Using the User-Design Research for Building School Communities

Alison A. Carr-Chellman and Michael R. Savoy

Abstract

This article examines the construct of user-design and a variety of its manifestations as it is related to the school community. We look at user-design, borne primarily from the roots of interface design and Scandinavian user-participation and extend this conversation to include literatures from learner-centered design, emancipatory design, stakeholder participation, and systems theory. We also examine several related strands of research from participatory action research to critical theory and constructivism. This work is meant to help inform school community leaders and practitioners as they think about standard ideas of stakeholder participation. It is meant to help extend this thinking to include broader, more emancipatory ways of engaging all the users of our systems.

Keywords: user-design, stakeholder, design, group processes, and involvement.

Introduction

"Knowledge and human power are synonymous."

Sir Francis Bacon

The purpose of this article is to describe the state of research and theory in user-design and connect this foundation to school community interests. In recent decades the importance of the learner and user has increased considerably,

and attention paid to stakeholder participation in school community relations has been on the rise. However, one closely related area of research and theory has not been carefully explicated, namely user-design, including its potential contributions to engaging whole communities in the design of their own systems of human learning.

Traditional reform efforts and work with school communities has often taken the form of new initiatives being diffused by select leaders or administrators, or mandated change coming from public policy decisions most often made at the state or district levels. Because of this traditional innovation flow, front-line users in school districts such as teachers, learners, parents, business partners, and community members are often faced with acceptance or rejection as their only options in response to new ideas being introduced into their schools. This has led to some innovations being less than acceptable or usable, and rarely are they effectively implemented. The instructional sciences have not been exempt from this type of one-sided, often-unsuccessful *diffusion* of innovation. The experts' and practitioners' frustrations with the lack of relevant, useful results has led to more collaborative efforts to design, develop, implement, and benefit from reform processes and products.

In this paper, we use the term "design" to indicate school change and reform; we tend to prefer the term design because design, as creation, is not as grounded in the current status quo system of education and learning. The paper outlines a clear definition for user-design, ties it to a number of foundations and related disciplines, and finally suggests ways in which these ideas might be utilized by the school community practitioner.

What Is User-Design?

The engagement of end users in the creation of new artifacts is not an entirely new concept. For example, the architect works closely within the boundaries of what the end user wants, needs, and hopes for their new home while lending his expertise to the project (Hooper, 1986). In contrast, many school leaders have not traditionally consulted with the broadest possible set of stakeholders. In a traditional educational reform model, a problem is identified and solutions are generated (Rogers, 1995). Sometimes this takes the form of administrator initiated or state mandated policy changes such as the standards movement. A given solution is then negotiated with *opinion leaders* and eventually imposed on the end users or learners (Rogers). In most cases these processes lead toward something being done *to* rather than *with* the school community.

User-design, in contrast, empowers the users to authentically engage in the decision-making process that *is* design. In this case, the end users are empowered to play a central role in the creation of their own systems.

User-design, when applied to educational change, represents a dramatic shift in power dynamics from traditional approaches (A. A. Carr, 1997; Reigeluth, 1996). In traditional diffusions of innovations, the reformer analyzes, creates, and negotiates; the leaders initiate, approve, and decide. Unfortunately, the users are left to accept or reject the innovation, and much literature has focused on better and better ways to encourage adoption or compliance from the end users (Evans, 1996; Rogers, 1995; Valente & Davis, 1999). This approach, however, ignores savvy users who realize that they are being, in large part, controlled by the negotiated agenda of the designer and the administrator. Typically, those products or processes which are truly designed by users tend to build ownership among users and create a significantly different adoption process than is typical of more manipulative (Rogers, 1995) models of innovation adoption. Rogers' approach, or the "colonial" approach to design and diffusion has been critiqued because of the disempowerment of users and the lack of respect afforded indigenous knowledge (Carmen, 1990; Yapa, 1996a, 1996b). This traditional approach is deficient in terms of the robustness necessary given the variability of many current contexts (Larsen & McGuire, 1998). Thus, in user-design, actions such as initiation, approval, rejection, design, and decision making are negotiated among the users, designers, and leaders.

In general, we can say that the literature on stakeholder participation, which may be the closest link in the school community discipline, tends toward empowerment, particularly of specific populations such as teacher empowerment (Bauch & Goldring, 1998; Midgley & Wood, 1993; Romanish, 1993) or parent empowerment (Cochran & Dean, 1991; Comer & Haynes, 1991; Delgado-Gaitan, 1991; Pena, 2000). However, these examples, while they attempt to take stakeholder involvement to the empowerment level, continue to rely on approval and negotiation among leaders and school administrators.

Though user-design has empowering potential, many users still need a little convincing. Ehn (1993) interprets Ackoff (1974) as concluding that three conditions are necessary for users to be motivated to participate in design efforts. "(1) it makes a difference for the participants, (2) implementation of the results is likely, and (3) it is fun" (p. 74). Ehn further states that user-design not only means users being involved in design, but also the designers participating in its use. Designers must be more than outside researchers, consultants, or even facilitators. They must be users as well, thereby increasing their stake in the effectiveness of the design process and eventual product. In addition, where designers are users, power differentials are increasingly mitigated.

One important distinction to make with regards to defining user-design is what it is NOT. It is not the practice of increasing "user involvement in acquiring, maintaining and manipulating essential institutional data" for the purpose of "incorporating user input into systems design and development" (Hurley & Lipp, 1980). It is also not user-based (Abels, 1997) design in which focus groups and questionnaires are used to gather user perspectives for application to the design of systems. While these approaches are good strategies for soliciting input and garnering user support, they rarely significantly change what school leaders do.

Thus, user-design embraces the conflict inherent in power dynamics present in most organizations and social systems and brings this conflict into clear relief by engaging users in empowered decision making through design. User-design is, however, perhaps not quite so clear as this definition suggests. Rather there are a variety of levels of user-engagement that encompass several levels of user-design and empowerment. This next section addresses these levels and sub-levels of user participation, including user-design.

Types of User-Participation

Noyes and Baber (1999) define *user* as the "human component" of design. However, this definition gives no detail as to who actually uses and/or benefits from the designed product or process. It also does not define the level of knowledge these users possess. User-participation occurs in various ways depending on the context, participants, resources, and intentionality with which user-engagement is proscribed. There is much confusion about the differences between *levels* of user participation, that is, user-centered, learner-centered, student-centered, user-design, etc. While some researchers make no distinction between sub-levels of user-centered design (Sugar, 2001), others distinguish between user-centered and user-participation (Salvo, 2001), and some clearly define various levels of user-design (Schulze, 2001).

Regardless of the sub-level of user-design, the designer and/or leader typically determines the extent to which users are engaged in the creation of their own systems. Thus, grassroots movements (Jackson, 1993; Merrifield, 1993; Olson, 1990) are infrequently possible. Because the leader typically maintains power in most organizational contexts, including most schools, and is usually uncomfortable giving it up, true user-participation requires a different perspective on organizational structure and radically different communication systems.

Perhaps the best way to understand the types or sub-levels of user-design is to array these levels of user-participation on a continuum of empowerment

(see Figure 1). A few of the associated researchers and theorists are listed under each design model.

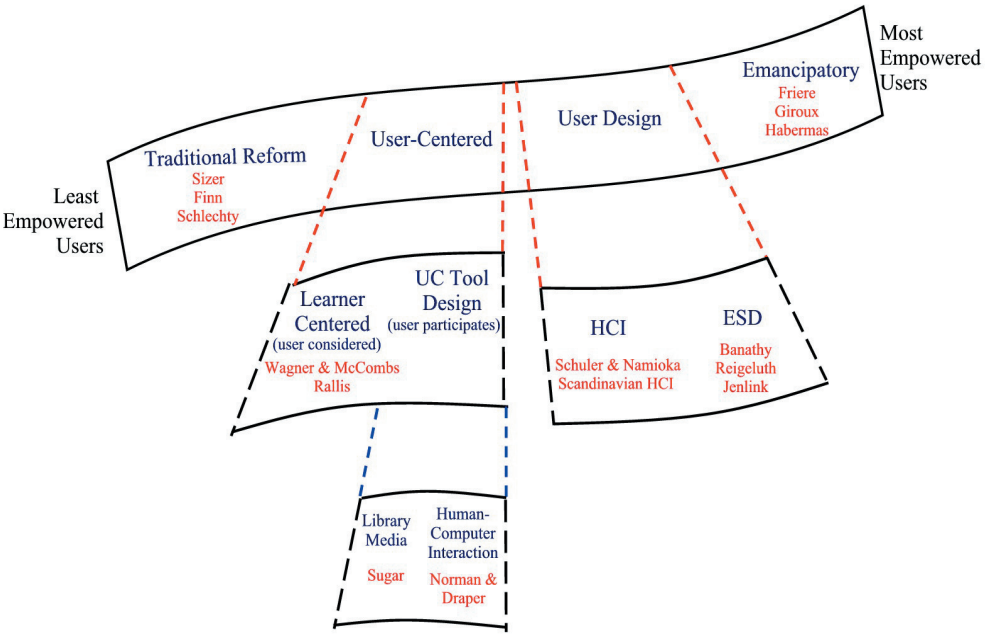

Figure 1. Continuum of empowerment.

User-centered Design

In earlier work, we distinguished broadly between user-*centered* design and user-design (A. A. Carr, 1997). In that earlier work, user-centered design and learner-centered design are used synonymously. However, for the purposes of clarity, we can divide user-centered design into two broad groups of models and corresponding literature. The first is primarily concerned with learners, while the second is more concerned with end-users. In general, the learners are primarily engaged in structured or semi-structured learning experiences while end-users are engaged in tool use. We explore learner-centered design first and then user-centered tool design second, distinguishing between user-centered tool design for human computer interfaces and for library media tools.

Learner-centered Design

In traditional educational situations, the teacher defines what the learner will learn based on external mandates from, for example, curriculum and assessment standards. Consideration of the learner is given through pretests, learner analyses, and sensitivity to individual learner differences; however, the learner does not actually have a *say* in what, when, how, and to what extent they learn. Learner-centered design differs from other types of user-design in that the focus is on learning and pedagogy rather than tool use, as is the case in Human Computer Interface design. Learner-centered design emanates from learner-centered psychological principles (American Psychological Association, 1993), particularly those associated with metacognition, cognition, affective, developmental, and social psychology. Perhaps the most well known theorist to extend learner-centered principles from situated cognition (Brown & Duguid, 1994), constructivism (Duffy, Lowyck, & Jonassen, 1993; Jonassen, 1999), and systems theories (Banathy, 1973, 1996; Senge, 1990) was Barbara McCombs (2001; McCombs & Whisler, 1997).

Learner-centered design encourages active collaboration and engaging learners "as active participants in the generation of learning plans" (Wagner & McCombs, 1995, p. 33). In the current literature on learner-centered research, there is little discussion of the shifts in power that are necessary to engage learners in substantive ways. All things should focus on successful outcomes for the learner rather than extraneous concerns such as administrator desires, contextual cues, or resource limitations. This position argues that learners ought to be afforded a serious opportunity to influence their own learning (Wagner & McCombs) by taking a more active role.

In terms of empirical studies in the area of student-centered or learner-centered environments, there are a number of strands of research. The seminal author in this area is McCombs. She has four studies in particular which indicate positive findings for learner-centered classrooms (Daniels, Kalkman, & McCombs, 2001; McCombs, 2001; McCombs & Quiat, 2000; Weinberger & McCombs, 2001). The remainder of empirical studies on learner-centered approaches can be loosely broken down into two categories: studies which examine teacher philosophies/perceptions/abilities toward learner-centered classrooms (Paris & Combs, 2000; Williams, 1996) and studies which examine specific learning outcomes as a result of learner-centered classrooms (Jackson, Stratford, Krajcik, & Soloway, 1996; Nelson, 1999; Ruiter, 1971; Smrekar, 1997; Soloway et al., 1996). Salisbusy-Glennon, Gorrell, Sanders, Boyd, and Kamen (1999) examined an entire school which was implementing learner-centered philosophies. In this case, a large-scale, multi-method study looked at the effects of learner-centeredness on sixth and seventh graders in

an urban middle-class school. The study found that certain self-regulation strategies such as seeking, organizing, and transforming information were used more often than memorizing, self-evaluation, and record-keeping for those in the learner-centered school. Taken together, the studies on learner-centered learning are hopeful, encouraging, and positive with regards to using learner-centered approaches. They tend to use a variety of methods and find that teachers and learners, in proper mindset and in proper contexts, can make learner-centered approaches work well. However, turning learning entirely or primarily over to the learner is still not a part of this dialogue.

Tool Usage

The application of user-design principles to the creation of artifacts and tools for human productivity (Sugar & Boling, 1995) has primarily been utilized in two areas, Human Computer Interface Design (Norman & Draper, 1986) and library media use (Fidel, 1994; Morris, 1994; Wilson, 1995). Where school community practitioners are concerned, this represents one of the richest resources for understanding how stakeholders and users can be considered in the creation and design of their own systems of human learning, particularly where educational technology and school libraries are concerned.

Human computer interfaces

User-design for the creation of computer-based tools has focused more on the "how to" (work with users) than learner-centered models (Muller & Czerwinski, 1999; Soloway & Pryor, 1996). However, most user-centered design literature maintains power in the hands of designers. Sugar & Boling (1995) advocate for early user engagement and iterative processes to most effectively represent user desires in final products. Norman's edited text on *User-centered Systems Design* (Norman & Draper, 1986) seems to focus primarily on how best to engage users in the creation of their own systems. For example, the chapter by Riley (1986) focuses on what fundamental understandings users need to have in order to effectively engage with designers.

Media usage

In the case of library media usage, user-centered design has primarily meant conducting user surveys in order to better design the library resources and systems for patrons' use (DeCandido, 1997; Rockman, 1980; Wilson & Arp, 1995). Starting in the mid 1980's, information retrieval methods were increasingly influenced by advancements in technology (McCandless et al., 1985). These advancements coincided with library/media center users wanting information systems that were characterized by easy, adaptive, user-friendly interfaces and navigation tools (Payette & Rieger, 1998). These systems needed to

be suitable for novice technology users and handicapped individuals, as well as the typical library patron. This stream of research is, however, only tangentially related to what user-centered design for instructional purposes has meant. User-centered design for instructional systems has been more closely aligned with Donald Norman's understanding of design for human computer interfaces (1983, 1989).

Emancipatory Design

Emancipatory design models take the mission of empowerment beyond user-design. The emancipatory reform team hopes to inspire transformation, to alter some significant and often historically intractable aspect of society. The goal of emancipatory design is more to create change and vest the users in organizational outcomes than to actually create a working educational system. Emancipation as applied to action in the form of education or design emanates from Paolo Freire's work with Chilean illiteracy (Freire, 1970). It was Freire's contention that knowledge, collaboratively constructed, is the key to changes in practice. He asserted that research itself is a project of social change and his ideas were extended to the popular education movement (Morrow & Torres, 2002) in South America during the 1960s and 70s (I. C. Carr, 1990; Gerhardt, 1986; Melo & Benavente, 1978). Thus, emancipatory ideas have been used in education and research, but only rarely in design activities. Designers have been more interested in the creation of implementable, cost effective artifacts than in the ways those artifacts may serve to free oppressed populations.

In both the case of user-design and emancipatory design, the payoffs for the school community are tertiary rather than primary or even secondary; the rewards are usually greater for the users than the leaders. There exists little in the way of literature on what we are calling emancipatory design. This is quite possibly because it brings into sharp focus the conflict between users and designers. It may be seen as highly impractical, particularly in school communities where there is often clear conflict between teachers and administrators, parents and teachers, or the overall community. In such cases, user groups are unable to come to any extent of consensus on what schools should be, what should be learned, and what the purpose of education in society is. In the case of emancipatory design, the users are in charge; their power, their indigenous knowledge, is *more* powerful and respected than that of the expert. Therefore, the extent to which the school community flourishes and succeeds is the extent to which school users flourish and succeed. Because of this positionality, emancipatory design draws heavily on critical theories, which have as their central focus who benefits and who is disempowered by any innovation, policy, or product (Horkheimer & Adorno, 2002).

Where Does User-Design Come From?

The foundations of user-design research and theory are drawn from a wide variety of philosophical stances, research traditions, and theoretical perspectives. Considerable work has already been done to explicate many of these foundations, though their relationship and contribution to the aims of user-design have not been drawn. The purpose of this section is to briefly describe the foundations of user-design models and to indicate their relationships and contributions to the discipline of user-design, broadly defined.

Scandinavian User-Design

Scandinavian researchers have a long history of user-centered design, user-design, and emancipatory design literature. Their active involvement of users in systems development traces back two decades or more (Bansler, 1989; Bødker, 1996). Schuler & Namioka (1993) set out the Scandinavian roots of user-design as they apply to the creation of information technology interfaces. Scandinavian participatory design research not only focuses on improved product development as a result of user participation, but also the political structure between management and labor. However, the Scandinavian work force is characterized by high education levels, strong unions, and laws regulating management/union relations. Certainly Schuler & Namioka's text *Participatory Design: Principles and Practices*, is one of the seminal texts in the field. While their primary emphasis is on human computer interface tool use, many of the ideas are useful for stakeholder-based educational reform. Perhaps one of the best reviews of research in Scandinavian user-design is offered by Bjerknes & Bratteteig (1995), who focus primarily on the relationship between users and administrators and the inherent contextual issues that are defined by user-design. They trace the roots of user-design back to a series of research projects involving trade unions and define two strategic perspectives—conflict or harmony. In this case, Bjerknes & Bratteteig suggest that the conflict perspective recognizes the inherent contextual conflict between users/labor and administration/employers and calls on the researcher to work on behalf of the less powerful (that is the users, labor, or employees) to empower them. The harmony perspective suggests that all are working for the betterment of the organization and so all interests are aligned rather than being oppositional. Growing out of this review is a careful explication of the relationship of critical theory, democracy, and social change.

The vast majority of Scandinavian user-design research has focused on human computer interface (HCI) and tool design, although there has been some

work looking specifically at work contexts and the design of jobs for democracy (Elden, 1979). In fact, the Scandinavian cultures take the user-design process so seriously that in some cases, such as Denmark employment law and the Norwegian Worker Protection and Working Environment Act, it has been legislated (AML, 1977; Norrbom, 2001; Otten, 1991). The relationship between Scandinavian user-design research and the application of user-design is still quite limited. Very few school community scholars are utilizing (we suspect they may be unaware of) the Scandinavian HCI research on engaging users. However, we believe there is a natural extension from user-design to stakeholder participation, and that the user-design literature can therefore inform our practices with school communities. Thus user-design, as a relatively new model for the school reform field, embraces the somewhat unknown Scandinavian models for user-design of interface tools. Conceptually, the Scandinavian research on user-design typically creates more diametrically opposed forces between users and administrators. While Carr (1997; in press) recognizes the inherent power shifts necessary for effective user-design, Scandinavian researchers tend more toward a deconstruction of the social context of work in an effort to uncover the inherent conflicts as obstacles to user engagement.

Stakeholder Participation

User-design extends stakeholder involvement beyond mere input to create empowered users who have design and decision-making powers. However, links to stakeholder participation literature and research is an important foundation for user-design. Enacting substantive change requires more than a mere open invitation to stakeholders to participate. Each unique situation determines who the users are, and each user has a different experience and knowledge level. Understanding the ways in which leaders can enable stakeholders to take a decision-making role in the design of their own systems of human learning is the next step toward effective school community relations. In the most effective cases of both user-design and stakeholder participation, control percolates from the bottom up. Grassroots movements, while rare, are perhaps our strongest cases of true user-design built on the foundation of effective stakeholder participation. Kevin Kelly (1994) describes the problem of control over distributed systems (such as most social systems) by equating this problem to the example of bees in a hive. He asserts that within social systems where everything is connected to everything else (a lesson we are rapidly learning firsthand in the global economy of today), things happen quickly and "simply route around any central authority" (p. 469). Stakeholder researchers have, for some time, realized that stakeholder participation is one way to

stem ineffective implementation of innovations due to this "routing around" authority.

User participation, as with stakeholder participation, becomes more complex as the size of the system involved increases. For example, stakeholder research informs us that successful participation requires multi-level and multi-stake participation (Daresh, 1992; Stevenson & Pellicer, 1992). This means that for something as complex as a school system, for example, stakeholders from teachers to administrators, from community members to parents must engage in the design or participation processes at many levels including classroom, school building, district, and even state level policy-making. Stakeholder participation theory and research offers the user-designer a number of similar lessons about effective implementation of empowering methods (Berube, 1970; Cooper, 1992; Davies, 1981; Epstein, 1997; Fantini, Gittell, & Magat, 1970; Sarason, 1995). In general, the findings of the empirical research studies in stakeholder participation tend to point to positive, effective uses of stakeholders as sources of information, but this is more in the user-input vein than the user-design vein of change. That is, few cases of real decision making power accorded to stakeholders are present.

Systems Design/Systems Theory

Systems theory is one of the cornerstone foundations of user-design (Mingfen, 2000). There are many reasons for this connection. First, systems theory embraces certain underlying tendencies of user-design such as holism, interconnectedness, interdependencies, and respect for indigenous knowledge. Another reason why user-design and systems design are linked is because truly effective utilization of user participation requires that users understand how the system *they* are a part of works. For example, a school community team charged with making decisions about a new math curriculum will have a difficult time making realistic recommendations unless they fully understand the interconnections of the math curriculum with other curricular systems.

Educational systems theories (Banathy, 1991; Jenlink, 1995; Reigeluth & Garfinkle, 1992), specifically, share many of the fundamental values of user-design such as the importance of engaging users in the design of their own systems rather than devising ways to convince them to accept experts' designs. Social systems theories have always embraced the "softer" side of understanding wholes (Checkland, 1999). Unlike their counterparts in hard systems theories (Rapoport, 1986; von Bertalanffy, 1968), social systems theorists have fought long and arduous battles to forward the agenda of a valued systems theory—one that values humans placed in a post-Cartesian context.

While some of the ideas of hard systems theories are applicable to user-design, for example living systems, (Miller, 1978), liberating systems theory (Flood, 1990), and dynamical systems (Jantsch, 1980; Prigogine & Stengers, 1984), most of the commonalities are drawn from social systems or soft systems methodologies (Checkland, 1999; Churchman, 1968). These methodologies address issues associated with human activity systems and problems of change, design, and adoption/implementation in instrumental ways for the user-designer.

An example of the ways in which systems theories enlighten a specific communication problem may illustrate this connection. Dissemination of information across open systems boundaries calls for translations from researcher or design expert to user or stakeholder. Understanding system boundaries, permeability, interdependencies, and interconnections among the subsystems and suprasystems in question is necessary for effective communication in the case of a researcher trying to communicate her findings to a practitioner-based audience. User participation reduces the need for efficient and accurate translations by one source in order for the relevant information to be carried throughout the system.

What Other Literature Is Related to User-Design?

Participatory Action Research (PAR)

Traditional research has been value neutral (Denzin & Lincoln, 1994). The ethics of research and researcher were not in question and research was not linked to some sort of social action. User-design is best informed by certain types of research models which tend to engage participants in more powerful ways. Participatory action research (PAR) is one such model. PAR is research with a purpose, in context, to improve an organization with practical applications (Whyte, 1991). It is collaborative research where the "community" is in control (Stoecker, 1999). PAR makes research more accessible to those being studied and distributes knowledge to the academic researcher as well as the participants. Knowledge becomes a tool for fighting oppression. PAR empowers those that have traditionally had research done to them instead of actually participating in the design, implementation, and subsequent application of the results of research. The oppressed transform their own environment with the traditional researcher playing a supporting role (Rahman, 1993).

We recognize the realities of empirical research as it is tied to policy making. This leads us to suggest that while the methods that are most appropriate for user-design inquiry are qualitative, particularly participatory action research

(PAR), more traditional empirical studies such as controlled experiments may be useful for public meetings and policy decision making. However, in general, we feel that these studies, for example, comparing pre- and post-test scores, are not really getting at the critical issues associated with user-design implementation.

Critical Theory

Critical theory positions itself as oppositional to the modernist interpretations of life as equal, fair, and democratic for all. The main aim of critical theory is to uncover the "contradictions, social inequalities, and dominances" (Nichols & Allen-Brown, 1996, p. 226) in which grand narratives remain unquestioned. Educational critical theorists like Henry Giroux (1992), Mike Apple (1986; 1988; 1990) and Hank Bromley (1992) have continually challenged the status quo with questions such as who benefits, who is hurt, and what are the economic implications of a given policy or innovation? Critical theory attempts to examine an innovation, a policy, even a current cultural state from as many angles as possible—most frequently privileging the perspectives of indigenous and disempowered populations. This privileging is certainly ideologically aligned with the basic values of user-design.

Critical theory is particularly well suited to the user-design project for several reasons. First, action research is a central foundation for critical research and it is also, as we've stated above, a favored way to research user-design (Carr-Chellman, Cuyar, & Breman, 1998). Second, several Habermasian assertions are clear theoretical foundations for user-design (Habermas, 1984, 1987, 1990), including the lack of coercion for rational participation of stakeholders, a holistically structured knowledge, and the rejection of "an elitist splitting off of expert cultures" (Habermas, 1987, p. 330). Finally, Postmodernism in particular, as one branch of critical theory, is concerned with power shifts and the "dethronement of the authority" (McLaren, 1994, p. 196). User-design is essentially built upon similar ideas of questioning, critique, and power shifts.

Constructivism

Constructivism (Duffy et al., 1993; Jonassen, 1994) has been a significant influence on classroom practice over the past decade. For constructivists, learning in context, socially negotiated, is of paramount import. As in user-design, the learner is actively engaged, not a passive recipient of his learning. The idea of multiple perspectives (Duffy & Cunningham, 2001) which are continually negotiated (Rorty, 1991) is akin to the basics of Scandinavian user-

design. These ideas, in particular, offer significant and important lessons for the user-designer interested in negotiating, for example, the extremely diverse and multiple, even oppositional, perspectives of users of the public welfare system, the health care system, or the public education system.

Conclusion

This article has reviewed the basic theoretical foundations and related disciplines surrounding user-design as it can be applied to the school community. Our hope is that practitioners and scholars concerned with stakeholder participation of all sorts, building school community relations, and building bridges between, to this point, disparate school user groups will find the user-design literature helpful in thinking about ways that the school community can be improved. There are many examples of ways in which learning about user-design, emancipatory user engagement, and even human computer interface design may assist with the creation of stronger school communities. For example, lessons from the Scandinavian literature may help to inform school community practitioners as they embark on a parent advisory team formation and engagement. There are, naturally, a number of obstacles that arise whenever school community bridges are built; many of these have been well documented elsewhere. In addition, some of the warnings among the user-design community may be well heeded by the school community practitioner. The primary obstacle in both cases is no doubt the problem of power and the reticence of the powerful to engage users in decision making (A. A. Carr, 1997). The tendency to categorize all users into a monolithic group possessing a single set of characteristics, desires, and stakes in the outcome of reform projects is another important obstacle. From the human computer interface literature we learn about obstacles such as user motivation, apathy, user identification, communication, value conflicts, user access, obtaining user feedback, and implementing user feedback effectively (Grudin, 1993). Thus, the foundations of user-design can be an important source of information for those engaging in school community efforts in many ways from strategies to obstacles. While the theories and research in stakeholder participation and school community relations are rich, broad, and varied, careful consideration of user-design literature can only strengthen our attempts to build stronger school communities.

References

Abels, E. G. (1997). *The development and implementation of user-based design process in web site design*. Report to Disclosure, Inc.

Ackoff, R. L. (1974). *Redesigning the future: A systems approach to societal problems*. New York: Wiley.

American Psychological Association. (1993). *Learner-centered psychological principles: Guidelines for school redesign and reform* (ERIC Document Reproduction Service No. ED371994). Washington, DC: Presidential Task Force on Psychology in Education.

AML. (1977). *Law of workers' protection and working environment*. Oslo, Norway.

Apple, M. W. (1986). *Teachers and texts: A political economy of class and gender relations in education*. New York: Routledge.

Apple, M. W. (1988). Teaching and technology: The hidden effects of computers on teachers and students. In L. E. Beyers & M. W. Apple (Eds.), *The curriculum: Problems, politics, and possibilities* (pp. 289-311). New York: SUNY Press.

Apple, M. W. (1990). *Ideology and criticism*. New York: Routledge.

Banathy, B. H. (1973). *Developing a systems view of education: The systems-model approach*. Belmont, CA: Siegler/Fearon Publishers.

Banathy, B. H. (1991). *Systems design of education: A journey to create the future*. Englewood Cliffs, NJ: Educational Technology Publications.

Banathy, B. H. (1996). *Designing social systems in a changing world*. New York: Plenum Press.

Bansler, J. (1989). Systems development research in Scandinavia: Three theoretical schools. *Scandinavian Journal of Information Systems, 1*, 3-20.

Bauch, P. A., & Goldring, E. B. (1998). Parent-teacher participation in the context of school governance. *Peabody Journal of Education, 73*(1), 15-35.

Berube, M. (1970). Community control: Key to educational achievement. *Social Policy, 1*(2), 42.

Bjerknes, G., & Bratteteig, T. (1995). User participation and democracy: A discussion of Scandinavian research on system development. *Scandinavian Journal of Information Systems, 7*(1), 73-98.

Bødker, S. (1996). Creating conditions for participation: Conflicts and resources in systems development. *Human-Computer Interaction, 11*(3), 215-236.

Bromley, H. (1992). Culture, power, and educational computing. In C. Bigum & B. Green (Eds.), *Understanding the new information technologies in education: A resource for teachers*. Geelong, Australia: Deakin University Press.

Brown, J. S., & Duguid, P. (1994). Borderline issues: Social and material aspects of design. *Human-Computer Interaction, 9*, 3-36.

Carmen, R. (1990). *Communication, education and empowerment* (ERIC Document Reproduction Service No. ED362649). Manchester, England: Manchester University Centre for Adult and Higher Education.

Carr, A. A. (1997). User-design in the creation of human learning systems. *Educational Technology Research and Development, 45*(3), 5-22.

Carr, I. C. (1990). The politics of literacy in Latin America. *Convergence, 23*(2), 50-68.

Carr-Chellman, A. A. (in press). Power, expertism, and the practice of instructional design: Empowering the users. In G. J. Anglin (Ed.), *Instructional technology: Past, present and future*. Englewood, CO: Libraries Unlimited.

Carr-Chellman, A. A., Cuyar, C., & Breman, J. (1998). User-design: A case application in health care training. *Educational Technology Research and Development, 46*(4), 97-114.

Checkland, P. (1999). *Systems thinking, systems practice*. West Sussex: John Wiley & Sons.
Churchman, C. W. (1968). *The systems approach*. New York: Delacorte Press.
Cochran, M., & Dean, C. (1991). Home-school relations and the empowerment process. *The Elementary School Journal, 91*(3), 261-269.
Comer, J. P., & Haynes, N. M. (1991). Parent involvement in schools: An ecological approach. *The Elementary School Journal, 91*(3), 271-277.
Cooper, B. S. (1992). A tale of two cities: Radical school reform in Chicago and London. In J. J. Lane & E. G. Epps (Eds.), *Restructuring the schools: Problems and prospects*. Berkeley, CA: McCutchan Publishing Corporation.
Daniels, D. H., Kalkman, D. L., & McCombs, B. L. (2001). Young children's perspectives on learning and teacher practices in different classroom contexts: Implications for motivation. *Early Education and Development, 12*(2), 253-273.
Daresh, J. C. (1992). Impressions of school-based management: The Cincinnati story. In J. J. Lane & E. G. Epps (Eds.), *Restructuring the schools: Problems and prospects*. Berkeley: CA: McCutchan Publishing Corporation.
Davies, D. (1981). Citizen participation in decision making in the schools. In D. Davies (Ed.), *Communities and their schools* (pp. 83-119). New York: McGraw-Hill.
DeCandido, G. A. (1997). *After the user survey, what then? Issues and innovations in transforming libraries*. Washington, DC: Systems and Procedures Exchange Center.
Delgado-Gaitan, C. (1991). Involving parents in the schools: A process of empowerment. *American Journal of Education, 100*(1), 20-46.
Denzin, N. K., & Lincoln, Y. S. (1994). Introduction: Entering the field of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*. Thousand Oaks, CA: Sage Publications.
Duffy, T. M., & Cunningham, D. J. (2001). Constructivism: Implications for the design and delivery of instruction. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology*. Mahway, NJ: Lawrence Erlbaum Associates.
Duffy, T. M., Lowyck, J., & Jonassen, D. H. (1993). *Designing environments for constructive learning*. Berlin: Springer-Verlag.
Ehn, P. (1993). Scandinavian design: On participation and skill. In D. Schuler & A. Namioka (Eds.), *Participatory design: Principles and practices*. Hillsdale, NJ: Lawrence Erlbaum Associates.
Epstein, J. L. (1997). *School, family, and community partnerships: Your handbook for action*. Thousand Oaks, CA: Corwin Press.
Evans, R. (1996). *The human side of change: Reform, resistance, and the real-life problems of innovation*. San Francisco: Jossey-Bass.
Fantini, M., Gittell, M., & Magat, R. (1970). *Community control and the urban school*. New York: Praeger Publishers.
Fidel, R. (1994). User-centered indexing. *Journal of the American Society for Information Science, 45*(8), 572-576.
Flood, R. L. (1990). *Liberating systems theory*. New York: Plenum Press.
Freire, P. (1970). *Pedagogy of the oppressed* (M. B. Ramos, Trans.). New York: Seabury Press.
Gerhardt, H. P. (1986). *Brazil's popular education in the eighties: Essentials, fundamentals and realpolitik.* (ERIC Document Reproduction Service No. ED291877)
Giroux, H. A. (1992). Educational leadership and the crisis of democratic government. *Educational Researcher, 21*(4), 4-11.
Habermas, J. (1984). *The theory of communicative action: Vol. 1, Reason and the rationalization of society*. Boston, MA: Beacon.

Habermas, J. (1987). *The theory of communicative action: Vol. 2, Lifeworld and system: A critique of functionalist reason*. Boston, MA: Beacon.

Habermas, J. (1990). *Moral consciousness and communicative action*. Cambridge, MA: MIT Press.

Hooper, K. (1986). Architectural design: An analogy. In D. A. Norman & S. W. Draper (Eds.), *User centered system design: New perspectives on human-computer interaction*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Horkheimer, M., & Adorno, T. W. (2002). *Dialectic of enlightenment: Philosophical fragments* (E. Jephcott, Trans.). Stanford, CA: Stanford University Press.

Hurley, D. E., & Lipp, M. E. (1980). A method for gathering user input to achieve a successful design system. *Cause/Effect, 3*(3), 22-27.

Jackson, S. L., Stratford, S. J., Krajcik, J. S., & Soloway, E. (1996). *Model-it: A case study of learner-centered software design for supporting model building* (ERIC Document Reproduction Service No. ED446903). Arlington, VA: National Science Foundation.

Jackson, T. (1993). A way of working: Participatory research and the aboriginal movement in Canada. In P. Park, M. Brydon-Miller, B. Hall, & T. Jackson (Eds.), *Voices of change*. Westport, CT: Bergin & Garvey.

Jantsch, E. (1980). *The self-organizing universe: Scientific and human implications of the emerging paradigm of evolution*. New York: Pergamon Press.

Jenlink, P. M. (1995). *Systemic change: Touchstones for the future school*. Palatine, IL: IRI/Skylight Training and Publishing.

Jonassen, D. H. (1994). Thinking technology: Toward a constructivist design model. *Educational Technology, 34*(4), 34-37.

Jonassen, D. H. (1999). Designing constructivist learning environments. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. 2). Mahwah, NJ: Lawrence Erlbaum Associates.

Kelly, K. (1994). *Out of control: The rise of neo-biological civilization*. Reading, MA: Addison-Wesley.

Larsen, T. J., & McGuire, E. (1998). *Information systems innovation and diffusion: Issues and directions*. Hershey, PA: Idea Group.

McCandless, P., Clark, B., Allen, N., Kohl, D., Wallace, D., & Wert, L. (1985). *University of Illinois library: The invisible user: User needs assessment for library public services*. Washington, DC: Association of Research Libraries.

McCombs, B. L. (2001). What do we know about learners and learning? The learner-centered framework: Bringing the educational system into balance. *Educational Horizons, 79*(4), 182-193.

McCombs, B. L., & Quiat, M. (2000). *Results of pilot study to evaluate the community for learning (CFL) program*. Philadelphia, PA: Mid-Atlantic Lab for Student Success.

McCombs, B. L., & Whisler, J. S. (1997). *The learner-centered classroom and school: Strategies for increasing student motivation and achievement*. San Francisco, CA: Jossey-Bass.

McLaren, P. (1994). Multiculturalism and the postmodern critique: Toward a pedagogy of resistance and transformation. In H. A. Giroux & P. McLaren (Eds.), *Between borders: Pedagogy and the politics of cultural studies* (pp. 192-224). New York: Routledge.

Melo, A., & Benavente, A. (1978). *Experiments in popular education in Portugal* (ERIC Document Reproduction Service No. ED182086).

Merrifield, J. (1993). Putting scientists in their place: Participatory research in environmental and occupational health. In P. Park, M. Brydon-Miller, B. Hall, & T. Jackson (Eds.), *Voices of change*. Westport, CT: Bergin & Garvey.

Midgley, C., & Wood, S. (1993). Beyond site-based management: Empowering teachers to reform schools. *Phi Delta Kappan, 75*(3), 245-252.

Miller, J. G. (1978). *Living systems*. New York: McGraw-Hill.

Ming-fen, L. (2000). *Fostering design culture through cultivating the user-designers' design thinking and systems thinking* (ERIC Document Reproduction Service No. ED455775). Denver, CO: Association for Educational Communications and Technology.

Morris, R. C. T. (1994). Toward a user-centered information service. *Journal of the American Society for Information Science, 45*(1), 20-30.

Morrow, R. A., & Torres, C. A. (2002). *Reading Freire and Habermas: Critical pedagogy and transformative social change*. New York: Teachers College Press.

Muller, M. J., & Czerwinski, M. (1999). Organizing usability work to fit the full product range. *Communications of the ACM, 42*(5), 87-90.

Nelson, L. M. (1999). *Increasing retention of adult learners in telecourses through the incorporation of learning-centered instructional strategies and the use of multiple modalities for content delivery and interaction.* Unpublished Praticum, Nova Southeastern University.

Nichols, R. G., & Allen-Brown, V. (1996). Critical theory and educational technology. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology*. Mahwah, NJ: Lawrence Erlbaum Associates.

Norman, D. A. (1983). *Design principles for human-computer interfaces.* Paper presented at the Conference on Human Factors and Computing Systems, Boston, MA.

Norman, D. A. (1989). The electronic library: How will the user cope. *Bulletin of the American Society of Information Science, 15*(5), 8-9.

Norman, D. A., & Draper, S. W. (1986). *User centered system design: New perspectives on human-computer interaction*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Norrbom, M. (2001). Employment law in Denmark. *International Financial Law Review*, 23-25.

Noyes, J. M., & Baber, C. (1999). *User-centred design of systems*. New York: Springer.

Olson, L. (1990). 'Jury still out' on re: Learning's grassroots reform experiments. *Education Week, 10*(5).

Otten, M. (1991). Changing the workplace to fit human needs: The Norwegian Work Environment Act. *Economic and Industrial Democracy, 12*(4).

Paris, C., & Combs, B. (2000). *Teachers' perspectives on what it means to be learner-centered.* Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

Payette, S. D., & Rieger, O. Y. (1998). Supporting scholarly inquiry: Incorporating users in the design of the digital library. *Journal of Academic Librarianship, 24*(2), 121-129.

Peña, D. C. (2000). Sharing power? An experience of Mexican American parents serving on a campus advisory council. *The School Community Journal, 10*(1), 61-84.

Prigogine, I., & Stengers, I. (1984). *Order out of chaos.* New York: Bantam Books.

Rahman, A. (1993). *People's self-development: Perspectives on participatory action research*. London: University Press Limited.

Rapoport, A. (1986). *General systems theory: Essential concepts and applications*. Cambridge, MA: Abacus Press.

Reigeluth, C. M. (1996). A new paradigm of isd? *Educational Technology, 36*(3), 13-20.

Reigeluth, C. M., & Garfinkle, R. J. (1992). Envisioning a new system of education. *Educational Technology, 32*(11), 17-23.

Riley, M. S. (1986). User understanding. In D. A. Norman & S. W. Draper (Eds.), *User centered system design*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Rockman, I. F. (1980). The potential of on-line circulation systems as public catalogs: An introduction. *RQ, 20*(1), 39-58.

Rogers, E. M. (1995). *Diffusion of innovations*. New York: Free Press.

Romanish, B. (1993). Teacher empowerment as the focus of school restructuring. *The School Community Journal, 3*(1), 47-60.

Rorty, R. (1991). *Objectivity, relativism, and truth: Philosophical papers* (Vol. 1). Cambridge, MA: Cambridge University Press.

Ruiter, W. W. (1971). *An analysis of the effectiveness of a learner-centered teaching system compared to that of a conventional teaching of basic electricity to university students.* Unpublished doctoral dissertation, Oregon State University.

Salisbury-Glennon, J. D., Gorrell, J., Sanders, S., Boyd, P., & Kamen, M. (1999). *Self-regulated learning strategies used by the learners in a learner-centered school.* Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Quebec, Canada.

Salvo, M. J. (2001). Ethics of engagement: User-centered design and rhetorical methodology. *Technical Communication Quarterly, 10*(3), 273-290.

Sarason, S. (1995). *Parental involvement and the political principle*. San Francisco, CA: Jossey Bass.

Schuler, D., & Namioka, A. (1993). *Participatory design: Principles and practices*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Schulze, A. N. (2001). User-centered design for information professionals. *Journal of Education for Library and Information Science, 42*(2), 116-122.

Senge, P. (1990). *The fifth discipline: The art & practice of the learning organization*. New York: DoubleDay.

Smrekar, J. L. (1997). *The impact of learner-centered classrooms on second language learning: Communicating with educators.* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Soloway, E., Jackson, S. L., Klein, J., Quintana, C., Reed, J., Spitulnik, J., et al. (1996). *Learning theory in practice: Case studies of learner-centered design.* Paper presented at the Conference on Human Factors and Computing Systems, Vancouver, British Columbia, Canada.

Soloway, E., & Pryor, A. (1996). The next generation in human-computer interaction. *Communications of the ACM, 39*(4), 16-18.

Stevenson, K. R., & Pellicer, L. O. (1992). School-based management in South Carolina: Balancing state-directed reform with local decision making. In J. J. Lane & E. G. Epps (Eds.), *Restructuring the schools: Problems and prospects*. Berkeley: CA: McCutchan Publishing Corporation.

Stoecker, R. (1999). Are academics irrelevant? Roles for scholars in participatory research. *American Behavioral Scientist, 42*(5), 840-854.

Sugar, W. A. (2001). What is so good about user-centered design? Documenting the effect of usability sessions on novice software designers. *Journal of Research on Computing in Education, 33*(3), 235-250.

Sugar, W. A., & Boling, E. (1995). *User-centered innovation: A model for "early usability testing."* Paper presented at the annual national convention of the Association for Educational Communications and Technology, Anaheim, CA.

Valente, T. W., & Davis, R. L. (1999). Accelerating the diffusion of innovations using opinion leaders. *The Annals of the American Academy of the Political and Social Sciences, 566*, 55-67.

von Bertalanffy, L. (1968). *General system theory: Foundations, development, applications*. New York: George Braziller, Inc.

Wagner, E. D., & McCombs, B. L. (1995). Learner centered psychological principles in practice: Designs for distance education. *Educational Technology, 35*(2), 32-35.

Whyte, W. F. (Ed.). (1991). *Participatory action research*. Newbury Park: Sage Publications.

Williams, P. A. (1996). *Relationships between educational philosophies and attitudes toward learner-centered instruction.* Paper presented at the Georgia Educational Research Association, Atlanta, GA.

Wilson, L. A. (1995). Building a user-centered library. *RQ, 34*(3), 297-301.

Wilson, L. A., & Arp, L. (1995). Library literacy: Building the user-centered library. *RQ, 34*(3), 297-302.

Yapa, L. (1996a). Innovation diffusion and paradigms of development. In C. Earle, K. Mathewson, & M. Kenzer (Eds.), *Concepts in human geography* (pp. 231-270). Lanham, MD: Rowman & Littlefield.

Yapa, L. (1996b). What causes poverty? A postmodern view. *Annals of the Association of American Geographers, 86*(4), 707-728.

Alison A. Carr-Chellman is an associate professor of Instructional Systems and currently serves as the professor-in-charge of the INSYS program in the Department of Learning and Performance Systems at Penn State University. Her research interests include stakeholder participation, user-design, diffusion of innovations, systems theories, and online learning.

Michael R. Savoy is a doctoral student in Instructional Systems in the Department of Learning and Performance Systems at Penn State University. His research interests include user-design, parent/community/school communication and partnerships, professional development, and systemic change.

Correspondence concerning this paper can be addressed to Alison A. Carr-Chellman at 307 Keller Bldg., University Park, PA, 16802.