justice in the field of technology.

The problem may not be simply whether the instructor needs to offer formal class discussions for student reflection or not. That is, we may need to more closely look at the design of the course curriculum in terms of students' relationship building with their community partners and their inquiries related to serving the marginalized community. The INIS course was a uniquely designed service-learning course in technology. In setting his educational goals for providing a contextual problem-solving practice, Martin obviously emphasized student creative thinking and active control of technology. Moreover, he continuously pointed out that students should be able to understand both strengths and weaknesses of a technology by overcoming an optimistic envisioning of technology that would work for all social problems at once. These were the crucial connections that Martin made between technology education and ethics.

However, I notice that the INIS course design for service projects is still weak in fostering students' building of strong caring relationships with their community partners

(see Chapter 4). Moreover, what was also missing in the INIS course is further student exposure to pluralistic approaches to technology design and evaluation (also see Chapter 4). If students are guided by instruction in terms of considering only practicality and cost-effectiveness while designing a technology, this technology education cannot help transform human society, but instead, would reinforce a technocratic culture through professional enculturation. Students should be encouraged to speculate on various issues—social, political, organizational, educational, and ethical—with their technology choices and uses, as Pacey (1983) and other philosophers of technology have contended. Hence, I assume that the course activities related to community service projects, such as students' site visits and planning for their final lab installation, should be primarily and more carefully evaluated and recreated if this course pursues the ideal of service learning and social change.

Making better practices of service learning in technology requires further research and discussion on the relationship between curriculum development and students' development of an ethic of care. Needless to say, the INIS course is not a final product that makes strong ties between service learning and technology. However, it is definitely a work-in-progress towards creating a better service practice with technology through student active and experiential learning. In the next chapter, I extend my close examination of this INIS case to a further discussion with Martin on the implications of this research for service integration in technology at large—specifically regarding three different levels (course-, program-, and institutional) of support/change for accomplishing the highest ideal of service learning.

CHAPTER 6

FOR A NEW BEGINNING OF TECHNOLOGY EDUCATION THROUGH SERVICE INTEGRATION

> The innovation process doesn't end, but begins, with the teacher. Implications for curriculum development follow from this view of the teacher's role. Since the innovation doesn't even come into being until it is realized in an actual setting, the goal should not be to establish the endpoint for instruction, but rather, to supply the most useful tools possible for the re-creation process. (Bruce & Rubin, 1993)

Since spring 2004, I have examined the case of a postsecondary computer-training course, in which a passionate and experienced teacher has developed his own way of teaching technology through the implementation of service-learning pedagogy over several years. Through my investigation of the INIS case, I have explored new possibilities for transcending the technocratic society that has created and reinforced the individualistic and exclusive culture of technological elites. I have also sought ideas for an alternative technology education that would form a bridge between technique and social responsibility and between knowledge development and a commitment to action for social change. But most of all, I conducted this study in order to help others better understand the complexity of teaching through community service and the educational issues emerging within service-learning practice in technology education.

Through this case study, I did not intend to advocate or reject a wide scale adoption of service learning in academics. But at the same time, I do not expect that this evaluation will remain as a simple criticism of an individual service-learning course. I want to create further discourse on how we educators, including the INIS teacher, can improve service-learning practices within their situated contexts based on what we learn from this particular case. Therefore, later in this research, I tried to validate my etic understanding of the course and interpretations of the data with an insider, the INIS

course instructor. I believe that my further discussion with him about the future direction of reform in the INIS course will help educators develop a much more holistic understanding of the case of service learning in technology.

Interview With the Course Instructor

In spring 2008, before completing my dissertation, I asked Martin, the INIS course instructor, to give me his feedback on what I have written. He willingly accepted, and later, we had a conversation that lasted nearly two hours about the vision and practical issues connected with implementing service learning in general and in relation to the INIS course. Most of all, throughout our discussion, Martin spoke about his passion for teaching and about developing service learning in his course as a means of pursuing social justice. He explained that after reading my previous chapters, he was inspired to make a commitment to this visionary curriculum enactment along with community-driven service practices. He told me about some changes that had been already made within the INIS course curriculum, even before he read my report. Martin also explained his developing ideas about how he would improve this service-learning course by fostering community building and by getting students to think critically about social and ethical issues of technology.

However, Martin said that there would also be some aspects of the course that could not be changed. In this introductory computer training course, he would still need to teach students about terminology and troubleshooting skills. He would have to keep most of the classroom and lab activities necessary for helping his students build technical

confidence and patience. Martin noticed the reality in which he could be restricted to some extent in making his instructional changes.

While discussing these challenges and the future direction of INIS, Martin and I both came to agree that one service-learning course in technology could hardly achieve all the educational goals and the full vision of service adoption. I also concur with Martin's understanding of the importance of support at the institutional and/or program level: "if individual instructors incorporate service projects in their courses without any institutional or program level of support, it will be considerably more difficult for them to make service learning successful, especially to meet the highest goal of service integration—for democracy and social reconstruction."

Implementing service-learning pedagogy certainly has some value in offering students and teachers opportunities to consider and experience community concerns and social responsibilities. However, creating innovative service integration in academics is hard to accomplish. In the next section, I will closely examine and extend my last interview with Martin to discuss the implications of this research and the potential directions for service integration in technology education at three different levels (course, program, and institution).

Discussion: Implications for Service Integration in Technology Education

Course Curriculum Change

In the last interview, the INIS instructor carefully lays out a few instructional changes to make in the course for the next academic semesters. Here, I particularly want to discuss three of his main ideas for his course curriculum change: (a) site trip redesign,

(b) less emphasis on hardware troubleshooting, and (c) additional guided activities for student reflection.

First, Martin happily introduces the changes that he and the director of Prairienet (Paul) have planned on INIS students' site trips to East St. Louis for the summer I semester of 2008. This will become the first intensive INIS course that runs throughout the four weeks during the summer.[23] For these summer service projects, Martin and Paul will arrange to have INIS students stay in the East St. Louis community for half of the semester. Moreover, during that time, INIS students will stay in a remodeled community center in East St. Louis, instead of driving to a hotel, twenty minutes away from the community. Schoen, a site representative, will help and arrange this special accommodation for student volunteers serving the community. Martin is extremely excited to see the student learning outcomes of this experimental course with redesigned site trips. Drawing on his observation of this test course and his findings, Martin wants to make a further instructional plan for the following regular academic semesters.

This redesign of INIS students' site trips is one of the pivotal changes that we certainly want to see in this service-learning course. I also believe that this curriculum change will be essential for building genuine and caring relationships between students and their community partners. In fact, since this change will be made on a four-week long exceedingly intensive summer course, I doubt it will show significant differences in student learning and inquiry. Apparently, this kind of redesign of site trips for spring and fall semesters will encounter more practical challenges, such as time, distance, and difficulty in maintaining site coordinators' active participation in the projects. However,

[23] This intensive four-week summer course is an exception. Other summer courses are usually offered as eight-week courses in this university.

by offering site visits that merely satisfy the basic needs for technical service, this course can hardly elicit strong community building among partners, which is the indispensable aspect for developing students' ethic of care. I hope that in his new site trip design, Martin not only changes the duration of INIS students' stay in the community, but also seriously considers including student activities for better understanding the marginalized community they visit. Identifying the community's culture and the efforts made to address its various problems would benefit INIS students in building their genuine relationships with their partners. Like the activity of "imagining a blind date" (see Chapter 4), the course curriculum should be developed further to encourage the student-community relationship building.

Second, beginning in the summer semester of 2008, Martin expects that INIS students will spend much less time opening up and looking inside computer hardware than students from previous semesters. In new semesters, students will deal with some mobile computers, such as iPods, which are hard to disassemble and reassemble. Martin notices that technology novices focus heavily on their hardware work, instead of further investigating the larger meaning of their community service experience. Hence, he expects that this practical change will reduce some hardware work and help students better manage their time for technical troubleshooting. That is, with this arrangement, a greater instructional emphasis will be placed on software or network problems than on computer hardware.

In fact, if service projects lead to a high level of frustration for students with solving too many detailed technical problems, and to a lack of time for student critical reflection and community building, it may be necessary to consider reducing some of the

heavy technical work on students. Dewey (1916) also makes a critical point on the issue of heavy skill-based instruction maintaining that "exaggerated devotion to formation of efficient skill irrespective of present purpose always shows itself in devising exercises isolated from a purpose" (p. 198). However, this direction of instructional change can become a rather complicated issue in technology education. For instance, in lieu of giving refurbished computers to the community sites, the university could provide brand-new computers to effectively reduce students' time and energy in handling many hardware problems. But then, students would not only have fewer opportunities for rich hands-on experience, but more importantly, could lose their control over computer hardware and the ability to make alternative choices for their own, or different users', needs. Finally, this alteration would certainly make student service projects highly expensive, resulting in significant financial impact. In considering these related issues, technology teachers need to approach reducing time for hardware work carefully.

Based on my class observations, one suggestion for facilitating student technical work might be to encourage INIS students to share resources among different project groups within a class, and even among students from different semesters, through use of mediated communication channels. Archived resources can help students avoid making the same technical mistakes, and save time doing similar tasks, such as searching for educational software. I believe that by building a history of service projects across semesters, INIS students can also improve the quality of their community service and technical designs.

Finally, Martin discusses his new instructional strategies for enhancing student inquiry and critical reflection on various issues of technology. In the course learning

objectives, Martin actually finds it difficult to include and place the primary emphasis on student commitment to action for social justice. That is, building technical confidence or conceptual learning cannot simply become the secondary goal in this introductory computer training course. Nonetheless, Martin tells me about his specific plans for revising course activities to foster student critical reflection on social issues of technology. For example, during the first week lab activity, in which students disassemble and reassemble computers, he asks them to tell whether the computers in front of them are good or not. By asking this question, Martin wants to guide his students in thinking that the ultimate value of a technology will be determined by how people use it—not only by hardware components. Martin also explains his plan to add some guided questions to students' one-minute paper assignments, where they reflect on their weekly lessons.

Another curriculum change for improving critical thinking that Martin considers is to include some readings on philosophical ideas about technology, such as Dewey's pragmatic technology and Heidegger. However, compared with these philosophical readings, I think that the open source movement will be a better topic choice for INIS students' class discussion. This topic, which one of Martin's previous students first brought up and inspired him to add to the course curriculum, is a good selection, because some of the INIS course activities and service projects can naturally elicit students' attention to this issue. It would be much more effective if the course included discussion on an issue more relevant to the student service experience. For this same reason, the issue of a digital divide could be another discussion topic option, which helps students reflect on the meaning of serving marginalized communities with computers.

Martin has not decided on specific readings to add, but already has a developed plan for how to offer these reading resources. He wants to provide this reading opportunity through an additional, web-based communication channel for students who look for more than their technical skill acquisition throughout the course. In the last semester, Martin already experienced a successful implementation of web-based interaction for students' sharing of ideas and in-depth discussions of non-technical issues. This activity was not mandatory, but Martin found that some students actively participated in the discussions and frequently used the mediated communication tool.

I believe that my analytical discussion of Martin's evolving ideas about redesigning his course curriculum have addressed the lessons that Martin and I learned about service learning, which will be useful for others teaching, designing, and researching a similar course in technology through service integration. Importantly, as I mentioned in the previous chapter, the critical question is not just whether Martin should include more activities to guide student reflection on larger social issues and problems, but how he can meaningfully coordinate these activities closely with students' community service experience. To create innovative service-learning practices, which closely link technology education and students' value development, researchers and teachers are especially in need of shared resources on a range of related social issues about technology and knowledge about designing student activities for critical reflection.

Program Coordination

During the interview, Martin mentions developing another service-learning course for students who want to experience further user service in technology. Martin notices that he could be limited to some extent in changing the INIS course curriculum, which

was originally designed for an introductory level of training LIS students about computer networks. In fact, most of INIS students are technology novices looking to improve their basic hardware skills and build technical confidence. At the same time, some students are technology experts who believe their future careers are tied to networked systems administration and a desire to better understand various issues of user service. Martin thinks that it will be much easier to accomplish the highest vision of service learning with the latter students in a new service-learning course. As Martin points out, fitting one semester-long course for all students may not be a practical decision. In this upper-level service-learning course for student training on networked information systems, Martin wants to teach his students to observe and closely probe the actual patterns of community residents' uses of the computer labs, which they and other INIS students installed during previous semesters at the sites. By researching how community users actually utilize the computer labs and what kinds of problems they encounter using the computers, students will redesign the labs or find better ways of customizing the computers for the practices of their community partners.

In addition to this idea of developing two different levels of service-learning courses, another emerging issue is to coordinate relevant courses on information networks through a program design in the department. The Graduate School of Library and Information Science (GSLIS) has some courses that teach the history of information technology, globalization and information policies, media literacy and youth, and Dewey's pragmatic technology. However, these courses dealing with social, political, and ethical issues of information technology are optional for students in the department.

Moreover, there is no program-level effort to link and coordinate these courses with the INIS service-learning course.

Recently, a few faculty members and students of GSLIS have defined a community informatics initiative. These people who are engaged in this initiative work together on building local communities' information networks and supporting the communities' diverse activities with university resources. This initiative also includes their efforts to internally develop university research and academic courses about community informatics. I hope these recent efforts will also lead to new program development, through which community participatory practices are effectively integrated or coordinated with related academic courses in the department. To do so, it becomes crucial to build and consolidate a shared meaning of technological literacy among engaged faculty members.

However, the problem is that technology education is often not conceptualized as a holistic praxis that fosters critical consciousness and responsible social agents. Unlike in other disciplines (social work and civic education), learning goals such as developing ethics, social responsibility, and a caring community are not central to technology education, even in its current state of transition toward restructuring its pedagogical paradigm to advocate for problem-solving and understanding processes of technology. Without holistic visions for how technology education can promote student reflection, inquiry, and value development, any alternative pedagogy, including service integration, in technology may lose its vital purpose of creating democratic education.

The Assessment of Performance Unit (APU) (1981) in the United Kingdom identifies three key components of technological literacy: skills, knowledge, and values

(Shield, 2000). In the past, technology education, which used to be named industrial arts in the United States, was a skill-based form of employee technical training for manufacturing industries. Over the last few decades, the emphasis of the reconstructed technology education has been placed on the first two components—skills and knowledge—of technological literacy shown in Shield's diagram below.

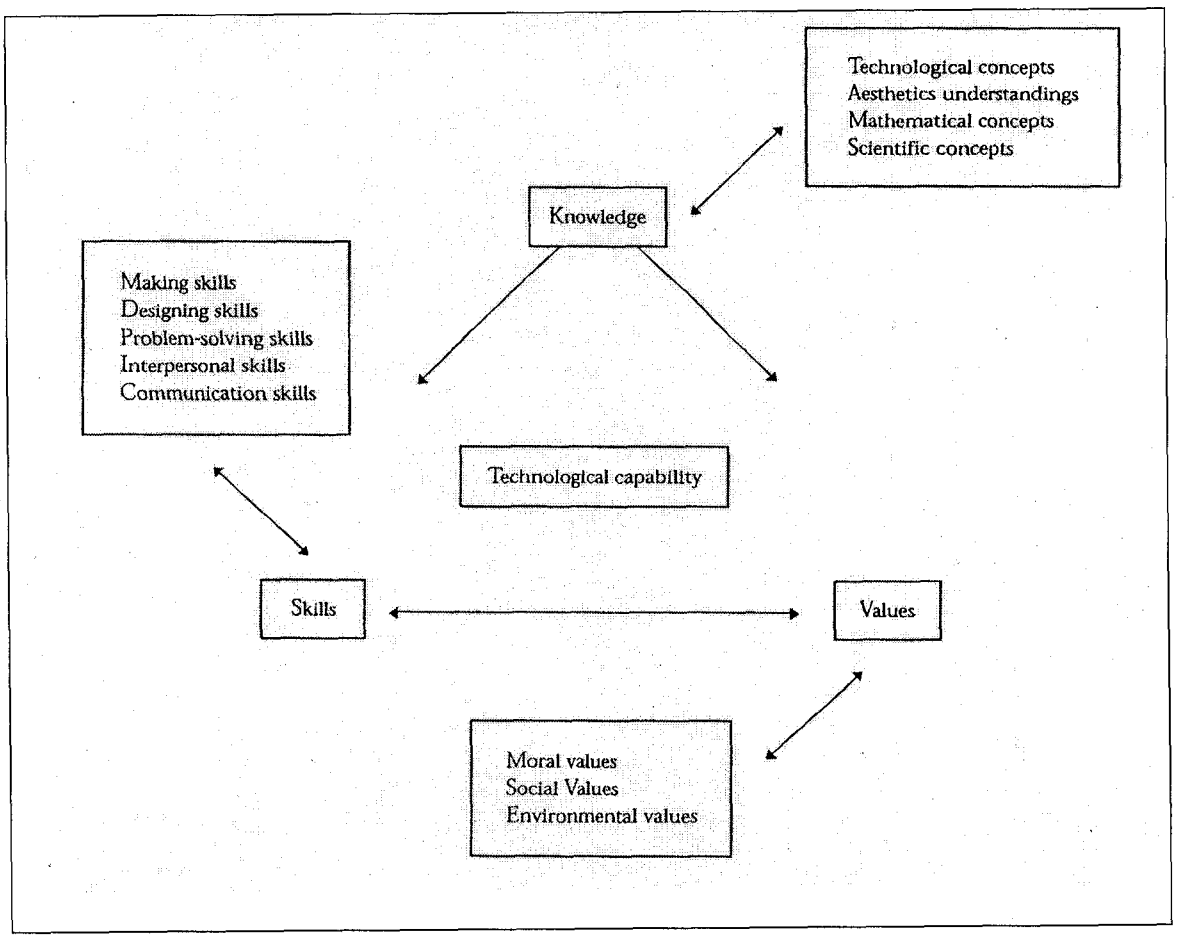

Figure 6. Three components of technological literacy (Shield, 2000).

Snyder (2004) clarifies this shift, saying that "technology education has evolved from a discipline that mostly taught psychomotor skills to one that now emphasizes more cognitive as well as affective learning principles" (p. 19). However, the development of cross-functional skills and conceptual knowledge is still limited in student learning about technology because it only includes "how-to" knowledge from the practical and technical

standpoint. Suggesting a holistic view of technology education, Seemann (2003) makes a valid statement: "Technology education and practice are not only a *how-to* experience, but significantly a *know-why* experience. The latter is fundamental to the human act of *creating* new knowledge itself, not just *using* knowledge" (p. 30).

In Engineering, for instance, there is a growing understanding that "software," "communication skills," "customer relations," and "business thinking skills" are more important for training technology professionals than hardware skills. However, as Martin explains, even this new change in setting learning objectives in Engineering does not concern ethics and the issue of social justice. I claim that the primary purpose of technology education needs to be focused first on a holistic view of learning, emphasizing students' value development for social reconstruction, and only then on building a program-level of support or coordination.

Institutional Support

Benson, Harkavy, and Puckett (2007) have published a recent book titled *Dewey's Dream*, in which they first state that Dewey theorized the concept of a "school as a social center," but actually failed in demonstrating or clarifying how his vision could be realized in real educational practices. Even his laboratory school, they maintain, was not genuinely community-based, but rather artificially designed. Rather, Benson, Harkavy, and Puckett (2007) find that Dewey's vision was better realized in "Elsie Clapp's community schools" and "Maurice Seay's school-based programs," in which students worked on solving real community problems (pp. 63-73).

Benson, et al. discover another realization of Dewey's dream within the rebirth of the U.S. research universities as civic-minded and multidisciplinary institutes that

emphasize "reallocating resources to their neighboring schools and communities" (p. 86). According to their interpretation, "Dewey's dream" comes true through community schools and community participatory practices that seek student learning in understanding and solving local communities' problems. But at the same time, they argue that participants engaged in this school-community partnership and practice should not have their scope of view limited in local needs, but widely opened to the larger and international problems and issues.

The Prairienet Community Network and the East St. Louis Action Research Project (ESLARP) are university-based organizations with missions to enrich community-participatory practice and action, as Benson, et al. (2007) describe. These university organizations have provided resources over the years to help underrepresented local communities revitalize their economic, educational, and cultural activities. More significantly, these organizations have conducted their community projects, primarily based on a community-driven approach. Prairienet, for instance, provides consultations to community partners when community representatives identify their own community problems and approach the director of Prairienet for available resources.

However, when this grass roots approach is applied to implementing academic service learning, practical challenges keep emerging in coordinating students' learning with community sites' desires. One such difficulty surfaces when community people participate in service projects from a business-oriented and utilitarian perspective. For example, community representatives are interested in acquiring new computers and popular software at the least cost, but are unwilling to voluntarily experiment on alternative technologies with a new vision. Even though other technology choices, such

as Linux, might arguably empower community users with greater control and application options than Windows, community sites in East St. Louis were not ready to consider adopting such new possibilities. Some of them allowed open-source programs to be installed on their computer labs, but only because they had no better cost-effective choice.

To solve this problem, Martin explains that instead of simply following community sites' technical decisions or explaining all the advantages of using Linux, university project coordinators and he might work together to locate and make realistic suggestions for the community organizations. According to him, one solution might be giving community sites an opportunity to test out a couple of sample computers with different Linux distributions. With this opportunity to experience and compare alternative technologies, Martin assumes that community users can become more positive in thinking about taking new possibilities. He also considers that doing research on successful cases of using open source software for community practices will be needed for effectively carrying out this plan.

Promoting community sites' active participation in service projects is highly challenging, too. Community partners should start to prepare themselves ahead of time by understanding the importance of their active participation, clear vision statements, and reciprocal relationships with their university partners. This would benefit them much more than simply obtaining free computer labs. Compared with the previous version, the recent "memorandum of understanding" (2006, see Appendix D) implemented as an initial site contact has clarified more of the specifics that community representatives should understand regarding the service project process and their own responsibilities—

both technical and non-technical. In addition to revising documents, more realistic ways of encouraging community representatives to understand the meaning of their participation needs to be fostered and encouraged by university project coordinators.

To an increasing degree, efforts have been made to incorporate university research and educational practice along with the developed university-community (Fischer, Rohde, & Wulf, 2007). As Benson et al. (2007) assert, deeply rooting postsecondary education in community-based practice concerning community problems and values is one way of realizing Dewey's vision for democratic education. However, implementing successful community-participatory practices still presents many practical challenges to resolve. Engaged university faculty and project coordinators need to re-examine their current relationships with community partners and search for more effective ways of coordinating students, community, and the university through community-participatory practices. Only their solid vision, continuous reflection, and realistic efforts can make the university-community partnership sustainable and guide its future.

Conclusion: Technology and Service in Pursuing Social Reconstruction

Another case of service learning through the Batey Technology program (Batey Tech) at the Puerto Rican Cultural Center (PRCC) provokes some critical thoughts about effective service-learning practices. PRCC is a non-profit institution that attempts to build and maintain Chicago's Puerto Rican/Latino community by providing rich media resources. Batey Tech, one of the programs at PRCC, mainly offers an educational environment that supports youths' academic and technological practices, and their

college preparation. This community-based program also invites students from Chicago area universities to volunteer for working with the community youths.

Martin has co-taught this INIS course with Elizabeth, one of his previous INIS students, who currently works as an instructor at a university in Chicago. Martin taught his own students on campus as usual. In the meantime, Elizabeth taught her students in Chicago and guided them in their service projects at PRCC. All course requirements were kept the same in both classes, except the places where student community service took place. Whereas Martin's students made two site trips to East St. Louis, Elizabeth's spent almost every week throughout the semester at PRCC.

Interestingly, at the end of that semester, Martin was struck to hear that Elizabeth's students "pitied" his students because Martin's were not able to work with community people as much as they were. While listening to Martin's story about this experience, I grew curious about what actually made Elizabeth's students appreciate their frequent interaction with the community people. How did their service learning differ from that in Martin's class in terms of their discourses and inquiries about technology design and use? The different experiences of these two classes lead me to ask what practices contribute to innovative and effective service learning.

Delve, Mintz, and Stewart (1990) describe five different phases of service learning: exploration, clarification, realization, activation, and internalization. In the "exploration" stage, the meaning of service learning is simply explored through students' real engagement in helping local communities. Through "clarification," learners become more and more aware of relevant social issues and different approaches to explain the problems that they discover. The "realization" process of service learning begins when

students start to acknowledge social responsibilities and the need for their moral commitments. Through their clarifications of the social problems present, and in participating in creating solutions for the communities they serve, students are able to make a real commitment to action for social transformation; this is the "activation" phase. Then, the last stage is "internalization" through which students' developed values and self-identities are coherently integrated into their career plans and their specific social or political actions. I introduce this analysis of different phases of service learning not because I think that a good practice design and implementation comes in such a linear process, but because I want us to rethink what the highest ideal of service learning looks like. According to Delve, Mintz and Stewart (1990), the highest ideal of service learning is apparently a practice that can deeply affect and even change students' lives, values, career choices, and their social actions.

Discourses on implementing service-learning pedagogy have been ever more heated in the U.S. and in the university where the INIS course is situated. However, refuting that there has been an unreflective promotion of service adoption, Kahne and Westheimer (1996) claim that a new political issue has arisen within current service practices. They ask the question: "In the service of what?" It is a question focused on what educational goals implementations of service learning primarily pursue: "charity" or "social change."

According to Kahn and Westheimer's (1996) analysis, when service learning aims at charity, students are encouraged to develop altruistic attitudes towards the disadvantaged communities. Students also learn about their duties as citizens, and undergo additional learning experiences that formal school environments do not usually

provide. In contrast, service-learning practices pursuing change or proactive democracy place a greater emphasis on promoting students' critical understanding of related social issues. Students are guided in developing critical conceptual changes and active social relations with others from different cultures through these activities.

In this analysis, Kahne and Westheimer (1996) criticize naïve implementations of service-learning practices that do not actually generate a critical consciousness about, and action for, underrepresented communities. In light of this critique of service learning, further curriculum reforms in technology education need to begin with teachers clarifying their own educational visions: Is their technology education for social reconstruction, or for professional enculturation in a status quo. In revisiting Dewey's philosophy of progressive education, Karen F. Zuga (1992) also provides a noteworthy statement of her vision for technology education for social reconstruction:

> Social reconstruction involves active participation through "doing." However, this is not mindless drill, skill development, or even the completion of personally chosen projects, because the Progressives clearly intended a social purpose to all activity. They viewed the intended a social purpose to all activity. They viewed the school as a community in which values and habits useful in the greater community would be instilled through practice. This was not to be an activity such as job training or skill development which fit students into preconceived notions of what adults believed they should become. (pp. 3-4)

If service learning allows students to practice designing and building technology by speculating only on technical aspects in terms of performativity or efficiency, this will not be a technology education in pursuit of social reconstruction. Progressive practices of technology will need to foster students' creative imaginations in developing their technology designs and their use, in deeply considering alternative solutions and multiple perspectives. If a technology course does not also develop students' critical inquiry into larger social and political issues related to the service experience, the vision of social

reconstruction cannot be accomplished. In addition to supporting a goal of building caring communities, service learning needs to promote critical inquiry into technology and community service by challenging students' biased perceptions and habitual attitudes.

In closing my journey of exploring new possibilities in technology education, I would like to confirm the idea that simply adopting a wide dissemination of service learning in technology education should not be a high priority. More important for educational researchers and practitioners is an accumulation of shared knowledge about consistent and coherent service integration in the field of technology education. In order to facilitate this, the purposes of technology education should be continuously reconsidered and discussed at large in terms of a holistic and progressive vision of education for social transformation. Additionally, individual teachers' reflective teaching practices and experiments to develop challenging new curricula should be maintained and strongly encouraged. Finally, individual cases of curriculum reform should be thoughtfully evaluated and reported to understand the uniqueness of their situated contexts, not simply to address general benefits, but more critically, and to reveal the challenges in the whole process of change. Policy making in technology education should be fundamentally grounded in these three processes: curriculum knowledge, experimenting, and evaluating.

In this sense, INIS is clearly a valuable case that has evolved as the result of one experienced teacher's courageous challenges and efforts to integrate a non-traditional pedagogy in a technology course. It was not the best case of service adoption in technology, but certainly a meaningful one meriting a researcher's in-depth investigation. The specific course designs and implementations of service projects in the INIS course

need to be further developed to strengthen students' community building with their community partners and to foster their critical thinking about the larger issues of technology and their social responsibilities in relation to marginalized communities. INIS is still lacking in regards to creating a holistic praxis of technology education for social change. It needs to make a strong connection between students' service experience and their value development in the field of technology through the curriculum design. However, despite its current limitations, I believe that this service-learning case still suggests an alternative model of learning about technology through service integration. The experiential learning in this INIS course engages students in contextual, problem-based activities on technology and enhances their moral sensibilities. Furthermore, through service integration, the instructor creates a student practice of technology that emphasizes the importance of understanding the user sphere for designing and building technology. Notably, these learning outcomes, which are critically important for fostering socially responsible technology professionals, have not been seen in many other traditional and skill-based technology courses.

As I end my study, I wonder how students will learn differently from the newly redesigned INIS course in the upcoming years. I hope to see a new beginning of INIS in re-creating the course as an alternative manifestation of technology education in pursuit of social reconstruction. Further, I hope that all the individual efforts to make better interdisciplinary, service-learning practices in technology will eventually lead us to a clear re-envisioning of technology education in terms of caring, social responsibility, and community empowerment. We should not let technology lead us, but instead, empower ourselves with it.

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APPENDIX A

STUDENT PRE-COURSE SURVEY

This pre-survey is conducted for the purpose of understanding the student profile of the class. All of the information obtained from this survey will be kept anonymous and confidential. Duration: August 27th (Friday) to September 7th.

1. Please tell me why you decided to take this course:

2. What do you expect to learn from this course?

3. Please describe what you think a "networked information system" is.

4. What does "designing networked information systems" mean to you? Please describe your thoughts.

5. Have you had experience with or taken a class related to the following computer technologies? If yes, please describe your experience.

   a) Designing or repairing computer hardware: Yes / No

   b) Local or Internet networking? Yes / No

   c) Computer programming? Yes / No

   d) Web design? Yes / No

   e) Computer software? Yes / No

6. Have you participated in service to a community before? Yes / No

   If yes, please describe one of your experiences and your opinions about the experience.

_____

_____

_____

_____

_____

_____

7. Have you participated in a team project before? Yes / No

   If yes, please describe one of your experiences and your opinions about the experience.

_____

_____

_____

_____

_____

8. Major / The year you entered the program: _____

9. Gender: [Female / Male]

10. Ethnicity (Please circle one):

    a) African American

    b) Asian American

    c) American Indian

    d) Caucasian

    e) Latin American

    f) International Student:
    - African
    - Asian
    - European
    - Latin American
    - North American
    - Other ( )

    g) Other ( )

APPENDIX B

STUDENT POST-COURSE SURVEY

Part I.

1. Please rank the top three class activities (in below) that you think should be most kept in this course.
2. Please rank the top three class activities (in below) that you think should be dropped off from this course.

#1 KEEP	#2 REMOVE	
_____	_____	*Lab Week 1, Dissembling and reassembling computers*
_____	_____	*Lab Week 2-3, Inventorying and troubleshooting*
_____	_____	*Lab Week 4, OS installation*
_____	_____	*Lab Week 5, Building a Local Area Network*
_____	_____	*Lab Week 6, Building a Wide Area Network*
_____	_____	*Lab Week 7, Prairienet tour*
_____	_____	*Open Labs after the first site trip*
_____	_____	*One-minute papers*
_____	_____	*Concept papers*
_____	_____	*Lecture, Q & As from one-minute papers*
_____	_____	*Lecture, PowerPoint presentations*
_____	_____	*Movie Week 6, Warriors of the Net*
_____	_____	*Movie Week 14, Revolution OS*
_____	_____	*Guest Speakers Week 12,GSLIS & CITES user services*
_____	_____	*Guest Speakers Week 13, Formerl LIS students*
_____	_____	*Final service project (Site trip I & II)*
_____	_____	*Presentation Week 9, Site survey report*
_____	_____	*Final presentation & documentation*

Part II.

1. What aspects of this course were most beneficial to you?

2. What do you suggest to improve this course?

3. What did you learn about yourself from the course?

4. What did you learn about computer technology (or a networked information system) by taking this course? What does it mean to you?

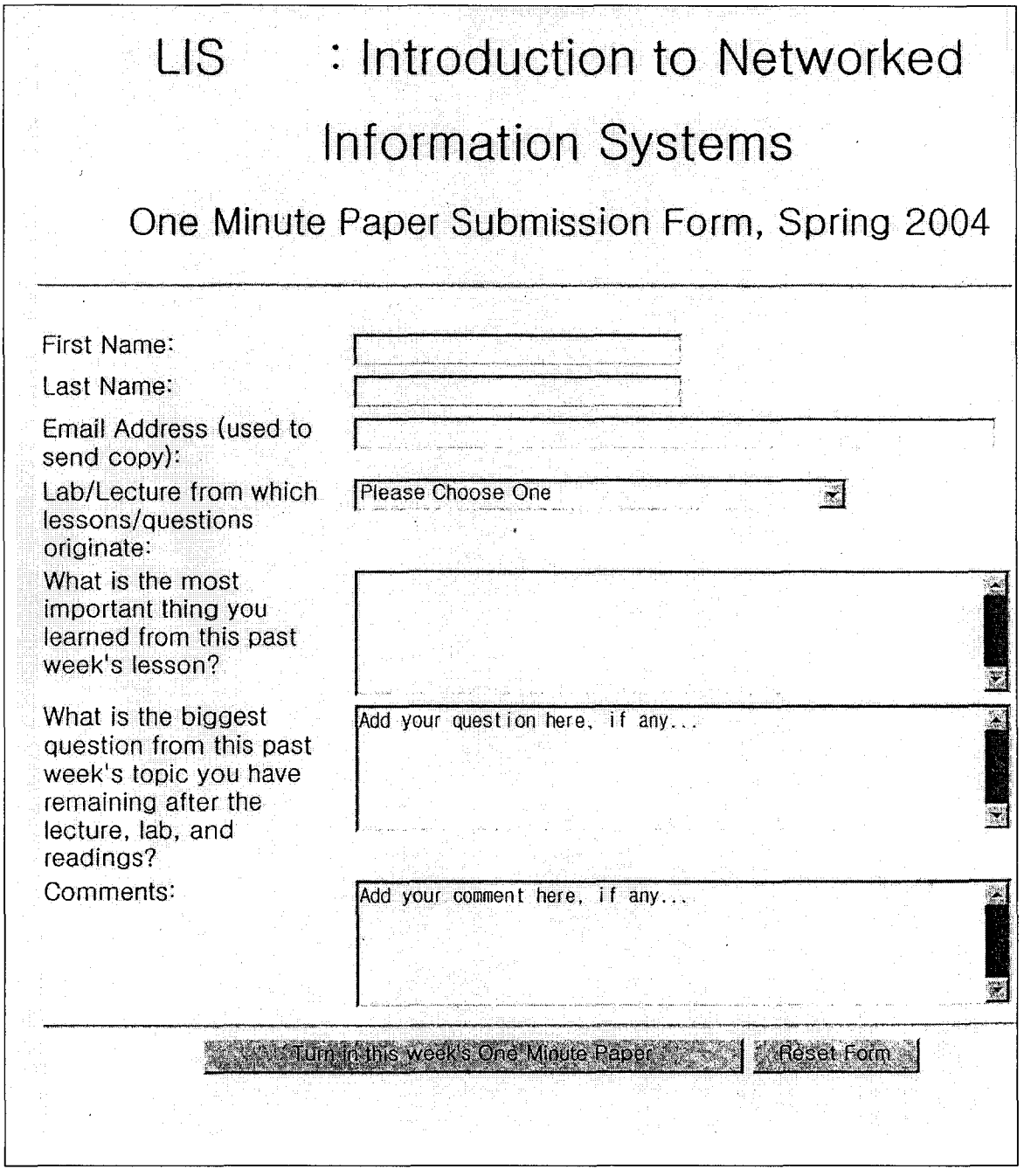
5. Please describe what you learned about the process of "designing" or "building" a networked information system by doing the service project?

6. Have your thoughts and feelings about computer technology changed since you've taken this course?
    i. If so, please tell me what was changed and what made you change.
    ii. If not, please describe your persistent thoughts or feelings about computer technology?

7. What are your career plans? Do you presently consider finding a job in a computer-related field?

APPENDIX C

ONE-MINUTE PAPER SUBMISSION FORM



LIS : Introduction to Networked Information Systems

One Minute Paper Submission Form, Spring 2004

First Name:

Last Name:

Email Address (used to send copy):

Lab/Lecture from which lessons/questions originate: Please Choose One

What is the most important thing you learned from this past week's lesson?

What is the biggest question from this past week's topic you have remaining after the lecture, lab, and readings? Add your question here, if any...

Comments: Add your comment here, if any...

Turn in this week's One Minute Paper | Reset Form

APPENDIX D

MEMORANDUM OF UNDERSTANDING (2006)

Digital ESL Computer Lab Project
Fall 2006

Memorandum of Understanding
Between Prairienet and ESL Church

Prairienet Community Network in partnership with the Digital East St. Louis Collaborative has conducted an ongoing project over the last six years to expand the availability of computer and Internet access in East St. Louis and the neighboring communities. As part of this project, community computer labs are set up with the assistance of a class (Introduction to Networked Information Systems) from the Graduate School of Library and Information Science.

The labs are typically comprised of 5 to 15 workstations that are networked together. The computers are donated (used) machines and ownership is transferred to the host site. In the event that the site no longer supports a computer lab, the host may dispose of the computers in manner of its choosing.

Computers used for this project are second-generation Pentium machines running on 266MHz or above with a Win 98 operating system. In past lab setups, host sites have chosen to purchase additional items such as a newer operating system, specialized software, additional memory, faster CD-ROM drives, printers or scanners, all of which are installed prior to delivery to East St. Louis. Due to time limitations, it should be noted that these installations cannot be done by students at the time of delivery. They must be completed in advance.

The installation of the labs requires two site visits by the students. The first will take place on October 13 at 3:00 p.m. The students will need to speak with site coordinators or others that will be engaged in the use of the lab. The meeting should take between one to two hours. The meeting is to help the students understand the needs of the site, the placement of the lab, potential problems and to also acquaint the site coordinators with the students and the scope of the project. This dialog will continue (via phone or email) until installation of the lab has been completed. It is extremely important that communication be maintained between the host site coordinators and the students working on the lab. Any changes to the original design (hardware and software) must be agreed to and completed prior to installation.

The second visit will take place December 1-2. Students will arrive to begin work Friday afternoon and most of the day on Saturday. They will need full access to the facilities and regular access to the host site coordinators. On that weekend the students will deliver the computers and network equipment to the sites. They will set up the computers and network and perform a full test of the equipment. They will also work with the host site coordinators to go over the basic setup as well as any maintenance and usage issues.

After delivery and setup, hosts are responsible for the first tier support of the computer labs. Workstations are designed to allow host site coordinators to easily return the software setup of each computer to the originally shipped state. For additional support, students and staff from Prairienet may perform advanced diagnostics and replacement as time and resources permit.

Partnership with Prairienet in this program requires the host site to provide appropriate space for the computer lab. This includes desktops and necessary electrical power. In addition the host agrees to provide computer training opportunities to the community. To this end, Prairienet will provide "train the trainer" sessions to teach host coordinators, volunteers and staff how to conduct computer training.

I, _____, on behalf of ESL Church,

Have read and understand the responsibilities expressed in this memorandum.

Signed _____ Date _____

Signed _____ Date _____
Prairienet Representative

AUTHOR'S BIOGRAPHY

Junghyun An is a doctoral candidate in the College of Education in the University of Illinois at Urbana-Champaign. Originally from South Korea, she came to Illinois in the fall of 1999 to begin a master's degree in Curriculum and Instruction. After completing her master's in the spring of 2001, she focused her study in Instructional Technology while pursuing a doctoral degree. Her research interests have included online communities for collaborative and inquiry-based learning, cultural and identity issues emerging within a virtual learning space, discourse analysis, and ethnographic research in technology studies. In examining educational computing policies and practices, she currently engages in the study of alternative and interdisciplinary curriculum development for technology education in pursuit of fostering socially responsible professionals and teachers in the field.

Before coming to Illinois, she lived in Seattle for years, studying English, Early Childhood Education, and TESOL. She taught Korean and mathematics to Korean American children at the Seattle's United Korean School. She graduated from Sogang University in Seoul in 1990, majoring in Chemistry.