Community Informatics Studio: A Conceptual Framework

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Abstract: This paper extends the theoretical framework underlying the Community Informatics (CI) Studio. The CI Studio has been described as the use of studio-based learning (SBL) techniques to support enculturation into the field of CI. The SBL approach, closely related to John Dewey's inquiry-based learning, is rooted in the apprenticeship model of learning in which students study with master designers or artists to develop their craft. In this paper, we introduce our *critical interpretive sociotechnical* (CIS) framework as the conceptual framework underlying the CI Studio course and pedagogy. In doing so, we explain how the CI Studio can be understood a pathway for advancing community-defined social justice goals through critical pedagogy and participatory design techniques. We describe our embrace of both critical and interpretive perspectives as the foundation upon which the CI Studio supports the following ideas: Instructors, students, and community partners can collaborate as co-learners and co-creators of knowledge exploring current topics in community informatics; theory and praxis can be brought together in dialog to ground transformative, liberative action and reflection in community spaces; and multiple perspectives can be embraced to promote a culture of epistemological pluralism. We conclude by providing a set of principles that summarize our CIS approach, particularly for those who wish to use and further develop the CI Studio pedagogy in their own research, teaching, and practice.

Keywords: community informatics, studio-based learning, community engagement, interpretive theory, critical theory

Introduction

The Community Informatics (CI) Studio has been described as an innovative pedagogical approach that uses studio-based learning (SBL) to support enculturation into the field of CI (Wolske, Rhinesmith, and Kumar 2014). The SBL approach, closely related to John Dewey's inquiry-based learning, is rooted in the apprenticeship model of learning in which students study with master designers or artists to develop their craft. Teacher–student interaction unfolds collaboratively through the iterative aspects of the studio design process and models the studio space as a foundation for our CI studio pedagogy. Our approach builds on progressive education, participatory action research, and community-based engagement strategies, as well as its own integration into library and information science through a 12-year community–university partnership with the East St. Louis Action Research Project (ESLARP) in Illinois. The CI Studio is focused on real-world design cases that arise organically from ongoing conversations with community partners. Specific projects are highlighted each semester to emphasize community informatics themes. The CI Studio is ultimately a pathway for advancing community-defined development goals through participatory design techniques.

In this paper, we seek to advance the CI Studio further by arguing for the inclusion of both critical and interpretive theoretical approaches. We introduce a *critical interpretive sociotechnical* (CIS) perspective as the underlying conceptual framework for our CI Studio course and pedagogy. The CIS perspective contributes a theoretically grounded pedagogical approach for preparing students to engage as information professionals with community partners in a meaningful way that provides equal benefits to all. We begin by highlighting the meta-theoretical assumptions guiding the CI Studio pedagogy to make visible our perspectives on three related topics: technology/society, teaching/learning, and research/knowledge. We conclude by providing a set of principles that summarizes our CIS approach, particularly for those who wish to use and further develop the CI Studio pedagogy to advance a more just, equitable, and democratic society.

Meta-Theoretical Assumptions

The CI Studio pedagogy draws upon critical and interpretive perspectives from a range of academic disciplines. In this section, we draw upon Williamson and Johanson (2013) to establish the meta-

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theoretical assumptions behind positivist, interpretive, and critical research paradigms (see Table 1) as a gateway for understanding the values and commitments that underlie, and propel our motivation for developing, the CI Studio pedagogy. The purpose is to articulate the boundaries and borders of our approach before intentionally blurring the lines between them in the sections that follow.

Table 1. Meta-theoretical assumptions behind the three research paradigms.
Source: Reprinted from Williamson and Johanson (2013, p. 123).

Paradigm	Positivist	Interpretive	Critical
Reason for research	To discover regularities and causal laws so that people can explain, predict, and control events and processes.	To describe and understand phenomena in the social world and their meanings in context.	To empower people to change their conditions by unmasking and exposing hidden forms of oppression, false beliefs and commonly held myths.
Ontology—the nature and existence of social reality	Assumes an ordered and stable reality exists out there waiting to be discovered, irrespective of an observer.	Assumes reality is socially constructed, fluid, and fragile, and exists as people experience it and assign meaning to it.	Transcends objective–subjective poles and assumes reality is socially constructed but nevertheless perceived as objectively existing.
Epistemology—the nature and the ways of knowing	Takes an instrumental approach to knowledge: knowledge enables people to master and control events. Knowledge represents reality and is stable and additive; statements about reality are true only if they are repeatedly not empirically falsified.	Takes a practical approach to knowledge; aims to include as much evidence about the subject, the research process and context as possible to enable understanding of others' life-worlds and experiences, and how the researchers came to understand them.	Takes a dialectical approach to knowledge. Knowledge enables people to see hidden forms of control, domination and oppression, which empowers them to seek change and reform existing conditions and social order.
The logic of scientific explanation	The dominant logic of inquiry is hypothetic–deductive: hypothesized relations among variables (logically derived from causal laws or theories) are empirically tested in a way that can be repeated by others.	The dominant logic of inquiry is inductive and develops idiographic descriptions and explanations based on studies of people and their actions in context; explanations need to make sense to those being studied as well as to the researchers and their community.	The logic of inquiry can be deductive and inductive but also abductive, seeking creative leaps and revealing hidden forces or structures that help people understand their ways of changing them.
Ethics and claims about values and normative reasoning concerned with what "ought" to be	Assumes both natural and social sciences are objective and value-free, operating separately from social and power structures; ideally positivist researchers are detached from the topic studied and collect value-free facts.	Questions the possibility of value-neutral science and a value-free research; values are seen as embedded in all human actions (including researchers) and hence are inevitably a part of everything we study, without the judging of one set of values as better than another.	Any research is a moral-political and value-based activity; critical researchers explicitly declare and reflect on their value position(s), and provide arguments for their normative reasoning.

Interpretive Theory

Interpretive theories and perspectives play a significant role in the CI Studio pedagogy, particularly in guiding how we as instructors engage with our students and community partners to enhance learning in the classroom/studio space and in the local community. As we describe below, *pragmatism,* which is a significant intellectual area within interpretivism, serves as one of the major foundations of our SBL approach. In contrast to positivist researchers, who are primarily interested in prediction and control, interpretive researchers are concerned with describing and understanding phenomena "in the social world and their meanings in context" (Willamson and Johanson 2013, p. 123). Interpretive theory therefore uses observation and conversation in naturalistic settings to gain a deeper understanding of how meanings are *socially* constructed. Interpretivists within CI take great care in attending to the multiple perspectives of those within specific local social settings (e.g., public libraries, community-based organizations, public computing centers). As Vannini (2009) wrote:

> *Loosely speaking, interpretivists are (a) scholars who are interested in the ways communities, cultures, or individuals create meaning from their own actions, rituals, interactions, and experiences; (b) scholars who wish to interpret local meanings by locating them into a broader historical, geographical, political, linguistic, ideological, economic, and cultural milieu; (c) researchers who look at the meanings of texts and the codes and rules on which they rely to convey meaning; and (d) theory- and philosophy- oriented scholars who explore ideas of meaning and interpretation in and of themselves. (p. 558)*

The American school of pragmatist philosophy, which was founded and developed by Charles Sanders Peirce, John Dewey, George Herbert Mead, Charles Cooley, and Jane Addams, among others, has significantly shaped our approach to CI teaching, research, and practice. This is primarily because "pragmatism is concerned with action and change and the interplay between knowledge and action. This makes it appropriate as a basis for research approaches intervening into the world and not merely observing the world" (Goldkuhl 2012, p. 136). CI is concerned with "effective use" of technology, and pragmatist philosophy provides a framework for understanding how individuals and groups in local communities develop the "capacity and opportunity to successfully integrate ICT into the accomplishment of self or collaboratively identified goals" (Gurstein 2007 p. 49). These experiential and action-oriented perspectives also serve as a gateway for asking more critical questions, such as: "Effective use *for whom?*" These inquires assume that power and oppression shape information and communication technologies (ICTs) and thus deliver unequal benefits for different groups in society. Critical theory provides our pedagogy with a second suite of intellectual tools for investigating how systems of oppression impact understandings of technology/society, teaching/learning, and research/knowledge *with* community members.

Critical Theory

Critical theory, like interpretive theory, is another large umbrella of scholarship. Critical scholars have argued that "there are many critical theories, not just one" (Kincheloe and McLaren 2005, p. 303). The field is focused on "a set of complementary theoretical frames that examine structures of *domination* in society in order to open possibilities for the *emancipation* of people, meanings, and values" (McKinnon 2009, p. 238). Critical theory is often attributed to the following individuals and groups: Immanuel Kant; Georg Wilhelm Friedrich Hegel; Karl Marx; Max Weber; the Frankfort School theorists, including Max Horkheimer, Theodor Adorno, and Herbert Marcuse; Jürgen Habermas; Latin American educational philosophers, such as Paulo Freire; as well as French feminists and Russian sociolinguists (Kincheloe and McLaren 2005; Rasmussen 1996).

The CI Studio pedagogy is motivated by themes within philosophy of technology, critical pedagogy, feminist theories of technology, and critical race theory. Together with our students we engage in discussions about and activities with technology as co-learners and co-creators of knowledge, while calling attention to the "discursive and material practices of oppression and resistance" (McKinnon 2009, p. 238)—particularly where issues related to technology are concerned (e.g., privacy, surveillance, digital inequality). Kincheloe and McLaren (2005) introduced a useful framework for understanding a critical theorist, or a "criticalist," as one who accepts the following basic assumptions:

- *all thought is fundamentally mediated by power relations that are social and historically constituted;*

- *facts can never be isolated from the domain of values and removed from some form of ideological inscription;*
- *certain groups in any society and particular societies are privileged over others;*
- *oppression has many faces and that focusing on only one at the expense of others (e.g., class oppression versus racism) often elides the interactions among them;*
- *mainstream research practices are generally, although most often unwittingly, implicated in the reproduction of systems of class, race, and gender oppression. (Kincheloe and McLaren 2005, p. 304)*

Critical theory offers a framework for investigating who benefits and who loses, particularly in the design, development, and implementation of ICTs. Criticalist researchers, therefore, might ask: How do broader social, political, and economic contexts shape technology and its consequences for different groups in society? This approach "attempts to expose the forces that prevent individuals and groups from shaping the decisions that crucially affect their lives" (Kincheloe and McLaren 2005, p. 308). In critical theory, researchers and practitioners are fundamentally concerned with promoting social change. However, social transformation "is not limited to physical activism, but change also happens through discursive interventions, or offering emancipatory readings of domination that might lead individuals to change their participation in oppressive systems and ideas" (McKinnon 2009, p. 242). Ultimately, we believe that critical theory grounds the CI Studio approach to research, teaching, and practice that contribute to the struggle for a better world.

These brief overviews are not meant to provide an exhaustive guide to critical and interpretive theories. Rather, this section was meant to introduce a broad conceptual landscape within which we can elaborate on our thinking about the relationships between technology/society, teaching/learning, and research/knowledge that guide our engagement with both students and community members.

The CI Studio as Critical and Interpretive

In this paper, we argue that the major contribution of the CI Studio to community informatics scholarship can be found in its embrace of both critical and interpretive theoretical perspectives. We maintain that information professionals, particularly those working with community partners outside academic settings, can benefit by incorporating what has been referred to as "critical interpretivism" in information systems research (e.g., see Doolin and McLeod 2005) or "critical constructivism" in educational theory (Kincheloe 2005). In this section, we focus primarily on Kincheloe's (2005) critical constructivist framework. We begin by looking at the concept of constructivism before introducing Kincheloe's guidelines as a way to conceive of our CI Studio approach.

In using the term *constructivism,* we refer to Piaget's contributions to understanding knowledge as something that is created within specific sociocultural settings. Constructivists have argued that it is important not to confine constructivism within a purely cognitive domain and that the "pragmatic social constructivism of Mead and John Dewey" allows scholars to consider constructivism beyond the cognitive domain (Garrison 1998, p. 43). Garrison explained that pragmatic social constructivism "urges educators to consider the entire context, the environmental ethos of schools and community within the student [because] a creative individual must function in organic interconnection" (p. 60). Freedom, Garrison explained, therefore becomes a social achievement through a process whereby the student reflects on both self and society. Kincheloe takes these pragmatic social constructivist views further and uses critical theory as a way to connect the mind and self to broader discussions of how power and oppression structure inequality in society. We now turn to highlight some of the main perspectives found in Kincheloe's approach as a framework for understanding the overarching values, commitments, and goals of the CI Studio pedagogy.

> *In the realm of knowledge (the epistemological domain), it is simple-minded and misleading to merely study random outcomes of the construction process—isolated "facts" and "truths." Constructivists are as much concerned with this process through which certain information becomes validated knowledge as with committing lots of it to memory. They are also concerned with the process through which certain information was not deemed to be worthy or validated.*
>
> *The teaching and learning process is intimately connected to the research act. . . . A key dimension of critical constructivism involves the complex interrelationship between teaching and learning and knowledge production and research.*

> *Critical constructivists argue that a central role of schooling involves engaging students in the knowledge production process. A central dimension of teaching in this context involves engaging students in analysing, interpreting and constructing a wide variety of knowledges emerging from diverse locations.*
>
> *Critical constructivists are concerned with the exaggerated role power plays in these constructions and validation processes. Critical constructivists are particularly interested in the ways these processes help privilege some people and marginalize others. (Kincheloe 2005, pp. 2–4)*

We believe these points, in particular, speak directly to and synthesize well both the critical and interpretive aspects of our CI Studio approach. A critical interpretive framework then becomes the foundation upon which we have developed our CI Studio research, teaching, and practice with community partners. First, we explain how our thinking about technology and society provide a conceptual framework within which to understand our research, teaching, and community engagement strategies.

Technology/Society

Technology does not exist in a vacuum. Rather, it depends on a diversity of social, political, economic, historical, and cultural factors that shape its development. Therefore, we believe that in order to understand technology in its many facets and to make decisions that promote its effective use in community settings, CI Studio instructors and students first need a conceptual framework for understanding how broader social, institutional, and technological forces shape technology and its consequences. The "social shaping of technology" (SST) literature within the field of science and technology studies provides our approach to the CI Studio with critical and interpretive analytical tools for taking on this task. We begin this section by reviewing work by scholars within community informatics, library and information science, and computer science that begin to break down the barriers between the social and technical in the design of information systems. We believe these contributions serve as a gateway to critical theoretical perspectives within SST as a broad field of study.

Sociotechnical Foundations

There are several contributions within CI that have shaped our thinking and approach to the CI Studio. We begin with a focus on Gurstein's (2003) conceptualization of "effective use" of ICTs as a way to emphasize the use of technology in local communities to achieve self-identified goals, which might include local economic development, social justice, and political empowerment. We believe this emphasis is an important beginning for talking about how ICTs can be used *in support of* other social and community processes (Stoecker 2005). Stillman and Denison (2014) have proposed Sen's (1999) capability approach as a theory to ground CI research in "human, rather than technical or sociotechnical, problem solving" (p. 209). These approaches help to shift the focus from solely looking at the impacts of technology on communities to look at how technology use can expose the cultural contexts that shape technology itself (e.g., see Papert 1987). This shift from thinking about technology as a *thing* to thinking about technology as a *social process* is foundational to our CI Studio pedagogy.

Scholars of computer science have advocated for a sociotechnical systems approach to information and communication technologies. For example, drawing upon general systems theory (Bertalanffy 1968), Whitworth (2009) explained: "Sociotechnical systems are systems of people communicating with people that arise through interactions mediated by technology rather than the natural world" (p. 395). Seen in this way, he argued that computer developers should consider social, as well as technical, requirements when introducing new technological systems. Whitworth maintained that developers should embody "social concepts like freedom, privacy and democracy in their code" (p. 399). Situated evaluation has been introduced as a way to investigate how "innovation-in-use," or the "different ways in which the innovation is realized and thus created by diverse users" (Bruce, Rubin, and An 2009, p. 697), emerges through the design and use of sociotechnical systems. In contrast to formative or summative evaluation approaches, which focus on pre- and post-assessments of technology projects, situated evaluation allows researchers to question "the basic assumption of 'what' it is that is being evaluated" (p. 685). This interpretive method for studying effective use of technology in community settings becomes a bridge to the co-creation of knowledge with community members.

> *A situated evaluation approach conceives technology users as active creators, rather than as "passive recipients of technological products and scientific knowledge" (Eglash 2004). Users actively rethink the meaning and use of a technology and reinvent its practices by appropriating them within their situated, cultural contexts. Eglash (2004) calls this process appropriating technologies. We would go one step further to say creating technologies. (Bruce et al. 2009, p. 687)*

A sociotechnical systems perspective is useful for moving conversations about technology away from solely technical discussions. However, as several scholars have noted, a systems approach has several shortcomings, particularly in the context of action-oriented and more holistic research perspectives (e.g., see Flood 2010; Valentinov 2012). For example, Flood and Jackson (1991) introduced the term "critical systems thinking" to build upon systems theory by embracing what Flood (2010) described as five major commitments: "critical awareness, social awareness, human emancipation, theoretical complementarity, and methodological complementarity" (p. 279). These critical perspectives introduce what Flood (2010, p. 280) described as a "liberating praxis" to general systems theory, and they provide a useful addition to a sociotechnical systems approach.

Recognizing that social and cultural processes are enmeshed with ICTs and their development, we also look to critical theoretical frameworks as a way to connect interpretive perspectives of technology to broader structural forces that directly and indirectly shape people's access to and use of computers and the Internet in local communities. Key concepts from the SST literature serve as a key starting point in this direction.

Critical Perspectives

To describe our CIS framework, we embrace critical perspectives within the SST literature as a necessary broader theoretical mechanism to complement and expand upon the sociotechnical systems way of thinking. The strength of SST can be found in its theoretical contributions toward understanding the often hidden social, political, and economic forces that shape technology and its consequences. The SST literature has been described as a response to "technological determinism" (MacKenzie and Wajcman 1999; Williams and Edge 1996), a theory that assumes "technological change is an independent factor, impacting on society from outside of society, so to speak" (MacKenzie and Wajcman 1999, p. 5). Scholars working within this broad field share the assumption that technology is not neutral. Rather, it is often embedded with political qualities that can have consequences for how we think about community in the digital age (Winner 1986, 1997).

SST scholars use critical and interpretive theoretical approaches to explain how a diversity of human and nonhuman actors interact to influence and stabilize technology artifacts in a range of social settings (e.g., see MacKenzie and Wajcman 1999). The social shaping perspective is useful for considering how ICTs develop, for whom, and at what cost to the public and its surrounding environment. Themes from philosophy of technology, feminist theories of technology, and critical race theory have significantly influenced the CI Studio pedagogy. We believe the multidisciplinary nature of SST offers important frameworks for examining how power shapes the design, implementation, and consequences of ICTs, particularly in local communities.

Zheng and Stahl (2011) described the value of critical theory in contributing to Sen's (1999) capability approach, which is widely known for having "made major contributions in the research on and practices of human development in areas like poverty alleviation, gender equality, and democracy" (p. 69). Drawing largely from Feenberg's (1993, 1999) critical theory of technology (CTT), Zheng and Stahl introduce three areas in which CTT extend Sen's (1999) capability approach by offering the following: a critical account of human agency to account for the role of hegemony in the production and reproduction of sociohistorical settings; a critical account of technology that looks beyond simplistic notions of goods and resources; and a critical theory that helps to reduce the risk of the capability approach "being applied as a simplistic measurement tool by sensitising it towards reification and hegemonic potential of scientific methods, and emphasising the reflexivity of researchers" (p. 77). We believe these three perspectives augment the contributions of the Capability Approach (CA) to CI by promoting deep and thorough investments in ICT projects "that can demonstrate and map how ICTs affect human well-being rather than being engaged in short-term 'single-shot' approaches" (Stillman and Denison 2014, p. 208).

The CI Studio pedagogy is also motivated by themes from feminist theories of technology and critical race theory. Feminist theorists, such as Wajcman (1991), have called attention to the ways in

which "preferences for different technologies are shaped by a set of social arrangements that reflect men's power in the wider society" (p. 24). By challenging patriarchy and white supremacy, Wajcman and other critical theorists of technology have argued that there is "no single dominant shaping force" in the social shaping of technology (MacKenzie and Wajcman 1999, p. 16). We believe that perspectives from feminist theories of technology and critical race theory are a necessary way for us, as two white male CI researchers in privileged positions within the academy, to check our own normative beliefs and assumptions and to deepen our understandings of the ways in which our own social, cultural, and political advantages shape our approach to technology, education, and engagement. In this way, we assume that race, class, gender, and technology, and their intersections, are social constructs that are situated within social and historical contexts. Critical race theorists are therefore extremely valuable for CI scholarship because scholars working within the field

> *attempt to expose racism and injustice in all its forms and facets; they attempt to explain the implicit and explicit consequences of systemic, policy-related racism; and they work to disrupt and transform policies, laws, theories, and practices through the exposure of racism. (Milner 2007, p. 391)*

We believe that these critical theoretical perspectives contribute important conceptual frameworks to CI research and practice, and more specifically do so for those who work with individuals and groups that have been oppressed by systems in society that reinforce inequality. The CI Studio pedagogy is deeply committed to listening to and learning from our students and community partners in order to gain a deeper understanding of people's everyday experiences with technology. In this way, we can begin to uncover how broader systems of power become embedded in the design, development, and use of ICTs in local communities. It is only at this point that we, as CI Studio teachers/learners and researchers/knowledge producers, can begin to develop what Eubanks (2011) described a model of high-tech equity that resists oppression, acknowledges difference as a resource, and fosters democratic and participatory decision making.

Teaching/Learning

SBL was selected as a technique for our CI pedagogy because of its strong roots in pragmatist educational philosophy. The CI Studio course begins each semester by drawing upon Dewey's "the meaning of purpose" (1938, p. 69), asking all participants—instructors, students, and community partners—to reflect upon and discuss how their (1) purposes for joining the current learning environment and (2) knowledge of their history with technology, education, and community engagement come together to inform the overall shape and direction of the design case for the semester. Students also engage in observations of community spaces and conversations with their community partners to understand the broader context within which the CI Studio design projects are to take place. As Lackney (1999) wrote, "background knowledge about the stated design problem, its context, history and importance must be examined before any meaningful response can be developed by the student" (p. 4).

The instructors intentionally serve as guides in the CI Studio to combat the traditional hypodermic needle model of communication in which information is transmitted one-way from teacher to students. In critical pedagogy, Freire (1970/1993) referred to this approach as the "banking concept of education," in which "knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing" (p. 72). The CI Studio pedagogy consciously works to disrupt the traditional teacher–student paradigm early in the semester. Importantly, this model serves two goals: an immediate one related to student learning in class, and a long-term one to model an educational experience that students can bring with them into the community as they begin to work with their partners. Early lectures are used sparingly in our SBL approach with the purpose of introducing students to theoretical concepts and augmenting their self-directed learning about the design case.

From "Service Learning" to Learning *With* Community Members

The CI Studio pedagogy consciously engages in what might be called a political process whereby we problematize assumptions about "service learning," particularly when community technology projects are involved. The idea of service learning has been described in a number of ways. In this section, we attempt to make it clear where we stand on this topic.

> *Referred to by various names—service learning, civic engagement, or community-based learning—the general philosophy is to encourage a mutually beneficial partnership between students and a community group, with students providing needed service to a community that, in turn, provides rich, applied learning experiences to the students. (Lawson, Spanierman, Poteat and Beer 2011, p. 205)*

Scholars have expressed a number of shortcomings of the service learning approach. For example, Bishop, Bruce, and Jeong (2009) explained, "too much emphasis is placed on student outcomes, and not enough on the process of learning for all of the parties involved, including faculty, students, and community members" (p. 16). The authors introduced a "community inquiry" model as a learning process that brings theory and practice together in a critical manner (p. 22). Day (2011) introduced the idea of community learning theory into CI research and practice. He explained there are many benefits, including the following:

> *Community learning not only enables and facilitates capacity building by equipping people with the skills, information, knowledge and support through which community voices can be heard; but also gives them the confidence to speak and engage in dialogue with others—an essential ingredient when collaborating in partnerships comprising people from within and beyond local community networks. (p. 3)*

The CI Studio pedagogy builds upon critical and interpretive perspectives to inform our approach. For example, we draw upon Freire's (1970/1993) elaboration on the concept of "praxis" as the combination of both "*reflection* and *action* directed at the structures to be transformed" (p. 126). We focus our discussions with students on the goals of: (1) learning *with* community members, and (2) strengthening our knowledge of the social structures and technologies that serve to reinforce race, class, and gender inequality. By calling on critical theory, the CI Studio pedagogy seeks to deepen pragmatist approaches that fall short of recognizing the structural reasons why community–university partnerships may (or may not) be needed in the first place. Understood in this way, teaching/learning with community partners is only half of the equation. The other half involves a focus on how research is conducted and how knowledge is created in community settings.

Research/Knowledge

In order to understand our approach to community engagement, we first need to begin by explaining how we view research as a process that promotes the co-creation of knowledge with community partners. CI Studio begins by asking the questions "Research *for whom*? Knowledge *for whom*?" These are two critical questions that guide our research, teaching, and practice. The purpose is to focus on who will ultimately benefit from the research conducted and the knowledge produced as a result of the community–university partnership. Participatory action research and community-based research methods have become useful strategies for working in this direction. We begin the semester by reading Stoecker's (2005) "Is CI Good for Communities?" with our students. The paper provides an important framework for considering who gains from our (i.e., instructors' and students') research with community partners. This is essential when considering that technology can often end up doing more harm than good, particularly in poor communities and in communities of color (Ganghadaran 2013).

Community-Based Research

To reduce the potential harms that can occur from community engagement projects, it's crucial that we not only begin by looking inward to our past experiences in community settings but also at how our understandings of those experiences have consequences for our design cases. We embrace participatory/community-based research methods as a strategy for developing a more balanced playing field between instructors, students, and community members, to ensure that everyone benefits equally. Fortunately, CI researchers and practitioners have already taken up the topic of linking universities and communities in a special issue of *The Journal of Community Informatics* (Allen and Foth 2011).

A second fundamental aspect of this approach for the CI Studio is the concept that we are all technology experts (Eubanks 2011). We think about this fact in the following four ways:

1. Within a sociotechnical systems perspective, the physical, informational, personal, and group levels are overlapping views of one system. Some bring a greater technical expertise, whereas others bring a greater social expertise (Whitworth 2009).

2. Innovations are not static and fixed, but are continuously being developed as we each co-create innovations-in-use (Bruce et al. 2009).
3. Feminist perspectives on technology challenge all of us to reconsider our very definitions of technology—which came to be defined exclusively by mechanical and civil engineering in the late nineteenth century—to also account for everyday life technologies (Wajcman 2010).
4. Eubanks (2011) challenges us to recognize those who bring lived experiences of the oppressive, unjust impacts of the power and politics embedded in technology.

In addition to these four areas, the CI Studio also emphasizes the importance of community organizing in answer to Stoecker's (2013) contention that building community capacity "requires a special set of sophisticated skills that have become devalued in academic life. Those skills are most embodied in the community worker" (Stoecker 2013, p. 51). This articulation is one of the underlying values of the CI Studio pedagogy. Both authors of this paper did extensive community work before entering academia. These experiences were significant in shaping our approaches to teaching/learning and research/knowledge in the classroom and in the local community.

Participatory/community-based research methods compliment the CI Studio pedagogy because they begin by focusing on the assets, or strengths, that exist in the community, rather than focusing on a "deficit-based perspective" (Rhinesmith 2012 p. 2532). Further, building from a capability approach perspective, it is recognized that the degree of freedom each person has in converting bundles of assets into valued beings and doings is critically determined by the ways in which the different assets intersect (Unterhalter 2009). In recognizing the multidimensionality of resources, a capability approach allows us to deemphasize financial resources without dismissing them altogether and allows us to move beyond a deficit-based paradigm that focuses on a distribution of financial and material resources from the "rich" to the "poor" (Sen 1999).

The CI Studio pedagogy also recognizes that the word *participatory* is often overused and can lead to well-intentioned yet hollow promises and disappointing outcomes as a result. Therefore, we draw upon Arnstein's (1969) ladder of participation framework as a way to communicate with our partners and advocate for the highest level of community control possible at the end of our CI projects. While we emphasize partnerships as a high degree of citizen power (Arnstein 1969), we work with our community partners to ensure that they will ultimately gain control of the decision making and have managerial power over their ICT projects. We believe this approach is key in order to help reduce the potential harm that could result from instructor–student–community collaborations. Thinking about community informatics in this way, we join Stoecker, Eubanks, and other scholars who have emphasized the role of CI as a "supporting cast member" (Stoecker 2005) in working toward the goal of advancing a more inclusive and just society. We believe this approach can help to promote multiple ways of knowing, or a culture of epistemological pluralism, to help combat the centralization of knowledge created by cloud computing and big data in the era of NSA surveillance (Mosco 2014).

A Critical Interpretive Sociotechnical Framework

We believe that a critical interpretive sociotechnical (CIS) framework summarizes our values and commitments shared herein. We argue that this approach can help to promote a culture of epistemological pluralism to defend against technological determinism. We have found this conceptual framework useful for our delivery of the CI Studio course and pedagogy, and we have also found this useful in our work in support of community-defined social justice goals. We hope these concepts are useful to inform community informatics teaching, research, and practice. Following is a set of principles that we believe encapsulate the CIS framework:

1. Knowledge of the world is socially constructed within specific historical and social contexts that are fundamentally mediated by power relations. Facts are always determined by some degree of ideological inscription (Kincheloe and McLaren 2005, p. 304).
2. Theory and praxis must be brought together in dialogue to ground transformative, liberative action and reflection in community spaces—a critical interpretive approach.
3. Instructors, students, and community partners in the CI Studio must be co-learners and co-creators of knowledge, and they should benefit equally from their participation in CI projects.
4. An asset-based perspective that considers the bundle of resources each participant brings to the project, along with his or her capability sets allowing the conversion of these resources

into valued doings and beings, must be the starting point for any community engagement project.

5. Community–university partnerships should embody a high degree of citizen power, and energy should be intentionally focused on ensuring that the community gains ultimate control over the decision-making and managerial power (Arnstein 1969, p. 217) in CI projects.
6. People's everyday experiences with technology are essential gateways for understanding: (a) how oppressive systems in society reinforce existing inequalities, and (b) the role that technology plays in supporting these social processes.
7. Assumptions about technology—and about those who use technology—deeply impact teaching, learning, research, and knowledge creation processes.
8. Power and oppression, whether intentional or unintentional, shape ICTs and thus deliver unequal benefits for different groups in society.
9. Therefore, great care and ongoing assessments are needed in research, teaching, and practice with community members in order to (a) ensure that engagement does not reinforce existing race, class, and gender inequalities, and to (b) reduce the potential of causing any harm in community settings.
10. Difference must be embraced as a resource (Eubanks 2011) and a strategy for promoting multiple ways of knowing, or a culture of epistemological pluralism.

Our purpose in introducing these 10 principles is not only to provide a clear and concise description of the strategies and goals of our CI Studio pedagogy, but also to introduce a framework that may be useful to other CI researchers, practitioners, and educators interested in gaining new perspectives from critical and interpretive theoretical frameworks. The CI Studio provides a forum in which information professionals can learn to be professionals by bringing these ideas into focus throughout their professional lives.

Conclusion

In this paper, we argued that the contribution of the CI Studio to community informatics could be found in its embrace of both critical and interpretive perspectives. We introduced our critical interpretive sociotechnical (CIS) theoretical framework as an essential approach for preparing our students as information professionals to work with community partners and to help them engage more effectively with community partners in a meaningful way that provides equal benefits to all. We paid careful attention to how these assumptions shape our pedagogical technique. We began by highlighting the meta-theoretical assumptions guiding the CI Studio course and pedagogy with the purpose of making our perspectives more visible on three related topics: technology/society, teaching/learning, and research/knowledge. We concluded by providing a set of principles that we believe encapsulate the CIS framework, particularly for those who wish to use and further develop the CI Studio pedagogy to advance a more just, equitable, and democratic society.

References

Allen, M. and M. Foth. (2011). "Research in action for community informatics: A matter for conversation." The Journal of Community Informatics 7(3). Available at: http://ci-journal.net/index.php/ciej/article/view/836/745.

Arnstein, S. R. (1969). "A ladder of citizen participation." Journal of the American Planning Association 35(4): 216–224.

Bertalanffy, L. V. (1968). General system theory. New York, George Braziller Inc.

Bishop, A., C. Bruce, and S. Jeong. (2009). Beyond service learning. Service learning: Linking library education and practice. L. Roy, K. Jensen, and A. H. Meyers (eds.). Chicago, American Library Association: 16–31.

Bruce, B. C., A. Rubin, and J. An. (2009). Situated evaluation of socio-technical systems. Handbook of research on socio-technical design and social networking systems. B. Whitworth and A. de Moor (eds.). Hershey, Information Science Reference: 685–698.

Day, P. (2011). "Community-based learning: A model for higher education and community partnerships." The Journal of Community Informatics 7(3). Available at: http://ci-journal.net/index.php/ciej/article/view/805/786.

Dewey, J. (1938). Experience and education. New York, The Macmillan Company.

Doolin, B. and L. McLeod. (2005). Towards critical interpretivism in IS research. Handbook of critical information systems research: Theory and application. D. Howcroft and E. M. Trauth (eds.). Cheltenham, Edward Elgar: 244–271.

Eglash, R. (2004). Appropriating technology: An introduction. Appropriating technology: Vernacular science and social power. R. Eglash, J. L. Croissant, G. Di Chiro, and R. Fouche (eds.). Minneapolis, University of Minnesota: vii–xxi.

Eubanks, V. (2011). Digital dead end: Fighting for social justice in the information age. Cambridge, MIT Press.

Feenberg, A. (1993). Critical theory of technology. New York, Oxford University Press.

Feenberg, A. (1999). Questioning technology. London, Routledge.

Flood, R. (2010). "The relationship of 'systems thinking' to action research." Systemic Practice and Action Research 23(4): 269–284.

Flood, R. and M. Jackson. (eds.) (1991). Critical systems thinking: Directed readings. Chichester, Wiley.

Freire, P. (1970/1993). Pedagogy of the oppressed. New York, Continuum.

Gangadharan, S. P. (2013). "Joining the surveillance society? New internet users in an age of tracking." Available at: http://newamerica.net/publications/policy/joining_the_surveillance_society.

Garrison, J. (1998). Toward a pragmatic social constructivism. Constructivism and education. M. Larochelle, N. Bednarz, and J. Garrison (eds.). Cambridge, Cambridge University Press: 43–62.

Goldkuhl, G. (2012). "Pragmatism vs interpretivism in qualitative information systems research." European Journal of Information Systems 21: 135–146.

Gurstein, M. (2003). "Effective use: A community informatics strategy beyond the Digital Divide." First Monday 8(12). Available at: http://firstmonday.org/article/view/1107/1027.

Gurstein, M (2007). What is Community Informatics (and Why Does It Matter)? Milan, Italy: Polimetrica.

Kincheoloe, J. L. (2005). Critical constructivism. New York, Peter Lang.

Kincheloe, J. L. and P. McLaren. (2005). Rethinking critical theory and qualitative research. The SAGE handbook of qualitative research. N. K. Denzin and Y. S. Lincoln (eds.). Thousand Oaks, SAGE: 303–342.

Knoble, M. (1999). Everyday literacies: Students, discourse, and social practice. New York, Peter Lang.

Lackney, J. A. (1999). "A history of the studio-based learning model." Available at: http://www.edi.msstate.edu/work/pdf/history_studio_based_learning.pdf.

Lawson, L., L. Spanierman, V. Poteat, and A. Beer. (2011). Best place for best practice? The challenge of multicultural learning in a community-based design studio. Implementing diversity: Contemporary challenges and best practices at predominantly white universities. H. Neville, M. Huntt, and J. Chapa (eds.). Urbana, Center for Democracy in a Multiracial Society: 205–224.

MacKenzie, D. and J. Wajcman. (1999). Introductory essay: The social shaping of technology. The social shaping of technology (2nd ed.). D. MacKenzie and J. Wajcman (eds.). Buckingham, Open University Press: 3–27.

McKinnon, S. (2009). Critical theory. Encyclopedia of communication theory. S. W. Littlejohn and K. A. Foss (eds.). Thousand Oaks, SAGE: 238–244.

Milner, H. R. (2007). "Race, culture, and researcher positionality: Working through dangers seen, unseen, and unforeseen." Educational Researcher 36(7): 388–400.

Mosco, V. (2014). To the cloud: Big data in a turbulent world. Boulder, Paradigm Publishers.

Papert, S. (1987). "Computer criticism v. technocentric thinking." Educational Researcher 16(1): 22–30.

Rasmussen, D. M. (1996). Critical theory and philosophy. The handbook of critical theory. D. M. Rasmussen (ed.). Cambridge, Blackwell Publishers.

Rhinesmith, C. (2012). Free library hot spots: Supporting broadband adoption in Philadelphia's low-income communities. International Journal of Communication 6: 2529-2554.

Sen, A. (1999). Development as freedom. New York, Anchor Books.

Stillman, L. and T. Denison. (2014). "The capability approach community informatics." The Information Society 30: 200–211.

Stoecker, R. (2005). "Is CI good for communities?" The Journal of Community Informatics 1(3). Available at: http://www.ci-journal.net/index.php/ciej/article/view/183/129.

Stoecker, R. (2013). Research methods for community change: A project-based approach. Thousand Oaks, SAGE.

Unterhalter, E. (2009). Education. An introduction to the human development and capability approach: Freedom and agency. S. Deneulin and L. Shahani (eds.). Sterling, Earthscan.

Valentinov, V. (2012). "System–environment relations in the theories of open and autopoietic systems: Implications for critical systems thinking." Systemic Practice and Action Research 25: 537–542.

Vannini, A. (2009). Interpretive theory. Encyclopedia of communication theory. S. W. Littlejohn and K. A. Foss (eds.). Thousand Oaks: SAGE: 558–563.

Wajcman. J. (1991). Feminism confronts technology. University Park, The Pennsylvania State University Press.

Wajcman, J. (2010). Feminist theories of technology. Cambridge Journal of Economics 34(1): 143-152.

Whitworth, B. (2009). A brief introduction to sociotechnical systems. Encyclopedia of information science and technology (2nd ed.). M. Khosrow-Pour (ed.). Hershey, Idea Group Reference.

Williams, R. and D. Edge. (1996). "The social shaping of technology." Research Policy 25: 865–899.

Williamson, K. and G. Johanson. (2013). Research methods: Information, systems and contexts. Prahran VIC, Tilde University Press.

Winner, L. (1986). The whale and the reactor: A search for limits in an age of high technology. Chicago, The University of Chicago Press.

Winner, L. (1997). "Cyberlibertarian myths and the prospects for community." Available at: http://homepages.rpi.edu/~winner/cyberlib2.html.

Wolske, M., C. Rhinesmith, and B. Kumar. (2014). "Community informatics studio: Designing experiential learning to support teaching, research, and practice." Journal of Education for Library and Information Science 55(2): 166–177.

Zheng, W. and B. C. Stahl. (2011). "Technology, capabilities and critical perspectives: What can critical theory contribute to Sen's capability approach?" Ethics and Information Technology 13: 69–80.