

Bridging the Digital Divide: Sociocultural Constructionism and an Asset-Based Approach to Community Technology and Community Building

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Introduction

Most efforts to engage urban residents with technology have addressed these populations as monolithic entities. Programs targeted at "low-income" and "inner-city" communities reflect this. Not surprisingly, "low-income" and "inner-city" communities constitute an extremely diverse setting that can include African-Americans, Hispanics, Whites, and others, whereas each individual possesses their own interests and needs. Research indicates that there are marked differences in computer access and use across socioeconomic and racial groups (NTIA, 1994, 1997 & 1999; Nielsen Media Research, 1997; Novak & Hoffman, 1998). While these studies provide a clear picture of the gap in computer access and use, they do not explain what can be done to address it.

Many are inclined to believe that the "digital divide" (NTIA, 1994, 1997 & 1999) can be explained purely by economic factors, to the exclusion of social or cultural considerations. They would argue that disparities in the buying power of minorities and Whites or between low-income communities and middle-class communities, is at the root of the problem, and that providing access alone will ensure a level playing field. Studies have found that while the gender gap in computer and Internet use is closing over time, the socioeconomic and racial gap is growing (NTIA, 1994, 1997 & 1999; Abrams 1997). While we can certainly expect the numbers of minorities and residents of low-income communities who buy computers to rise as equipment prices drop, the idea that cost is the only prohibitive measure is a gross oversimplification. According to the National Telecommunications Information Administration (NTIA) (1994, 1997 & 1999), minorities lag behind Whites, even at the same level of income, with respect to computer ownership. This would serve to refute the argument that economics is the only hurdle to overcome, but at the same time raises the following question: what other factors contribute to this divide? I argue that social and cultural considerations must be taken into account when searching for answers to this question. People must be able to see the relevance of technology in order to fully embrace it. At the same time, since access does not imply use, and use does not imply meaningful use, we must also consider the nature of engagement we seek to promote.

In this paper, I establish the theory of sociocultural constructionism – a synthesis of the theories of social constructionism (Shaw, 1995) and cultural constructionism (Hooper, 1998), that is rooted in the theory of constructionism (Papert, 1993). Sociocultural constructionism is a theory about individual and community development that can inform efforts to engage populations traditionally underserved by technology. To explicate a

methodology for operationalizing this approach, I draw from the literature on community building and the practice of asset-based community development (Kretzmann & McKnight, 1993). Sociocultural constructionism and an asset-based approach to community technology and community building involve participants as active change agents rather than passive beneficiaries or clients, and as the active producers of information and content, rather than passive consumers or recipients.

Finally, I describe a research project that is currently underway at a predominantly African-American, low-income, housing development in Roxbury, Massachusetts, in collaboration with the MIT Media Laboratory and the MIT Department of Urban Studies and Planning, to investigate the effectiveness of this approach in achieving social and cultural resonance and bridging the digital divide.

Social and Cultural Resonance

A social setting is defined as an environment in which numerous forces, particularly those stemming from an individual's relationship to others, act upon people who are located in that setting (James & Nahl, 1979). Culture refers to the values, beliefs, and practices that influence the way an individual interprets the world (Gee & Green, 1998; Lee & Smagorinsky, 2000). Culture manifests itself in a variety of social settings (i.e. home, school, and community). Research shows that culture plays a significant role in an individual's level of engagement with technology (Hooper, 1998), and that the social setting plays a significant role in how a community makes use of technology (Shaw, 1995).

Achieving a certain level of social and cultural resonance is critically important to any effort that seeks to engage populations with computers and the Internet that have not traditionally enjoyed the benefits of these technologies. Minority and low-income communities certainly aren't suffering from "technophobia," as evidenced by the high penetration of modern technologies such as pagers and mobile telephones. Notice, however, that these technologies immediately suggest specific benefits and uses. They address certain social needs, such as the desire to communicate with others, and they adhere to certain cultural practices in that they are valued (and often perceived as symbols of status). On the other hand, computer technology, given its inherently flexible nature, does not immediately suggest a particular benefit or use, because it can support a variety of aims. Therefore, when searching for effective strategies to diffuse computer and Internet technology, it is incumbent upon designers and planners to ensure that the infrastructure is well suited to the interests of end-users. I believe that computers and the Internet can achieve even greater levels of penetration, and associated patterns of meaningful use, when sociocultural considerations are carefully taken into account. In other words, when people can readily see the benefits of these technologies toward improving their life, their family, and their community, they will be much more likely to embrace them, thus achieving some measure of resonance with their social and cultural milieu.

Consequently, I am advocating a holistic approach to individual and community engagement with technology, one that seeks to identify their interests first, and then determine how technology can support those interests. It is an approach that not only involves individuals as residents, but also the surrounding community in the form of local associations and institutions (e.g., schools, libraries, etc.) and neighborhood businesses. It is an approach that is rooted in the theories of social constructionism (Shaw, 1995) and cultural constructionism (Hooper, 1998), as well as the practice of asset-based community development (Kretzmann & McKnight, 1993). It is an approach that combines the best practices of community technology with the best practices of community building, as a means toward achieving social and cultural resonance. In the following sections, I explain the theoretical foundation for sociocultural constructionism and asset-based community development, as well as their relationship to community technology and community building.

Sociocultural Constructionism and Community Technology

Sociocultural constructionism is a synthesis of the theories of social constructionism (Shaw, 1995) and cultural constructionism (Hooper, 1998), both of which are rooted in Papert's (1993) theory of constructionism.

Constructionism

Constructionism is a theory about learning, and argues that people learn best when they are active participants in design activities (Papert, 1993), and that these activities give them a greater sense of control over (and personal involvement in) the learning process (Resnick, Bruckman & Martin, 1996). There has long been a debate as to whether or not learning is best characterized as an individual cognitive process, or a process of acculturation into an existing community (Cobb, 1994). These seemingly contradictory perspectives have been argued by constructivists such as Piaget (1954) and von Glaserfeld (1994), and sociocultural theorists such as Vygotsky (1978) and Rogoff (1990), respectively. Constructivists believe that the individual learns by actively constructing and reconstructing her conceptual model of the world, given a social and cultural context. The explanatory construct of knowledge is the student's cognitive self-organization. On the other hand, sociocultural theorists believe that the individual learns via participation in socially and culturally organized practices. Here, the explanatory construct of knowledge is the process of acculturation experienced by the learner.

In many ways, constructionism synthesizes both of these perspectives by asserting that individual development is enhanced by shared social activity. The vision of a constructionist learning environment is one that gives the individual the freedom to explore their natural interests, with the support of a community of learners, both expert and novice, that can facilitate deeper understanding. A constructionist learning environment is characterized by a rich exchange of ideas between individuals that is mediated by their interaction with each other as well as their shared physical and virtual constructions. A constructionist learning environment places emphasis on a learner's individual cognitive development, as well as the role that community and the surrounding human context play in enhancing this development. Both social and cultural constructionism represent extensions to the constructionist paradigm.

Social Constructionism

Shaw's (1995) theory of *social constructionism* states that "individual developmental cycles are enhanced by shared constructive activity in the social setting, and the social setting is also enhanced by the developmental activity of the individual." Shared constructive activity refers to the creation of "social constructions," of which there are five types: 1) social relationships, 2) social events, 3) shared physical artifacts, 4) shared social goals and projects, and 5) shared cultural norms and traditions. Social constructionism is a useful framework for advancing the interests of a community. It is also relevant to the role that technology can play in supporting these interests. A tool that is consistent with this paradigm is one that supports the creation of the aforementioned social constructions, thus enhancing the developmental cycle of the individual and the community.

In 1994, Shaw designed the Multi-User Sessions in Community (MUSIC) system to demonstrate how technology could be shaped around social constructionist principles. MUSIC is a community intranet that facilitates community communication and information exchange. It includes the following features: send/receive e-mail messages, community bulletin board, community announcements, community calendar of events, community chat room, and more. MUSIC was deployed in Dorchester, Massachusetts, and Newark, New Jersey, and proved to be particularly effective in supporting social relationships, social events, and shared social goals and projects. Shaw describes the social constructionist paradigm as part of a three-part synergy.

The social setting presents a context of *social relations and cultural materials* which set the stage for *sociocultural activities and processes* through which developmental *internalized and externalized* constructs can be formed. These constructs can further influence the setting by adding new artifacts and processes to the setting, causing it to evolve by changing existing relationships, adding or altering cultural materials, activities and processes, and by fostering new cognitive and social developments. (Shaw, 1995).

While Shaw makes reference to the *need* for internalized and externalized constructs in relation to the social setting, he makes no explicit claim as to the *kind* of internalized and externalized constructs that are most effective in engaging a community of learners, from a cultural perspective. It is here that Hooper's theory of cultural constructionism becomes especially useful.

Cultural Constructionism

Cultural constructionism argues that "individuals learn particularly well through creating objects in the world that express their cultural identity and have shared meaning within their home cultures" (Hooper, 1998). A cultural construction could be a drawing, collage, personal website, electronic community newsletter, or any other project that is an expression of cultural identity, and at the same time facilitates an engagement with new knowledge. Cultural constructionism is a useful framework for advancing the interests of an individual. In similar fashion to social constructionism, it is also relevant to the role that technology can play in supporting these interests. A tool that is consistent with this paradigm fosters the expression of one's cultural heritage, thus enhancing the developmental cycle of the individual and the community.

From 1992 to 1996, Hooper performed a longitudinal study of one student, Keanna, which involved her use of Microworld's Logo. The study took place at Paige Academy, an alternative African-centered school in an urban community in Massachusetts. Hooper observed how Keanna's programming projects, or constructions, mediated her understanding of computational ideas with her cultural identity. These projects proved to be effective in fostering Keanna's technological fluency, and facilitated her understanding of various computational themes such as modularity, parallelism, and evaluation. Hooper recognizes three layers of the cultural constructionist perspective on learning.

Constructivism captures the idea that children construct their own knowledge. *Constructionism* adds that they do this particularly well in the course of constructing things in the world. Finally, learning stories depicting Keanna's work on programming projects reveal constructionist learning that occurred particularly well in the context of concurrent exploration of her cultural identity and context and this leads to the extension of constructionism to *cultural constructionism*. (Hooper, 1998).

While Hooper argues for a particular *cultural* context, she makes no explicit claim as to the *social* context that is best suited for engaging an individual learner with respect to the construction of knowledge. It is here that Shaw's theory of social constructionism becomes especially useful. In concert, social constructionism and cultural constructionism demonstrate how a learning environment can address the needs of individuals, both independently and as members of a broader community.

Sociocultural Constructionism

Sociocultural constructionism argues that individual and community development are reciprocally enhanced by independent and shared constructive activity that is resonant with both the social setting that

encompasses a community of learners, as well as the cultural identity of the learners themselves. Sociocultural constructionism is framework that addresses the interests of both an individual and a community. In the same fashion as social and cultural constructionism, it is also relevant to the role that technology can play in supporting these interests. A tool that is consistent with this paradigm empowers residents to express their cultural heritage, and enables broad community communication, and information and resource exchange, thus enhancing the developmental cycle of the individual and the community.

The Computer Clubhouse, organized by the Computer Museum (now part of the Museum of Science) in collaboration with the MIT Media Laboratory, is an example of a successful effort to foster an environment that is socially and culturally resonant with a youth population (Resnick, Rusk & Cooke, 1998). Fifteen stand-alone Clubhouses have been established to-date, including two overseas, with plans to expand the Clubhouse network considerably in the future.

At the Clubhouse, young people are able to pursue their interests by creating physical and virtual artifacts that reflect their cultural identity, within the context of a community of peers and mentors. The Clubhouse is a community technology center (CTC) that serves inner-city youth, and represents a particular approach to learning within a CTC that is rooted in constructionist tradition.

At many CTCs the goal is to teach youth basic computer skills and applications. At the Clubhouse the goal is for youth to learn how to express themselves fluently with technology (Papert & Resnick, 1995). This is demonstrated by their ability to transform ideas into technological projects.

At the Clubhouse, young people become designers and creators – not just consumers – of computer-based products. Participants use leading-edge software to create their own artwork, animations, simulations, multimedia presentations, virtual worlds, music creations, Web sites, and robotic constructions. (Resnick, Rusk & Cooke, 1998).

I believe such an environment can be fostered beyond the walls of a CTC, and incorporated into an effort to promote community engagement with technology.

Community Technology

The term *community computing* has gradually evolved to encompass three models of community involvement with technology (Beamish, 1999). The first model is *community networks*, or community-based electronic network services, provided at little or no cost to users. The second model is *community computing centers* or community technology centers (CTCs), publicly accessible facilities that provide computer access for people who can't afford a computer, as well as technical instruction and support. The third model is *community content*, or the availability of material that is relevant and interesting to some target audience (e.g., low-income residents) to encourage and motivate the use of technology. These approaches can be classified according to what they provide: hardware, software, and training, infrastructure, online access, or content. They can also be classified according to the groups they target: individuals, schools, youth, community organizations, and the general public, or specific groups such as a neighborhood, racial or ethnic minorities, the homeless, and the elderly (Beamish, 1999).

Community technology is "a process to serve the local geographic community - to respond to the needs of that community and build solutions to its problems" (Morino, 1994). Given this definition, any effort that seeks to operationalize the sociocultural constructionist approach to individual and community engagement with technology, must first identify the interests of various community constituencies, such as residents, local associations and

institutions (e.g., schools, libraries, etc.), and neighborhood businesses, and then determine how technology can support those interests. The challenge thereafter is to provide socioculturally constructive tools, or cultural materials, that are supported by socioculturally constructive activities in the social setting. To explicate such an approach, I draw from the literature surrounding resident and community involvement in efforts to revitalize neighborhoods, or community building. More specifically, I draw upon the writings of Kretzmann and McKnight (1993), and the practice of asset-based community development.

Asset-Based Community Development and Community Building

There are three primary approaches to community revitalization. *Community organizing* is an approach to community revitalization that enlists residents to take on powerful institutions in their community through direct, public confrontation and action (Alinsky, 1971; Delgado, 1986, 1994; Khan, 1991; Hess, 1999). *Community development* is an approach to community revitalization whereby freestanding, non-profit, community-based organizations coordinate the construction and rehabilitation of a discrete geographic area's physical infrastructure (Schorr, 1997). *Community building* is an approach to community revitalization that is focused on "strengthening the capacity of residents, associations, and organizations to work, individually and collectively, to foster and sustain positive neighborhood change" (Aspen Roundtable, 1997).

Community Building

The genesis of community building can be found in three sources (Hess, 1997). First, the critiques of traditional advocacy and social service delivery by self-help reformists such as Thomas Dewar. These critics believed that true community improvement could never be achieved by systems based on dependence and a flawed model of professionals "serving" clients. Second, the writings of Kretzmann and McKnight at Northwestern University's Asset-Based Community Development (ABCD) Institute, popularized in their book *Building Communities from the Inside Out: A Path Toward Finding and Mobilizing a Community's Assets* (1993). The ABCD approach is described in greater detail below. Third, the emphasis by feminist organizers on the infinite power that can be achieved through building relationships within small informal groups, in contrast with past techniques that targeted widespread participation and were grounded in conflict and confrontation (Bradshaw, Soifer & Guterrez, 1994; O'Donnell & Schumer, 1996; Stall & Stoeker, 1997). Feminist organizing advocates a voluntary, communal response to community problems and places professionals in the redefined role of coach or co-learner. A fourth contributing factor to the community building movement is the epistemological concepts of "learning webs" and "communities of learners" espoused by progressive educators such as Ivan Illich (1970). These models for self-motivated learning focused on a restructuring of the student-teacher relationship by providing the learner with "new links to [their community] and the world" (Illich, 1970).

Community building has a social and cultural orientation as its foundation. Socially, community builders believe that relationships among community members represent the basic building blocks for strengthening distressed neighborhoods. Culturally, community builders seek to ensure that the values, beliefs, and practices of community members are consistent with the strategies that are undertaken. Successful community building cultivates leadership (Gilbert, Specht & Terrell, 1993). These initiatives are typically organized by a relatively small group of committed individuals that serve the larger community. Their focus is on increasing social capital by expanding connections within the community and improving the ability of community members to work together effectively. Community building conceives the public interest in a community as communal (Gilbert, Specht & Terrell, 1993). In other words, the community is seen as a set of individuals working together on common interests, with an emphasis on voluntary action that will naturally coalesce around important issues. It is an approach that adheres to an agenda planning form of power and encourages residents to develop their own vision for the community that can be translated into an agenda that reflects their interests (Gaventa, 1980; Lukes, 1974). Finally,

the nature of civic involvement among residents in a community building initiative is that of engaged citizenry (Sviridoff & Ryan, 1996). As engaged citizens, residents are enlisted in wide numbers in a broad set of roles toward building "networks, contacts, trust, and standards all essential to the community's problem-solving capacity" (Sviridoff & Ryan, 1996). Residents are directly involved in establishing social ties to each other, as well as other community members, including associations, businesses, and institutions. Asset-based community development represents a particular model, or technique, for building community.

Asset-Based Community Development

ABCD is a process for "mapping" a community's assets and mobilizing these assets to address community-defined issues and solve community-defined problems. Kretzmann and McKnight (1993) identify three characteristics of asset-based community development:

- *Asset-based* - Community building begins with what is present in the community, as opposed to what is absent or problematic in the community. It is focused on indigenous assets as opposed to perceived needs. These assets represent resources that can, and must be utilized in order to achieve positive and sustainable change.
- *Internally focused* - Community building calls upon community members to identify their interests and build upon their capacity to solve problems. One of the distinguishing characteristics of community building is its heavy emphasis on leveraging that which is in the community first, before looking to outside entities and/or resources.
- *Relationship driven* - Community building has also been defined as "any identifiable set of activities pursued by a community in order to increase the social capacity of its members" (Mattesich & Monsey, 1997). This requires the ongoing establishment of productive relationships among community members, as well as the associated trust and norms necessary to maintain and strengthen these relationships.

For these reasons, asset-based community development can be an appropriate methodology for harnessing the individual and collective talents of the members of a community. Not only does this have direct applications to community engagement with neighborhood revitalization, but also community engagement with technology. The asset-based nature can ensure broad participation including residents, associations, businesses, and institutions (e.g., libraries, schools, etc.) when designing strategies to deploy a community technology initiative. The internal focus can ensure that their voices are heard and act as a guiding force in the conceptualization and implementation of an initiative. The emphasis on relationships can increase the capacity of community members to communicate more frequently, exchange information and resources more efficiently, and work together more effectively, as it relates to an initiative.

Kretzmann and McKnight (1993) identify five steps toward whole community mobilization: 1) *Asset-mapping* - Mapping completely the capacities and assets of individuals, citizens' associations and local institutions, 2) *Building internal relationships* - Building relationships among local assets for mutually beneficial problem solving within the community, 3) *Asset-mobilization* - Mobilizing the community's assets fully for economic development and information sharing purposes, 4) *Building a vision* - Convening as broadly representative a group as possible for the purposes of building a community vision and plan, and 5) *Establishing external connections* - Leveraging activities, investments and resources from outside the community to support asset-based, locally defined development.

These steps can also be applied to community engagement with technology. Asset-mapping can identify the community resources that are relevant to the community technology initiative. This includes assets that could benefit from, or contribute to the initiative such as the skills and abilities of residents, the products and services of neighborhood businesses, the social services and programs offered by local associations, and the resources found in local institutions such as schools and libraries. As mentioned earlier, building internal relationships can increase the community's capacity to work together effectively to coordinate the initiative. Asset mobilization can be partially mediated online, particularly given how well the Internet and the World Wide Web are suited to information sharing purposes. While e-mail and listservs could easily perform this function, more sophisticated tools could be developed to facilitate this exchange in new and innovative ways. Building a vision can help leaders in understanding how the various community constituencies can benefit from the initiative – as seen from their point of view. Finally, establishing external connections can involve institutions in the initiative that lie outside the community, such as universities (i.e. research and evaluation) and philanthropic groups (i.e. funding). Links to these and other entities can greatly contribute to the initiative's long-term sustainability.

These steps have proven effective in a variety of community revitalization efforts, including: mapping and mobilizing local business assets to create a job-matching network (Kretzmann, McKnight, & Puntenney, 1996a), mapping and mobilizing the economic capacities of local residents to create a cooperative buying arrangement (Kretzmann, McKnight, & Puntenney, 1996b), mapping and mobilizing consumer expenditures to identify opportunities for local entrepreneurship (Kretzmann, McKnight, & Puntenney, 1996c), mapping and mobilizing the associations in a local neighborhood to establish a "council of associations" (Kretzmann, McKnight, & Turner, 1999), and creating a neighborhood information exchange that connects local skills and knowledge (Kretzmann, McKnight, & Puntenney, 1998). I assert that an asset-based approach to community technology and community building can be equally effective in achieving a social and cultural resonance that truly taps into the interests of residents and their community.

Community Technology and Community Building

At the intersection between community building and community technology lies tremendous synergy. Each of these domains seeks to empower individuals and families, and improve their overall environment. Surprisingly, approaches that combine these areas have received very little attention. In response to the digital divide, the challenge in many minority and low-income communities has been to identify strategies for engaging residents with technology, providing economical access to technology, and encouraging meaningful use of technology. These efforts have largely, and justifiably, focused on establishing infrastructure and providing training. As computers and the Internet continue to penetrate these communities, it begs the question of what can be done to truly leverage a given technological base. From among the three models of community involvement with technology – community computing centers, community networks, and community content (Beamish, 1999) – there are a limited number examples where technology has been used to promote community building by regarding residents and other community members as key stakeholders in the process. Conversely, from among the multitude of models for community revitalization, such as community organizing, community development, and community building (Hess, 1999), we are only beginning to witness the benefits that are afforded by incorporating technology into these approaches in a meaningful way.

The best practices of community building see community members as active change agents. ABCD is an asset-based approach to community building that sees community members as active change agents rather than passive beneficiaries or clients. The best practices of community technology see community members as the active producers of community information and content. Sociocultural constructionism is an asset-based approach to community technology that sees community members as the active producers of community information and content

rather than passive consumers or recipients. With anticipated increases in funding for large-scale community building and community technology projects (The White House, 1999), there is a great deal to be learned regarding how community building and community technology can be mutually supportive, rather than mutually exclusive. In the final section of this paper, I briefly describe an approach to integrate community technology and community building based on the principles of sociocultural constructionism and asset-based community development.

Fostering Social and Cultural Resonance

To investigate the effectiveness of an asset-based approach to community technology and community building in fostering social and cultural resonance, I am working with the residents at Camfield Estates, a predominantly African-American, low-income, housing development in Roxbury, Massachusetts, and the community members in its surrounding environs. The project represents a collaborative effort between the Camfield Tenants Association (CTA), the MIT Media Laboratory, and the MIT Department of Urban Studies and Planning. Our approach to community building and community technology relies heavily on resident involvement and broad community participation in mapping and mobilizing assets, and also involves a database-backed web system currently undergoing development at MIT, the Creating Community Connections System (C3), that is consistent with the sociocultural constructionist framework. The research site, research plan for resident involvement and community participation, and the C3 system, are described in greater detail in the following sections.

Research Site

Camfield Estates, formerly Camfield Gardens, is a recently renovated, 102-unit development consisting of several town houses rather than low- to medium-rise apartments. There are approximately 400 residents at Camfield Estates with an average age of 27. Unlike some housing developments where residents are transient, Camfield Estates is a stable environment with relatively low turnover. The property is equipped with a T1 communications line that connects the Camfield Neighborhood Technology Center (NTC), a community technology center located on the Camfield property, to the Internet. Furthermore, a community technological infrastructure is being established at Camfield Estates consisting of a computer and a high-speed Internet connection in each unit. CTA has expressed a strong interest and enthusiasm about the project, and has formed a committee to oversee the project's implementation. This committee includes Camfield residents, representatives of CTA, the NTC director, and researchers from MIT.

Research Plan

A preliminary survey will be administered prior to the beginning of the project. A series of initial meetings will also take place with residents and other community members to solicit their input and participation in the planning process. The preliminary survey and initial meetings, in many ways, represent the most important aspect of the project since they will dictate the project's direction thereafter. The preliminary survey and initial meetings will seek to identify the community's interests and how technology can support their interests. It will also help to identify which community assets will need to be mapped and mobilized in order to advance the project. How could a computer improve their lives? What are the issues that they would like to see addressed that could be supported by technology? Health care? Safety? Education? Employment?

After the preliminary survey has been fully assessed by the committee, two parallel initiatives will be undertaken. The first initiative will focus largely on community building, and will involve residents in mapping and mobilizing community assets. The second initiative will focus largely on community technology, and will involve training residents (and local associations and institutions) in computer use, leading up to the deployment of a computer and a high-speed Internet connection in each unit. Both of these initiatives are described in greater detail in the following subsections.

Community Building: Mapping and Mobilizing Community Assets

Camfield Estates' residents and other community members will be invited and encouraged to join the various working committees that will be formed to oversee the project's implementation. A team of residents will also be actively involved in the asset-mapping process, acting as project coordinators, resident interviewers, and field surveyors. The residents that fill these positions will be trained in how to identify community assets and gather the requisite data. Training residents to conduct the fieldwork is important for two reasons. First, it teaches them how to identify and map their own local assets. This is a valuable skill that could be leveraged in the future should the community decide to extend the asset-mapping initiative. Second, it creates an awareness among residents of the resources that exist in their community. In the past, residents involved with similar projects have been pleasantly surprised to find community assets they were previously unaware of (Turner, 1999). In summary, as the residents catalog the community's capacity, they are increasing the community's capacity.

The asset-mapping team will gather information about the capacities of other residents, local associations and institutions, and neighborhood businesses. Once again, the nature of the data to be collected will be heavily informed by the results of the preliminary survey and initial meetings. To conduct the asset-mapping process, the following instruments will be employed:

- *Resident Capacity Survey* – Captures information about residents regarding their abilities and interests in a variety of skill areas (e.g., creative skills, computer skills, etc.). Also captures information regarding their education, training, and employment experience. This is based on resident capacity surveys developed by Kretzmann and McKnight (1997), and Turner (1999).
- *Association and Institution Capacity Survey* – Captures information about local associations (e.g., non-profit organizations) and institutions (e.g., libraries and schools) regarding their targeted needs (e.g., basic subsistence, education, health care, etc.), targeted members (e.g., high school dropouts, senior citizens, etc.), assets needed/shared, projects and activities, and partnerships in the community. This is based on association and institution capacity surveys developed by Kretzmann, McKnight, and Turner (1999), and Bishop (1999).
- *Business Capacity Survey* – Captures information about neighborhood businesses regarding their products and goods purchased/sold, as well as their hiring needs. This is based on business capacity surveys developed by Kretzmann, McKnight, and Punttenney (1996a).

Camfield residents will be asked to provide this information on a voluntary basis. All of the associations, institutions, and businesses within an approximately 15-block radius of Camfield Estates will also be solicited to complete a survey.

To support community building via technology, the Creating Community Connections (C3) system will be made available through the Camfield Estates website. C3 will serve two primary functions. First, C3 is a community intranet that facilitates community communication and information exchange. In that regard, C3 offers the following features: e-mail, community listserves, community bulletin boards, community calendar of events, community chat rooms, community announcements, and more. Second, C3 is a community extranet (portal) and community building tool that facilitates resource exchange, asset-mapping, and asset mobilization among community residents, associations, institutions, and businesses. In that regard, C3 includes the following features: job opportunity postings, volunteer opportunity postings, automatic generation of an online resume for residents, personalized web portals for residents, the ability for residents, associations, and institutions to create a home page,

full browse/search/update capabilities of asset (resource) records online, and security restrictions. The resident social service coordinator will also be involved in mobilizing community assets based on the needs of community members.

Community Technology: Training and Deployment

Training will be offered to residents, associations, institutions, and businesses, at NTC. Camfield residents will receive comprehensive training in the following areas: basic computer hardware components (e.g., keyboard, mouse, etc.), basic computer software applications (e.g., operating system, e-mail, word processing, Internet browser, etc.), and specialized computer software applications (namely, C3). After residents have completed a mandatory basic training course, they will be able to take their computer home and connect to the network (note that residents will not be required to complete the resident capacity survey to participate in training and receive a computer). Thereafter, residents will be able to attend training sessions offered at NTC on additional topics such as website design, desktop publishing, and animation.

Similarly, local associations, institutions, and businesses will be invited to participate in training sessions specifically designed to demonstrate how they can benefit from a presence online, as well as how to access and update their asset record on the C3 system. Thereafter, space will also be made available on the C3 server for associations and businesses to build their own websites.

Once these two parallel initiatives have been completed, the final investigation will begin as to how community technology and community building can work in concert.

Conclusion

In this paper, I established the theory of sociocultural constructionism – a synthesis of the theories of social constructionism and cultural constructionism, that is rooted in the theory of constructionism. Constructionism is a theory of about learning based on Papert's belief that "better learning will not come from finding better ways for the teacher to instruct, but from giving the learner better opportunities to construct" (Falbel, 1993). Constructionism synthesizes the constructivist and sociocultural perspectives on learning.

Sociocultural constructionism extends the constructionist paradigm, and argues that individual and community development are reciprocally enhanced by independent and shared constructive activity that is resonant with both the social setting that encompasses a community of learners, as well as the cultural identity of the learners themselves. Social constructionism can inform efforts to engage individuals and communities with technology in a way that achieves social and cultural resonance.

To explicate a methodology and operationalizing this approach, I have drawn from the literature on community building and the practice of asset-based community development. Asset-based community development assumes that neighborhood revitalization starts with what is already present in the community – not only the capacities of residents as individuals, but also the existing commercial, associational and institutional foundation. It is a technique that is internally focused and seeks to identify the core interests of various community constituencies. It is also an approach that is relationship driven, and endeavors to increase the community's social capacity toward positive and sustainable change. Here, I have argued that an asset-based approach to community technology and community building can be effective in achieving a social and cultural resonance that truly addresses the needs of residents and the broader community. Such an approach promotes community members as active, rather than passive, participants in the process.

Finally, I have described a research project that is currently underway at a predominantly African-American, low-income, housing development in Roxbury, Massachusetts, in collaboration with the MIT Media Laboratory and the MIT Department of Urban Studies and Planning, to investigate the effectiveness of this approach in achieving social and cultural resonance. It is expected that the sociocultural constructionist framework, coupled with an asset-based approach to community technology and community building, will be successful in guiding our efforts, and future efforts, to bridge the digital divide.

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