

Technology Education and Engaged Scholarship: The Professional, Personal, and Political

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Abstract

Just as people with hammers tend to see all problems as nails, teaching computer skills can undermine human interactions. A 2007 UNESCO report discusses the ethical implications of emerging technologies. When education about, and application of, the nuts and bolts of technology are divorced from a clear understanding of how technology and society interact, existing social structures are often reinforced. My 12-year journey teaching Library and Information Science service-learning course “Introduction to Networked Systems” has led to open-ended approaches to technology design and implementation that value the relationships among learners more than the computers and tools they are learning to use. Borrowing from Susan Noffke’s 2009 article about educational action research, this presentation will consider the professional, personal, and political aspects of applying engaged scholarship in library and information science. The paper uses personal reflections, results from two doctoral dissertations, as well as direct feedback from students to consider better ways to focus on people instead of things in our engaged scholarship related to the application of technology within society. From my start as a practitioner teaching an introductory technology course for pre-professionals, my journey of progressive discovery through praxis has highlighted a number of take-home lessons, including:

- a theoretical understanding of the interaction of technology and society by both students and researchers contributes to more authentic engagement;
- a participatory, asset-based approach to technology implementation in community provides a necessary critical assessment of IT;
- intentional, participatory design of technology and its implementation is foundational if we are to effectively support inclusive initiatives for more just communities.

Introduction

Just as people with hammers tend to see all problems as nails, teaching computer skills can undermine human interactions. As stated in the UNESCO report *Towards Knowledge Societies* (2005), “Issues of technology and connectivity emphasize infrastructures and governance of the network planet. They are clearly crucial but should not be viewed as an end in themselves.” Instead, the report goes on to clarify, Information and Communications Technologies (ICT) should be valued based on their ability to serve as tools supporting the development of knowledge societies; in turn, knowledge societies must set as their goal fostering human development based on human rights. When education about, and application of, the nuts and bolts of technology are divorced from a clear understanding of how technology and society interact, existing social structures are often reinforced. Dewey (1939, p. 48) states: “the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing he is studying at the time. Collateral learning in the way of formation of enduring attitudes, of likes and dislikes, may be and often is much more important than the spelling lesson or lesson in geography or history” – or I would add, computer and digital literacy – “that is learned.” Given the

importance of technology as a tool in our society, developing competency in computer hardware, operating systems, and networks is now often an entry-level requirement for many positions in libraries. But ICT education that is divorced from a clear understanding of how technology and society interact often reinforces existing social structures (UNESCO, 2005).

This paper outlines a 12-year journey of a Graduate School of Library and Information Science “Introduction to Networked Systems” course in which a service-learning final project has been incorporated. The paper uses my personal reflections as the instructor, feedback from students, and results from two doctoral dissertations based on the analysis of the course and its impact. The aim is to explore several ways, some more successful than others, I have tried to foster a “shift from a thing-oriented society to a person-oriented society” (King, 1967) while providing pre-professional library and information science students an introduction to technology. This work expands on an earlier published reflection regarding the benefits of service learning (Montegue, Wolske, and Larkee, 2009) to introduce how different theoretical lenses have progressively shaped the course as it moved from a traditional service-learning approach towards one that is perhaps best framed within community inquiry.

Background

I first began teaching the course Introduction to Networked Systems (INIS) in 1997 as an extension to my primary responsibilities as manager of systems and director of Prairienet, the community network for East Central Illinois. As such, I entered into the course without a specific theory or pedagogy informing my instructional methodology. The initial design of the class emphasized professional development for Masters of Library and Information Science degree candidates destined for academic, public and school libraries. From the course syllabus:

The overall objective of the course is both to 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. Upon completion of the course, students should walk away with:

- 1. 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;*
- 2. A basic working knowledge, especially directed towards LIS professions, of computer hardware, operating systems, and networks through hands-on training;*
- 3. Skills that will not only serve today's needs but setup an understanding for tomorrow's technologies.*

For my first two semesters, I continued the traditional offering of the course as a lecture course with several hands-on labs that the students completed on their own outside of class. During my third offering of the course, I added a concentration of hands-on, in-class exercises in which students upgraded hardware, installed an operating system, and built a working network as in-class exercises. During all three semesters students’ body of work included a team final project in which they served as consultants to the library board of the Luddite Public Library. Students were provided a budget and an inventory of existing limited and aging equipment found within the hypothetical library. At the end of the semester they presented a proposal to the library board, that is, the rest of the class, for upgrading office computers and creating a public computing center taking into account the available resources.

Consistent with traditional definitions of service-learning (Eyler and Giles, 1999; National Service-Learning Clearinghouse, 2012), the first incorporation of the new community-based final project into the INIS course, which occurred during the fall 2000 semester, had two primary goals: A service component to help the marginalized community of East St. Louis address their self-identified goal to bridge the digital divide; and a learning component to provide students with real-world hands-on activities to enhance student acquisition of computer hardware, software and networking skills. However, the projects arose out of a larger University of Illinois

Urbana-Champaign (UIUC) engaged scholarship initiative called the East St. Louis Action Research Project (ESLARP). Members from the East St. Louis community, in discussion with ESLARP faculty in 1999 regarding next priorities for achieving community development goals, began considering ways to address the digital divide. At the time there were no publicly accessible computers within the community, and very limited household ownership of computers. As such, the INIS final projects arise out of a tradition of grounding service learning within participatory action research to bring about reciprocal learning “in which the local knowledge of community residents is joined with the professional knowledge offered by university faculty and students to arrive at innovative solutions to community problems (Reardon, 1998).”

The director of ESLARP was familiar with the work that Prairienet Community Network had been doing in East Central Illinois and in 1999 asked whether we would be interested in partnering with ESLARP and the East St. Louis community to address the digital divide. Prairienet, a community-outreach initiative of the Graduate School of Library and Information Science (GSLIS), was an experiment in the integration of community inquiry and informatics (Bishop and Bruce, 2005) and used a pragmatic technology approach to community-based technology creation and use (Bishop, Bruce, and Jeong, 2009). East St. Louis residents who had stepped forward asking ESLARP to help address the digital divide, many of whom had been long-term partners with the UIUC initiative, participated actively in the identification of whether and which technologies should be utilized as tools to achieve community goals, in the adaptation of those tools to the immediate context, and reflection on the social impact and effectiveness of the tools as redesigned and applied. After holding focus groups in East St. Louis, a community-defined goal was set to establish a public computing center (PCC) within 5 minutes walking distance of any household in the community. It was reasoned that placing computers in familiar and comfortable public spaces would increase adoption while also addressing safety concerns related to walking the streets after dark between facility and home. The INIS class was identified as one resource that could support the community in realizing this goal. Local residents would provide ongoing technical support and digital literacy training, while Prairienet staff would provide train-the-trainer sessions.

Since 2000, organizations have regularly approached UIUC faculty and staff to request a PCC for their facility. In some cases the identification of the need for a PCC is in support of broader participatory action research projects cutting across a range of University disciplines and community organizations. Those that may be appropriate as a semester-based INIS project are forwarded to me for consideration. The project must include development or expansion of a local area network as opposed to installation of a few stand-alone non-networked computers. The facility must have, or the organization must be able to install in a timely manner, the electrical and cooling infrastructure needed to support the PCC. The organization needs to have the personnel and financial resources necessary to maintain the PCC and make it available to the community each week. The organizational timeline for establishing or expanding the PCC must mesh with the INIS semester timeline. Alternative means for achieving goals are considered for those projects that do not align with the INIS final project scope, including: smaller weekend volunteer technical support visits; multi-semester engagement projects that might include classes from multiple university departments, or; exploration of potential grants to fund larger scale projects.

The overall structure of the 15-week course has remained relatively constant since the first inclusion of a service-learning final project. Readings, lectures, and hands-on activities are used throughout the first part of the semester to introduce students to the basics of working with computer hardware, operating systems, and networks. Early to mid-semester, teams of 3-5 students have their first visit with the site coordinator from the host organization to learn about the community served by the organization as well as the organization’s mission, programs, and plans for integration of the PCC. Concurrent with their work to refurbish donated computers, students collaborate with the site coordinator to develop an implementation plan customized to

the organization and its goals for the PCC. Students then customize the refurbished computers with a selected operating system and software, and build the network to interconnect the computers to each other, to peripherals, and to the Internet as appropriate. Finally, at the end of the semester they return to the site to install the customized PCC. In more recent semesters, students have also become actively involved in refurbishing the space and building custom furniture in recognition that design of space as much as the configuration of the computer hardware and software contributes to effective use (GSLIS, 2011; Wolske, et. al., in press).

Between fall 2000 and spring 2012, INIS students have worked with 96 different organizations, 22 of which have served as a project site during two or more semesters. Of the 96 organizations, 50 have been churches with technology-based social programming directed at their immediate neighborhood. Students have worked with four libraries, including one in Sao Tome and Principe, Africa, as well as with various social service agencies, schools, and daycares. No official statistics have been kept regarding subsequent use and sustainability of the PCCs within the organization. However, based on feedback from partnering organizations, the PCCs installed by INIS students provide a valuable first step incorporating technology into their programming. Some use this first step as a launch pad for future grants to purchase new equipment or to hire dedicated staff. Others find such inclusion distracting from their mission, or find it too costly, and therefore opt to forego future computer programming as part of their community service programming. For 22 of our INIS project sites, the PCCs became an active part of their organization and subsequently needed to be upgraded or expanded as a repeat INIS project within 2-4 years of initial establishment. Further, some INIS project sites continue to serve as a base for ongoing community-University engagement projects. The use and sustainability of INIS-created PCCs remains a fruitful area for further research.

Learning Outcome Evaluations

In “Revisiting the Professional, Personal, and Political Dimensions of Action Research”, Susan Noffke (2009) explores three dimensions of action research that can be used to consider multiple layers of assumptions, purposes and practices of this research method. I use these dimensions to explore the multiple layers of assumptions, purposes, and practices that underlie the INIS final project. The professional dimension defines ways in which the INIS final projects help provide the technical skills students need as library and information science (LIS) professions, the fostering of a community informatics and pragmatic technology approach within professional practices, and informing the subdiscipline of community informatics. The personal dimension considers ways in which the INIS final project helps participants to evaluate and give an account of their own practices and reflect on how they might do better in the future. The political dimension is inherent in the other two dimensions, especially when the professional and personal dimensions take an explicitly ‘critical’ stance, that is, “a central commitment to exposing and working as part of a social movement against structural inequalities in power relations (Noffke, 2009)”. The final projects themselves represent an action to counter historical injustices by addressing the symptomatic problem of unequal access to technology. But the political dimension also includes consideration of the root causes of such inequalities and provides a call to address those root causes, not just the symptoms. In a very real way, my 12-year journey has been a personal discovery of how fostering a move from a thing-oriented society to a people-oriented society requires a continual critical stance lest our focus on being skilled operators result in support of structural inequalities. This personal discovery has not only resulted in changes in how I teach the course, but has come because of the dialectic with community and students that has been a regular part of the final project work that has increasingly blurred the roles of teacher, learner, and researcher.

Two doctoral dissertations have used the INIS course as the basis of their research. Next we will consider their findings to further explore the professional, personal, and political dimensions of the INIS course.

How Does Service-Learning Contribute to Professional Development?

In 2007 Muzhgan Nazarova completed her dissertation in library and information science that considered the research question: “How does a service learning experience in the INIS course contribute to careers/career development of the students”. At the time she conducted her survey following the spring 2006 semester, 250 students had taken the service learning variant of the INIS course; 211 responded to the request to complete the survey. 37% of the respondents had since gained employment at academic libraries, 18% at public libraries, 8% at school libraries, and 6% at special (including corporate) libraries. The rest were employed at a range of other libraries, agencies, or industries. The former INIS students held a range of coordination, technical, and administrative roles.

When asked their motivation for taking the class, 91% of respondents indicated they took INIS to gain technological skills, 47% the reputation of the course, 43% to gain fieldwork experience, 42% the reputation of the instructor. Former students were next asked to indicate their level of agreement to the following questions (percentages are those who checked either agree or strongly agree out of the total respondents): “Participation in this class increased my technological skills” (94%), “The hands-on project in the community changed the way I think about the LIS profession” (61%), “The experience in this class enhanced my ability to work with community organizations and members”(62%), and “The experience in this class enhanced my skills in Leadership (52%), Communication (72%), and Teamwork (79%)”. Clearly students developed a number of critical professional skills. Nazarova went on to analyze open-ended responses to further consider how development of these skills impacted their professional practices. For instance one former student points to the value of the leadership skills in combination with the technological skills:

In my current career, because of my basic technical background (mostly acquired through [INIS]), I am asked to perform routine troubleshooting and help with all technology-related issues at the high school at which I work. I also have the opportunity to work with the tech team and influence purchasing and other technology decisions.

Teamwork and community service were other important takeaway lessons that have the potential to impact the profession. They remarked on learning “what a team can do for a community”, that “librarians can make a difference”, and that “our skills can extend far beyond the physical library”. As summarized by one student: “Outreach becomes a meaningful concept for me.”

Students also expressed the importance of learning about the digital divide “in a real, physical way.” As reported by one student:

[I]t changed my attitude about people who don't have access to computers, and how many different strategies can be used to help provide them access to computers and the Internet in their lives and communities.”

One student reflected on how the course changed their “vision of LIS profession from library centered to patron’s needs oriented.” Another student reported a move towards “seeing technology as a means (i.e., to improve people's lives) rather than as an end in itself.” A third student emphasized how “the social work experience strengthened my commitment to working with people through creating pathways to information, and convincing people they had a right to access to information. One student described how this led to a more critical reflection of their library:

It helped me think more about the information/economic divide at the same time made me question other issues including the very service we were doing.

The service-learning final project has led former students to consider “offering a similar course to undergraduate students & possibly a one-day teen program for the local public library.” As reported by one student:

As a public librarian, the class has significantly changed the way in which I teach my patrons about technology. It's no longer a secret set of skills, out of reach to the layperson. Instead technology is simply a fear to be conquered. By embracing this attitude, and helping to convince patrons that there is actually very little they can do to break a machine, I've made my own training sessions more interesting and effective.

Nazarova's research provides a number of clear indicators that the INIS service-learning final project has had an impact within the professional dimension, not just in the development of much needed technical skills, but also about the importance and value of outreach and engagement within library services and in exploring new ways to teach technology to patrons that is more people-focused. Further, it has contributed to a more pragmatic approach to technology as a tool and not a solution, as a means, not the ends. Indeed, in stating that the service-learning component helped one student consider not just the information/economic divide but to also to question other issues including the services being provided by libraries, we see a suggestion that the course also incorporates the personal and political dimensions. To look at these dimensions further, we next turn to research conducted by Junghyun An.

How Does Service Learning Contribute to Critical Inquiry and Perspectives About Technology?

In describing the political dimension of action research, Noffke (2009) highlights ways in which action research is rooted in work by, for, and with marginalized peoples. The political is evident even when action research is primarily undertaken to emphasize the professional or personal dimensions of research outcomes. That is the case with inclusion of the INIS service-learning final project as well. The course consistently emphasized the reflective process, encouraging students to “observe, think, plan, and act” as a regular part of their hands-on work with technology in the class and in the field, and by requiring students to submit weekly papers encouraging them to reflect further on their personal and conceptual development based on their course- and community-based activities during the week. But for much of the first decade, I didn't consider the course to have an explicit political dimension and didn't include specifically political readings. Anecdotal statements from students during conversations and through course evaluations, along with the results from Navarova's research, provided support that students were achieving key professional development goals along with a move towards greater people-centered foci.

To be sure there is a certain political slant that is modeled by my colleagues and me as a result of incorporating the course within the overall action research and community informatics programming from which the projects arise. In preparing students for their first visit with their assigned partner organization, they are told of the history of ESLARP and Prairienet and of the routes by which the INIS-partnering organizations engage with these programs. We discuss ways to learn about the organization, the community they serve, and how technology is intended to serve as a tool in support of the organizational mission. INIS students have always been told that it is important to start by understanding the assets of the community and recognizing that learning and service is bi-directional.

Junghyun An's dissertation includes a wonderful review of a number of theoretical lenses for problematizing technical-social relationships, much of which was admittedly new to me. For instance, Martin Heidegger argues that when people work to implement technology as a tool to reveal truth and harness its saving power, we end up in danger of being shaped and confined by the created technology as it “comes into presence”, or “Being” (Heidegger, 1977). Whether we intend it to or not, technology reinforces certain cultural values while reducing others, thereby

both reflecting and shaping who we are as a society (Winner, 1986; Bowers, 1988). Using this particular lens as a starting point, An used an ethnographic approach with the INIS course as her subject to understand problems and issues that may be encountered in designing and implementing community service learning in postsecondary technology education. Her aim was to “promote further discourse on developing alternative pedagogies that enhance students’ critical inquiries and perspectives about technology in higher education” (An, 2008).

Data collection occurred during the spring and fall semesters, 2004, and included class observation, collection of artifacts, pre- and post-course student surveys, and formal and informal in-depth interviews. At the time of the study, An reports that I viewed community service as a contextual, problem-solving activity. The goal was to help students to think through various issues emerging within the application of technology in community, and to learn how they can better coordinate a technology design with the needs of the community they serve. An found that students mostly approached technology education from a highly utilitarian perspective, with a primary goal of developing technical skills and specific content knowledge in order to prepare themselves for the job market. For these students, conducting community service projects were a way to enrich their hands-on, technical experiences and a highlight to add to their resumes. By contrast, as the instructor, my rationale went beyond skill-based training about computer technology to foster student values development through a critical understanding of technology design and use, as well as guiding students to overcome the prevalent, utopian view of technology. Overall, An found that in encouraging students to think creatively in order to dynamically connect technology choice to human purpose, my approach resembled that of Dewey’s pragmatism. For Dewey, a new or “pragmatic” technology is developed as part of a community of inquiry through pluralistic inquiries surrounding their interactions with existing technologies (Stuhr, 2002). It was this similarity that first prompted An to consider the INIS course as a case subject for her ethnographic research.

Based on her research, An found the link between service and technology education to be a valuable extension to traditional LIS technology education programs. However, she found a number of limitations in achieving the goal of helping students think through the various issues emerging through the application of technology in community. She found that time and distance, which limited the number of visits with community partners, was not supportive in building reciprocal relationships among the partners. Further, students’ understanding of the culture and activities of East St. Louis, as well as issues arising out of the intentional marginalization of the community “remained at a superficial level.” The problem was not just a result of the distance from partner sites, however, but also resulted from missed opportunities within the classroom:

INIS students spent most of their time preparing computers and cables prior to the day of the final lab installation so that they could refine their technical skills to a high level. However, the problem was that students were rarely engaged in thinking through and having serious discussions on various social issues and problems within their technology practices. Moreover, INIS students did not practice the design, use, and evaluation of technology in an ecological way.

One example highlighted by An illustrates potential ways in which students could have been engaged in a more critical reflection but were not. Towards the end of the course, the movie *Revolution OS* (2002) was shown, which looks at the founding of the open source movement generally and of the Linux operating system specifically. At the time of her study, the Microsoft anti-trust case was active in the federal courts, providing an opportunity to critically reflect on the agency LIS professionals have in reshaping community through the selection of software based on its inherent politics. But ultimately students weren’t “guided to a higher level of critical reflection and inquiry by promoting students’ ethical sense of social justice.” Indeed, some students interviewed by An reflected that they found viewing of the movie unhelpful because it was too political and didn’t really fit the objectives of the course.

While as practiced the final project work led to increased development of essential technology skills needed within their future professions, An found a significant lost opportunity in support of Noffke's political dimension:

Evident in their project evaluations, students often romanticized their actions and project results. They hardly gave critical thoughts about their technology designs in terms of its potential problems or weaknesses. They did not truly show their deeper considerations into alternative designs. Instead, student success was determined by whether or not they were able to provide a properly working computer lab to the community organizations, on time. In the INIS course, service experience still was not coherently integrated into promoting student development of critical consciousness or inquiry, but rather deployed as an additional social practice of charity in the process of technical training.

In *Experience and Education* (1938), John Dewey identifies a critical role of educators in identifying what surroundings are conducive to having experiences that lead to progressive learning for each student. Based on a survey of LIS professionals who had previously taken INIS we find that the experiences of the INIS course provided development of important technology, teamwork, communication, and to a lesser extent leadership skills (Nazarova, 2007) a finding supported by an ethnographic study of current students (An, 2008). The service-learning final project especially represented a useful way to enrich and make immediately relevant the hands-on technical knowledge of the course (An, 2008). These lessons led to an enhanced ability to work with community organizations and changed the way former students think about the LIS profession (Nazarova, 2007).

Dewey also states that "Above all, they [educators] should know how to utilize the surroundings, physical and social, that exist so as to extract from them all that they have to contribute to building up experiences that are worth while" (Dewey, 1939, p40.) An's research points to several limitations in the growth of students that since 2008 have become the focus of iterative changes in the INIS course:

- Building reciprocal relationships was not supported;
- Student understanding of the culture, activities, and issues of continued marginalization of East St. Louis remained at a superficial level; and
- Students weren't guided to a higher level of critical inquiry.

Do these limitations represent a ceiling of learning that can be accomplished in an introductory course on networked systems? Do these limitations indicate a need to find new environments in which to situate the learning of these technical skills? Or do these limitations represent missed opportunities to extract all the potential opportunities for building up experiences for growth? These are the questions that frame the next section of this paper.

Enhancing the Personal and Political Dimensions of INIS

Even before the publication of the research of An and Nazarova's dissertations, a few INIS students had been helping me personally towards a more critical reflection of the interaction of technology and society, itself a target of the personal dimension of action research (Noffke, 2009). Framed within their richly diverse life experiences and undergraduate majors, these students used the time traveling the three hours to and from East St. Louis, as well as off-hours in the community, to challenge me to consider the deeper impact of our engagement through their theoretical lenses. Both An and Nazarova's research found that a few students did indeed demonstrate greater development along the personal and political dimensions. In one case this seemed to be a student who came with a stronger technical background than is common, perhaps indicating a ceiling effect for other students who must dedicate more energy and time learning the basic technical concepts. But in reflecting on the engagement with students who especially challenged me personally to reflect more critically, I began to consider what non-technical skills

might better foster growth in the personal and political dimensions. Combined with my periodic dialectic with An, these laid the groundwork for a number of revisions to the course, most of which were implemented following publication of the dissertations.

Building Reciprocal Relationships.

An early and ongoing challenge has been to find ways to move myself and INIS students away from a de facto deficit model of community development that places the INIS project team into the position of expert and the community members as needy. When I first began teaching the class, one of my primary roles at GSLIS was as Manager of Systems for Prairienet. Soon after, I became the Manager of User Services at GSLIS and received a certification as a Help Desk Manager. Before adding the service-learning final project to INIS, I had students complete a final project for a hypothetical library wanting to create a PCC. The language of consultant was a natural outgrowth of my role at GSLIS. But after a couple of semesters it became apparent that the consultant framing was not consistent with the building of reciprocal relationships.

I have since used several strategies to move from a framing of consultants to one of partners. An early change was to frame the first visit within the analogy of a first date with someone you do not know. After having students visualize both positive and negative first dates, we discuss the importance of open dialogue and the affirmation of the other's interests and views as well as feeling affirmed by the other. Relatedly, I've tried to find ways to regularly affirm the non-technical knowledge the students bring to the class both to stress the importance of these backgrounds in building a successful project and also in modeling a community inquiry approach of engagement with community. Students come with a range of undergraduate degrees, including education, social work, communications, history, English, philosophy, architecture, urban planning, etc. that would have been of immediate benefit if students had chosen to go directly into the work force and provide valuable insights when performing the final projects. Likewise, the community partners bring important non-technical skills, whether or not formally recognized through post-secondary degrees, in social work, education, community development, community organizing, organizational management, etc. that are of critical importance. Identifying and linking skills to projects is a critical part of my work as facilitator in the progressive education environment and to which I dedicate regular time throughout the semester, especially early on in constructing project teams. This includes a pre-class conversation with the community partners to understand their personal backgrounds and interests as well as that of the host organization. It also includes a survey of the students to identify their non-technical strengths that they would bring to the team, as well as their project sites of interests (and also possible sites they would not feel comfortable working with). Combined with observations of student interactions during class sessions, I try to build the strongest team of students and community partners possible.

Until the summer semester, 2008, students only took two trips to East St. Louis to work on projects, the first visit when the site survey was conducted and the second visit at the end of the semester to setup the customized PCC. As a result, a primary concern in determining the date of the first visit around week eight was to assure I had covered in class the technical skills needed to perform an accurate site assessment. To deemphasize the technical and emphasize relationship building and learning about the community and organization, beginning the summer, 2008, a third scheduled trip has been added early in the semester. Students are also encouraged to make additional trips. Interestingly, as often as not students with project sites in the more distant East St. Louis region have been the ones to attempt additional trips. Based on conversations with students whose sites are close to campus, they have admitted they often allow the ease-of-travel lull them into a false sense that they can first take care of projects in other classes or catch up on work for assistantships since they can visit their project sites on short notice. This indicates that distance is not the only barrier to building reciprocal relationships.

Ideally, we work to invite the site coordinators into full partnership on the project. While often the site coordinators have competing obligations that keep them from an increased level of participation, there have been times when deeper engagement has been possible. Selecting partner sites that indicate interest in such deeper relationships has become an increasing priority when possible. Two examples are illustrative. During the fall 2009 semester I made a pre-visit to a church with an active after school program but no computers. Upon walking into the church for the first time, the community partners almost immediately asked my opinion of whether the PCC should be located against one wall of their large gathering space. But after a discussion regarding how their after school program worked, it became apparent to all of us that the computers would need to both support group training in the larger room and also small group mentoring that occurred in smaller break-out rooms. With this understanding, I used results from the aforementioned survey of new INIS students I administer at the start of each semester to select three students who were specializing in school librarianship. As a result, these students both brought that expertise to the discussion, but also benefited by learning from the site coordinators who brought their own expertise in afterschool programming. The broader team of community partners and INIS students critically evaluated ways in which computers might enhance and detract from the afterschool programming. Together, the students and community partners entered into an exploration that resulted in a PCC implementation that neither alone could have achieved. Most rewardingly, one of the students on that team continued to stay in contact with the site coordinators afterwards to learn from them how things were going and to provide additional insights she was learning from other classes. This example also represents the importance of identifying the best situation for individual students to maximize their learning (Dewey, 1939).

As another example from the spring 2012, INIS students worked with Generations of Hope, a five-block neighborhood 30 minutes from GSLIS where children adopted from foster care find permanent and loving homes and retirees can find a continued purpose in their daily lives. A cyber committee in the neighborhood had already been working to provide computer access, but the existing PCC was aging and was not well designed to support either senior or youth needs. In the past, sites near to GSLIS have not spent significantly more time with community partners even though travel time is decreased. But since 2011 I've advised students to consider three trips as a minimum, and also convey that past teams have found more visits result in deeper learning at multiple levels and is therefore highly encouraged. In this case the team of five students made at least seven trips to the community, sometimes in pairs, sometimes as a whole team. The cyber committee actively collaborated with INIS students to conduct surveys of residents, to consider alternative space designs, and to help in the acquisition of hardware and software to supplement the donated items available as a normal part of project work. The INIS students collaborated with the cyber committee to paint the space and build furniture.

These projects provide two case examples of what I hope is a growing trend in the INIS course for reciprocal learning that brings together the knowledge of community residents with the knowledge of university personnel to arrive at innovative implementations of PCCs. In several cases, community partners have accepted the offer to join the INIS class on the final day when teams present the results of their final project work and reflect on the lessons learned. In one case, this has included a community partner who drove the three hours from East St. Louis just to participate in the presentation before rushing back to open the doors of his business. To be sure, students still report the strongest depth of relationships that result from the final project work to be with fellow students. But some students have begun using the INIS course as the first step of a multi-semester engagement within community. For instance, by spring 2011 some students were volunteering to take four trips to East St. Louis. Building from the studio pedagogy that was becoming a part of the INIS final project model, I also began offering a course called Community Informatics Studio. During the summer, 2011, one of the project teams in the studio course spent eight straight days in East St. Louis working at two partner sites, one of which had been a spring 2011 INIS project site; most of the students were previous INIS students. One student from

summer 2011 studio cohort, and who had previously taken four trips to East St. Louis as part of her spring 2011 INIS project work, went on to work in the community as part of a practicum project spring 2012 with a library closely associated with a summer 2011 project site, traveling weekly at her own expense from UIUC to East St. Louis. Feeling there was work left to be done, she then spent the first six weeks after graduation primarily working with her partners at the library and the hosting organization to further help further develop the resources to meet their mission for community development. At her invitation, 12 current and past GSLIS, many of whom were past INIS and Community Informatics Studio students, joined her for a work weekend to help the library staff cull, catalog and shelve books. Such efforts represent not just a depth of relationship with fellow students, nor of faculty and staff with community, but of growing relationships between the students and their community partners.

Deepening student understanding of the culture, activities, and issues of continued marginalization.

Fostering reciprocal relationships does not necessarily lead to a deeper understanding of the community. For instance, in 2008 I officially became part of the community informatics initiative at GSLIS as a senior research scientist. This afforded me time to go beyond the technology support role that occurred as part of the service-learning engagement to directly engage in participatory action research in the East St. Louis community. At the same time I also established a relationship with the director of the local Catholic Worker House, and I began using this as a base of operations for INIS visits instead of one of the national hotel chains located in a neighboring “safe” community. The first opportunity to bring these new relationships to the INIS class occurred during the summer, 2008, offering of INIS that provided students with an extended eight-night stay in East St. Louis over a four-week period. In the past, the first visit occurred over two days in collaboration with ESLARP. Upon arriving in the region, a bus tour of East St. Louis was led by community member, social worker, and UIUC staff Billie Turner and was especially tailored for Architecture, Urban Planning, and Landscape Architecture students from UIUC who were the largest contingent of each trip, sometimes comprising over 100 students. The bus tour was taken in a large tour bus and drove by a number of blighted neighborhoods, abandoned industrial facilities, and the decaying downtown. It also drove past several successful community-ESLARP collaborations. For the summer class, I collaborated with Billie Turner to create a day-long introductory tour of East St. Louis for the course that visited with community organizations and included discussions with leaders to learn about the culture and activities of the organization and the community they serve. It highlighted visits with past INIS project sites and a community panel that discussed issues of the digital divide in the region. Similar tours have been used since, and by 2009 students began describing these as “hometown visits with Martin’s extended family.” Still, one of the summer 2008 students remarked:

It seemed as if there were two competing intentions that were going on in the course-- one on the technical aspects of computers, and one on literacy/training/empowerment. It was clear that the course was developed to focus on the technical aspects of computers and that the literacy/training aspect was something that was thought up later and imposed upon. I think we needed to have a stronger understanding of the technical aspects of computers before we could focus on training/literacy. If this was one of the foundational goals of the course, this needed to be more blatant from the beginning, and the course readings should have built up to it. As such, I really think that juggling the two in a month long course was trying to do too much. Addressing the social/ideological/historical/rhetorical issues of the digital divide-- and ultimately working with the community to learn to use technology to gain 'critical access' to larger social and political forces-- is a topic that could be addressed in a course all its own.

Is it necessary to separate the two? Had I crossed an imaginary line going from a soft-sell of moving from a thing-oriented society to a people-oriented society in an otherwise skilled operator training course to a hard-sell of the political dimensions of technology that was outside the scope of the course? Or would clarification of the political dimension at the beginning of the course and incorporating more readings at the start be sufficient? Beginning fall, 2010, a new framing of student projects was used. The first visit to project sites occurred very early to coincide with the first ESLARP visit the third week of classes. Prior to the visit, a new topic was added that presented the final project work of the summer, 2010, community informatics studio class that considered “what are the principles for effective public computing design (GSLIS, 2011)?” Among other things, the findings of the studio class were that design and equipping of spaces must focus first on the existing culture, social interactions, and programming. Students have always been instructed to present the site coordinator with a report following the first visit detailing the team’s understanding of the vision, mission, and goals of the community organization. However, historically this first report has also included team reflections on the goals of the organization regarding the technology as well, which often became the primary focus. Since fall 2010 this section has been deferred until later in the semester. During spring, 2012, documentation was further formalized using program logic models. Among other things, logic models are useful to help quickly visualize how existing activities are expected to support organizational goals, thereby bringing to light tacit theories of change (Frechtling, 2007). The teams work first to clarify their understanding of the community and organization through discussion framed around the first logic model documenting existing organizational programming and objectives before beginning a second logic model reflecting the theory of change proposed through the addition or refinement of technology as a resource supporting organizational activities. Ideally, the first logic model becomes a useful tool to facilitate the conversation between students as learners and community partners as teachers regarding organizational resources, programs, and outcome expectations. The second logic model helps students critical reflect on, and present to community partners, the predicted impact on program outcome expectations of different technical and non-technical choices for implementing the PCC.

All told, student final reports are now demonstrating a deeper understanding of the mission and programs of partner organizations as well as the community context. Further, student reflections are showing a greater awareness of the complexities of working in a marginalized community. As a result, they are also showing a more precise understanding of the expected impact, positive and negative, of incorporating technology into programming, and the necessary non-technological resources and changes that might maximize the likelihood of maximizing benefits and minimizing disruption as a result of the change made as part of their project. At the same time, organizations are gaining new insights into their theory of change as well as a logic model tool that facilitates evaluation of the effectiveness of activities in achieving objectives.

Guiding students to higher levels of critical inquiry

Changes implemented since 2008 have taken steps to address limitations in building reciprocal relationships and encouraging a deeper understanding regarding the culture and activities in marginalized communities. But what about fostering higher levels of critical inquiry? For most of the time I’ve been incorporating a service-learning final project, I’ve included during the first day a discussion of this quote by Martin Luther King (1967):

[W]e must rapidly begin the shift from a thing-oriented society to a person-oriented society. When machines and computers, profit motives and property rights, are considered more important than people, the giant triplets of racism, extreme materialism, and militarism are incapable of being conquered.

This quote is revisited periodically to encourage further reflection on the quote based on current course learning. The first day has also included an activity helping to increase their

confidence that they can succeed in which I talk students through a complete disassembly of a computer before having them work in pairs to reassemble those computers without instruction from me. Since the summer, 2008, I've included as part of the guided reflection after that first exercise the question "Is it a good computer?" At first students work hard to demonstrate newly gained knowledge of the technology by comparing the CPU or memory or hard drive specifications with those of today's computers. But I keep pressing: "Is it a good computer?" Eventually a student reflects that good must be defined based on the needs of the person using it. This discussion has been further enhanced by including as a required reading for the first week Langdon Winner's 1986 chapter "Do artifacts have politics?" to begin considering how design and implementation choices can lead to "good" technology favoring those in power. Combined, these are now used as a first step in a weekly theme engaging students in critical reflection of technology in community.

During spring 2010 a new weekly topic was added that went beyond understanding the technology underlying broadband to also reflect on how United States policies that rely heavily on laissez faire free market economics to build and influence/restrict use of broadband reinforce existing social structures. This is compared to policies in other nations to reflect on alternative approaches. With the 2010 award of a Broadband Technology Opportunity Project to the Champaign Urbana community that is helping to build a local municipal-owned fiber optics network especially targeting homes in underserved neighborhoods and the community anchor institutions that serve them (UC2B, 2012), this has taken on an even greater importance. During fall 2011 Everett Rogers' (2003) diffusion of innovation theory and Virginia Eubanks (2011) popular technology framework were included within another new topic looking at emerging technologies and the importance of finding ways to include the marginalized voices in the adaptation and adoption of innovations if old structures of oppression are to be overcome (see also Wolske and Bievenue, 2010). The emerging technologies presentation also includes a guided discussion regarding who benefits from the digital divide (Luyt, 2004; Eubanks, 2007) and whether there are political and ethical dimensions inherent in technology (Winner, 1986; Heidegger, 1977). Based on these discussions, we next consider the impact of always being on the receiving end of the innovation or 'Being', to use Heidegger's word, that is created by thing-oriented society, to use King's phrase. Finally, we consider what agency the students in their current and future role as LIS professionals have in working with community to affect a people-oriented society, to again use King's phrase.

In her book *Digital Dead End*, Virginia Eubanks (2011) argues for a popular technology approach to achieve high tech equity. Based on popular education, participatory design, and participatory action research, "popular technology reminds us that technology is not a destiny but a site of struggle." A popular technology approach:

- Resists oppression in the form of exploitation, marginalization, powerlessness, cultural imperialism, and violence;
- Draws on cognitive, cultural, and institutional difference as a resource; and
- Engages in participatory decision making in agenda setting, design, implementation, and evaluation.

At the end of the semester, students vary considerably in their ability to critically think about the sociotechnical interactions that both reflect and shape our structures and thereby impact historical oppression and marginalization. It is not clear at this point the depth to which students appreciate their agency as current and future LIS professionals in resisting oppression and addressing root causes of inequity. An (2008) remarked on the apparent student romanticization of the impact of their projects. But by working to address the limitations raised in An's research regarding the INIS course, I am seeing a move towards an "evaluation of the participatory projects by their ability to foster growth, in ourselves and others who work along side us" (Eubanks, 2011, p. 156).

Towards a Community Inquiry Approach to Technology Education

In their chapter “Beyond Service Learning”, Bishop, Bruce, and Jeong (2009) argue that in traditional service learning, a clear distinction is made between the community and the school, and within the school between the teacher/researcher and the student. Community members are served, faculty teach/research, and students learn. After indicating a range of problems with this model, they then go on to reframe service learning within a community inquiry approach. The community is no longer separate from school, but instead is a single unit in which some are students. Service and learning, indeed research and change, are activities in which any one of the members of the community may engage individually and corporately at any point of a project’s lifecycle. This paper outlines a 12-year journey of a Graduate School of Library and Information Science “Introduction to Networked Systems” course in which a service-learning final project has been incorporated. The journey began with a fairly traditional service learning approach. However, increasingly participatory action research strategies were included that led towards greater reciprocal partnerships putting the community in greater control of the projects (Reardon, 1996; Bishop, Bruce, and Jeong, 2009). What has been most notable for me in writing this paper is the realization of how the course has continued a development that is moving towards the type of community inquiry outlined by Bishop, Bruce, and Jeong (2009). This has required a continued search for ways to identify the best individual situations for students to learn, and for identifying ways to address historical limits in building reciprocal relationships, in helping the students develop an awareness of the culture, activities, and impact of ongoing marginalization, and in fostering growing critical inquiry regarding technology and society (An, 2008). Dewey (1938) notes that education is primarily a social process as interactions lead to the development of meaningful experiences. It is realized to the extent that individuals, including students, community, and instructor, form a community group. It has become doubly apparent during the reflection leading to completion of this paper the importance of a community inquiry approach to INIS engagement that brings together all project participants as a single unit if we are to successfully prepare LIS professionals to execute their agency to address the root causes of technology-based structural oppression as we work towards a people-oriented society that overcomes the giant triplets of racism, extreme materialism, and militarism.

The challenge remains how far an introductory course on networked systems can go in exploring these lessons. But based on early offerings of this course, what is clear is that in not directly engaging students in conversations regarding the political dimensions, the result is too often a dangerous separation of technological choices and community development goals. Incorporating periodic discussion of different theoretical lenses regarding the interaction of technology and society is critical even, and perhaps especially, in an introductory technology course if more authentic community engagement is to occur. Most recently, to more fully take advantage of the foundation such explorations provide has required a difficult decision to spin off the final project into a two credit-hour supplemental studio section of the course. Students can now take a four credit-hour section that only includes the in-class hands-on exercises and discussions alone, or receive a total of six credit-hours and participate in the traditional final project. This has allowed for expanded discussion in the studio of methods for engaging in community, including Randy Stoecker’s (2013) book *Research Methods for Community Change: A Project-Based Approach* and Laura Baker’s (2011) presentation of how she used participatory design methods to build a library learning commons. Over time I expect a number of other excellent works will find their way into the expanded section of the class. But it remains an open question whether a more conceptually integrated presentation of critical inquiry and sociotechnical literature can be provided simultaneously with the introduction to networked systems that is the core focus of the course. Overall, we continue to explore how to balance raising a critical awareness of the sociotechnical interactions of technology in community while further reducing the boundaries between university and community, and teacher/researcher and

learner. The right blend allows for engagement with theorists informed by praxis in which the students and I spend more time outside of the formal classroom in conversation and side-by-side work with our community partners, recognizing difference as a resource, that is a hallmark of community inquiry. In so doing, the outcome expectation is even greater critical assessment of information technology, along with increased intentional, participatory design and implementation of technology to more effectively support inclusive initiatives for more just communities.

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