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"Communities of Practice" as an Analytical Construct: Implications for Theory and Practice

Christopher Koliba
Community Development and Applied Economics,
Master of Public Administration Program, University of Vermont,
Burlington, Vermont, USA

Rebecca Gajda
Department of Educational Policy, Research, and Administration,
University of Massachusetts, Amherst,
Massachusetts, USA

Abstract: The "community of practice" (CoP) has emerged as a potentially powerful unit of analysis linking the individual and the collective because it situates the role of learning, knowledge transfer, and participation among people as the central enterprise of collective action. The authors' surface tensions and highlight unanswered questions regarding CoP theory, concluding that it relies on a largely normative and under-operationalized set of premises. Avenues for theory development and the empirical testing of assertions are provided.

Keywords: organizational learning, knowledge management, organizational behavior, innovation

"COMMUNITIES OF PRACTIVE" AS AN ANALYTICAL CONSTRUCT: IMPLICATIONS FOR THEORY AND PRACTICE

The term "community of practice" (CoP) has been applied extensively across multiple social science disciplines and professional fields[1] and has become a widely utilized theoretical construct since it was first introduced by Jean Lave and Etienne Wenger in 1991. Although a broad spectrum of social science disciplines and professional fields utilize CoP theory, thus

Address correspondence to Christopher Koliba, Community Development and Applied Economics, Master of Public Administration Program, University of Vermont, 103 Morrill Hall, Burlington, VT 05405, USA; E-mail: ckoliba@uvm.edu

reflecting a healthy interdisciplinary interest in its application, communities of practice persists as a largely normative and under-operationalized construct (Roberts, 2006). In this article, we attempt to shed light on the origins and evolution of communities of practice and showcase how CoP theory is presently being employed. Our investigation reveals the ways in which the community of practice has come to be used descriptively, as an analytical framework, and proscriptively, as an organizational intervention. We consider the prospects for developing the community of practice as an empirically sound intermediate unit of analysis, and discuss the need for deeper theoretical development of the construct. A series of research questions intended to focus and stimulate future empirical inquiry are presented.

Although the following review of literature draws upon fields well beyond the public administration and policy studies fields, the relevance of a community of practice framework to the study of public bureaucracies, governance networks, and policy systems should become obvious to the reader. We believe the operationalization of the CoP as an empirical construct will provide researchers in public administration and policy studies with a useful framework through which to describe and evaluate organizational and inter-organizational dynamics, a line of inquiry that possesses a long and rich history within the field (Gulick & Urwick, 1937; McNabb, 2007; Novicevic et al., 2007).

COMMUNITY OF PRACTICE: ITS USES, ORGINS, AND DEFINITIONS

Lave and Wenger are credited with coining the term communities of practice in their 1991 book, *Situated Learning: Legitimate Peripheral Participation*, in which they examined how "master practitioners" and "newcomers" form apprenticeship relationships (specifically, midwives, tailors, quartermasters, butchers and recovering alcoholics) through which situated learning takes place. To Lave and Wenger,

> Learning is a process that takes place in a participation framework, not in an individual mind. This means, among other things, that it is meditated by the differences of perspective among the CoP participants. It is the community, or at least those participating in the learning context, who 'learn' under this definition. (Hanks, 1991, p.15).

Thus, the notion of community of practice was first used, "to describe the way in which meaning was negotiated and reflected on in the practices of specific occupational groups . . ." (Wesley & Buysse, 2001, p.7).

Table 1. Uses of Communities of Practice Across Social Science and Professional Disciplines

Field	Citation
Anthropology	Sassaman & Rudolphi, 2001; Bradley, 2004
Business Management	Stamps, 1997; Lundberg, 1998; Wenger & Snyder, 2000; Allen et al., 2000; Snell, 2001; Fox, 2002; Kuhn, 2002; Ashkanasy, 2002; Hung & Nichani, 2002a; Swan et al., 2002; Breu & Hemingway, 2002; Lee & Valderrama, 2003; Contu & Wilmott, 2003; Ardichvili et al., 2003; Smits & de Moon, 2004; Manville, 2004; Martin et al., 2004; Vestal & Lopez, 2004; Zook, 2004; Down & Reveley, 2004; Sense & Clements, 2007
Computer Science	Davenport & Hall, 2002; O'Hara et al., 2003; Alani et al., 2003; Henri & Pudelko, 2003; Drake et al., 2004; Preece, 2004
Education, Adult	Merriam et al., 2003; Mitchell & Young, 2004
Education, Early Childhood Development	Wesley & Buysse, 2001; Buysse et al., 2003
Education, Elementary and Secondary Education	Pugach, 1999; Maynard, 2001; Evenbeck & Kahn, 2001; Au, 2002; Burton, 2002; Hung & Nichani, 2002b; Smith 2003; Gallucci, 2003; Boud & Middleton, 2003; Wixson & Yochum, 2004; Hodkinson & Hodkinson, 2004a; Bradley, 2004; Bloom & Stein, 2004; Schlagaer & Fusco, 2004; Palincsar et al., 2004; Foulger, 2004; Wixson & Yochum, 2004; Sergiovanni, 2004; Chalmers & Koewn, 2006; Levinson & Brantmeier, 2006; Anthony, 2007
Engineering	Winsor, 2001; McMahon et al., 2004
Gender Studies	Wagner, 1994; Bergvall, 1999; Ehrlich, 1999; Freed, 1999; Holmes & Meyerhoff, 1999; Stapleton, 2001; Paechter, 2003; Mills, 2003; Levinson, 2003; Baxter & Hughes, 2004
Health Care	Katsenberg, 1998; Pereles et al., 2002; Lathlean & le May, 2002; Parboosingh, 2002; Roos, 2003; Bate & Robert, 2002; Swan et al., 2002; Gabbay et al., 2003; Zanetich 2003; Faber et al., 2003; Popay et al., 2004; Dewhurst & Navarro, 2004; Adams et al., 2005; Hara & Hew, 2007; Andrew et al., 2008
Higher Education	Mandl et al., 1996; Waddock, 1999; Blimling, 2001; Van Note Chism et al., 2002; Trank & Marie, 2002; Kwon, 2003; Ennals, 2003; Tight, 2004; Jawitz, 2007

(*Continued*)

Table 1. (*Continued*)

Field	Citation
Political Science	Torney-Purta & Richardson, 2001; Youngblood, 2004
Public Administration	Burk, 2000; VanWynsberghe, 2001; Kilner, 2002; Gabbay et al., 2003; Snyder et al., 2003; Derksen, 2003; Zanetich, 2003; de Laat & Broer, 2004; Kolbotn, 2004; Rohde, 2004; White, 2004; Dekker & Hansen, 2004; Drake et al., 2004; Fontaine & Millen, 2004; Garcia & Dorohovich, 2005; Attwater & Derry, 2005; Pavlin, 2006; Novicevic et al., 2007; Koliba & Gajda,, 2007; McNabb, 2007
Social Psychology	Mandl et al., 1996; Linehan & McCarthy, 2000; O'Brien & O'Brien, 2002; Bouwen & Taillieu, 2004
Social Work	Adams & McCullough, 2003; Crase, 2007; Gotto et al., 2007

Communities of practices can be understood phenomenologically, as relational structures that are mediated by and through the social construction of knowledge (Buysse et al., 2003; Nicolini et al., 2003). As such, they are spaces through which "communicative action" can take place (Polanyi, 2002; O'Donnell et al., 2003). Communities of practice are said to exist at the intersection of intellectual and social capital—through which social networks serve as the basis of knowledge creation and transfer (Lesser & Prusak, 2000; Daniel et al., 2002; Snyder et al., 2003; O'Donnell et al., 2003; Wenger, 2004; Rohde, 2004; Preece, 2004; McNabb, 2007). It is believed, "that communities of practice are valuable to organizations because they contribute to the development of social capital, which in turn is a necessary condition for knowledge creation, sharing, and use" (Lesser & Prusak, 2000, p. 124).

CoP theory is being employed across many social science and professional disciplines. The table below demonstrates the reach of CoP theory across the disciplines and suggests that it exists as an integrating concept, often linking the given discipline to such interdisciplinary fields as organizational learning, knowledge management, and systems theory.

The fields of anthropology, social psychology and gender studies have used the CoP framework as a means to describe and analyze the relationships between certain groups, with specific attention paid to apprenticeship relations (in anthropology) and identity formation (in social psychology and gender studies). In general, the remaining disciplines tend to use CoP theory to explore professional and organizational behavior within the context of the professions and institutions encompassed within them.

Communities of practice are also widely referenced in the literature as an integral component of a structured intervention for organizational change and

professional development. Although some have highlighted the inability to, or at least the infeasibility of, actively cultivating communities of practice (Stamps, 1997), CoPs are increasingly being considered for, and suggested as, a key strategy for systems change and professional development.

CoP theory is also being used to analyze strategic alliances and cross-sector collaborations, couched in terms of partnerships for health care (Lathlean & le May, 2002; Gabbay et al., 2003; Dewhurst & Navarro, 2004); intergovernmental collaborations (Zanetich, 2003; Drake et al., 2004; Bouwen & Taillieu, 2004); transnational government organizations (Luque, 2001; Somekh & Pearson, 2002); inter-industry alignment (Starkey et al., 2004); and networks of non-governmental organizations (White, 2004; Rohde, 2004). These studies suggest that inter-organizational networks and collaborations are fertile ground for the application of CoP theory. For the public administration and policy studies fields, in particular, the CoP can play a pivotal role in describing and evaluating how "governance" gets carried out through interpersonal dynamics within networked contexts (Koliba, 2008), and as vehicles through which governments may engage citizens, other governmental agencies, non-profits and businesses (Snyder et al., 2003; McNabb, 2007).

Although the concept of communities of practice has been used by theorists across many fields, it is arguably Etienne Wenger who has done the most to advance CoP theory. One of the aims of this article is to not only build upon Wenger's framework, but critique it as well. In order to do so we will need to clearly define the community of practice, drawing out some of the characteristics first laid out by Wenger in the process.

Wenger's Definition of Communities of Practice

> Communities of practice are 'groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.' They operate as 'social learning systems' where practitioners connect to solve problems, share ideas, set standards, build tools, and develop relationships with peer and stakeholders . . . [They] feature peer-to-peer collaborative activities to build member skills and steward the knowledge assets of organizations and society. (Snyder et al., 2003, p. 17).

Community of practice theory has come to be applied to both "intra" or "inter" organizational settings, described as "existing everywhere" as an "an integral part of our daily lives" (Wenger, 1998, p. 6,7). Wenger has taken the concept of communities of practice and extended it into a comprehensive theory of how organizations and individuals within organizations work together (1998). In his book, *Communities of Practice: Learning, Meaning, and Identity*, Wenger explores their relationships to one another (describing

organizations as essentially "constellations of communities of practice"), and examines how individual identity is shaped by one's membership and trajectories within communities of practice to which they find themselves. At the time, he also asserted that communities of practice can transcend organizational boundaries and/or exist within and across formal networks (1998, p. 30).

Drawing upon the foundation of CoP theory discussed above, we have developed the following check-list to determine if a CoP has been formed. A community of practice can be said to exist when all three criteria are met:

1. A group has formed that can be said to be comprised of members. These members share a common set of characteristics that may be compromised of similar interests, expertise, roles, goals, etc.;
2. A physical or virtual space exists for these members to interact directly with one another. Spaces can be created through the formal or informal designation of physical meeting times and places or virtually, as space for ongoing dialogue. This space affords opportunities to dialogue with one another and that this dialogue is not mediated by a third party. This space forms the basis through which a "shared repertoire" for the group can emerge;
3. The group can be said to possess a common domain, practice or set of practices.

According to Wenger (1998), all communities of practice possess certain qualities, including the characteristics of mutual engagement, joint enterprise, and a shared repertoire. Individuals in CoPs are involved in a process of "mutual engagement," which is described as the realm of relationships and ultimately, the sphere of social capital (Snyder et al., 2003; Wenger, 2004). The concept of mutual engagement hinges on the extent to which the characteristics of community, including member relationships and the nature of their interactions—levels of trust, belonging and reciprocity, etc. exist.

The second feature of a CoP is the matter of engaging in a "joint enterprise," which Wenger and his associates describe as the realm of purpose and "domain"—referring to its common purpose and the sense of members' identification with a topic or practice (Snyder et al., 2003). "Communities of practice are groups formed around a shared interest in which discussion builds on the values and motivations of their members" (O'Donnell et al., 2003, p. 83). These interests and the common purposes that are derived from them are "communally" negotiated (Wenger, 1998, p. 78). "Practice is, first and foremost, a process by which we can experience the world and our engagement within it as meaningful" (1998, p. 51). The practices that emerge from this common purpose are understood as "indigenous enterprises" that are shaped by organizational, personal, historical, societal contexts (1998, p. 79). A CoP's joint enterprises are said to be held together through "mutual accountability" (1998, p. 81), essentially the level of reciprocity that exists between and among members of a CoP.

Wenger's third feature of a CoP is the existence of a "shared repertoire," (1998, p. 82) that can be understood as the realm of tools and techniques (Snyder et al., 2003). The shared tools and techniques of a CoP are the medium through which meaning is negotiated and learning occurs. A shared repertoire can include norms of informal conversation around a lunch table or "water cooler," to a structured protocol to guide dialogue and decision-making.

ADVANCING THE EMPIRICAL DIMENSIONS OF CoPs

Considering the future of community of practice research, Hodkinson and Hodkinson have observed that, "The research task is not to see whether [CoPs] exist or not, but to identify their characteristics . . ." (2004b, p.6). They believe that an "intermediate" unit of analysis (Hodkinson & Hodkinson, 2004b) designed to bridge the individual and the organizational levels is needed. We examine how the notion of communities of practice might be construed as a discrete unit of analysis that researchers and practitioners can utilize to systematically recognize and examine inter and intra organizational behavior. In order to do this we need an empirically determinable framework through which to describe and assess the workings of all communities of practice.

Currently, communities of practice have been described almost exclusively through qualitative means, mostly through the documentation of case studies.[2] Several efforts to apply quantitative tools to CoPs have been undertaken (Baird et al., 2004; Ballard & Seibold, 2004; Dewhurst & Navarro, 2004; Smits & de Moon, 2004), most often through the use of network analysis to examine the relationships between members of CoPs and the types of domains carried out within them (Alani, et al., 2003; Alatta, 2003; O'Hare et al., 2003). Garcia and Dorohovich (2005) have gone as far as developing a set of metrics to assess the effectiveness of virtual CoPs by quantifying the number of contacts, discussion threads, and number of page views occuring with particular CoPs operating within the Department of Defense. Dube et al. (2006) have also made substantive contributions to developing a typology of CoP characters within a virtual context. We suggest that the eventual utility of CoP theory lies in the capacity of researchers and practitioners to develop the empirical dimensions of CoPs as an analytical construct and operationalize the variables that support or hinder community of practice development.

Although we found repeated calls for the development of more empirical research (Boud & Middleton, 2003; O'Donnell et al., 2003; Hodkinson & Hodkinson, 2004b; Fontaine & Millen, 2004), there have been few attempts, aside from Dube et al.'s recent efforts (2006) to systematically isolate and operationalize variables that give shape and meaning to CoPs, determine the specific conditions that foster and/or hinder CoP development, or ascertain the correlation between CoPs and the attainment of organizational outcomes.

We believe a concerted effort by theorists and researchers to define and operationalize a set of such variables will go a long way toward moving CoP theory from a set of normative assertions to empirically determined ones. These variables can include assessing CoPs in terms of:

1. the goals and relationships for learning,
2. the mode and quality of knowledge transfer,
3. the degree of formalization,
4. the strength of coupling. Under these major headings, a set of discrete characteristics or variables can be culled.

These characteristics emerge as major themes running across the CoP literature, a point to which we will turn to next.

Outcomes and Relationships for Learning

Historically, CoPs have been understood as a structure through which learning takes place. Because "practices evolve as shared histories of learning" (Wenger, 1998, p. 87), the learning enterprise and the shared repertoire that can accompany it lies at the center of CoP theory. Writing about the link between CoPs and organizational learning, Brown and Duguid observe that ". . . Lave and Wenger's research emphasizes that to understand working and learning, it is necessary to focus on the formation and change of the communities in which work takes place" (Brown & Duguid, 2000, p.145).

It is not surprising, then, to find CoP theory linked to the concept of organizational learning and workplace learning (Brown & Duguid, 1991; Gherardi & Nicolini, 2000; Brown & Duguid, 2000; Wesley & Buysse, 2001; Driver, 2002; Buysse et al., 2003; Ennals, 2003; Nicolini et al., 2003; Yanow, 2003; Starkey et al., 2004; Dewhurst & Navarro, 2004; Fontaine & Millen, 2004; Huzzard, 2004; Peltonen & Lamsa, 2004; Handley et al., 2006 Mittendorff, et al., 2006;). A major theme across this literature concerns the place of formal versus informal workplace learning as "distinctly different types of learning," with informal learning often viewed as "inherently superior" to formal learning (Hodkinson & Hodkinson, 2004b, p.2). The learning organization field places emphasis on "the effect of knowledge creation on organizational change and sense-making. From this emphasis the tendency of [organizational learning] is also to stress more the informal, subjective aspects of knowledge creation and organizing . . ." (Peltonen & Lamsa, 2004, p. 251). Within this context, CoPs are often trumpeted for their degree of "self-organization," with an underlying assumption that they somehow stave off attempts by outsiders to impose their own goals or outcomes.

CoP theory is used to articulate workplace learning when professionals' learning and reflection are considered within the context of group dynamics. CoPs can be understood within the context of explicit outcomes

or performance goals geared toward the fostering of learning and reflecting-*on*-action; or be understood as opportunities through which reflecting-*in*-action (Schon, 1983), as a tacit practice undertaken by a CoP. "Reflective practice is predicated on the assumption that knowledge is derived from professionals' own experience and observations as well as from formal knowledge gained through theory and research, and that each informs the other" (Buysse et al. 2003, p. 266). As phenomenologically constructed entities, CoPs must be said to employ both informal and formal learning processes.

CoP theory has been associated with the notion of "situated learning," drawing upon Lave and Wenger's (1991) original utilization of the construct to examine the relationship between experienced and inexperienced members of a CoP (Lagache, 1996; Mandl et al., 1996; Henning, 1998; Wolfson & Willinsky, 1998; Maynard, 2001; Hager, 2003; Contu & Willmott, 2003; Dickie, 2003; Merriam et al., 2003; Bradley, 2004; Fuller et al., 2005). These authors have used CoP theory to explore the dynamics of certain kinds of relationships, examining communities of practice that rely heavily upon the maintenance of apprenticeship or mentoring relations.

Thus, in addition to empirically documenting the CoP learning as an outcome, we can examine how learning takes place through the interpersonal relationships and dynamics that take places within the CoP. Situated learning theory focuses on forms of relationships that imply that one has knowledge to share with the other: the mentor-apprentice, subordinate-supervisor, and expert-generalist, suggesting a dynamic of expert-driven learning. However, other forms of learning relationship exist as well, particularly peer-to-peer learning, sometimes referred to as "constructivist learning." The surfacing of these relationships become very important when light is shed on CoP governance, maintenance and creation, a topic to which we will turn to later. A critique of situated learning rendered by Contu and Willmott (2003) sheds light on the perpetuation of power dynamics in CoPs in which situated learning is taking place. They argue that these power dynamics help to shape the epistemological orientation of the CoP and its members.

Gajda and Koliba (2007; 2008) have linked CoP theory to John Goodlad's "cycle of inquiry" concept that draws upon the work of Dewey and Lewin, and places learning within the context of the cyclical process of dialogue, decision-making, action and evaluation. When these "DDAE" dynamics are studied within CoPs, a clear link between the group's capacity to evaluate its current practices, conditions, etc., learn through this evaluation by talking about it (dialogue), make decisions based on this discussion, and subsequently implement this decision into action may be found (2007). This application of the cycle of inquiry to a CoP framework may provide an observable link between a CoP's learning and its capacity to manage and transfer knowledge.

Modes and Quality of Knowledge Transfer

CoP theory lies at the intersection of learning processes and knowledge transfer and has been used to link the organizational learning and knowledge management fields. There is a great deal of literature focusing on the relationship between CoPs and the creation and utilization of knowledge within and across organizations (Brown & Duiguid, 1991; Ashkanasy, 2002; Burk, 2000; Bate & Robert, 2002; Wenger, 2000a; Brown & Duguid, 2002; Wenger, 2000b; Davenport, 2001; Davenport & Hall, 2002; Heaton & Taylor, 2002; Iverson & McPhee, 2002; Luque, 2001; Tsoukas, 2002; Ardichvili et al., 2003; Ennals, 2003; Gabbay et al., 2003; Zanetich, 2003; McMahon et al., 2004; Zook, 2004; McAndrew et al., 2004; Callahan, 2004; Hislop, 2004; Starkey et al., 2004; Kimble & Hildreth, 2004; Dube et al., 2006; McNabb, 2007). CoP theory has been used to describe how communication within an organization is carried out (Zorn & Taylor, 2004; Ballard & Seibold, 2004), "knowledge brokers" shape discourses (Burk, 2000; Zook, 2004), and bodies of knowledge evolve (Wagner, 1994). Within this literature, knowledge sharing and knowledge exchange appear to be promoted as the joint enterprises shaping the shared practices of the CoP. Much like the organizational learning field's concern with interpersonal relationships that promote learning, the knowledge management field views these relationships as vehicles for knowledge transfer, with a particular emphasis on the structures that are in place to foster more of it. Concepts like Bernstein's (1990) "knowledge framing" are useful here.

> In [Bernstein's] terms, framing of knowledge is strong when there is a sharp boundary between what may be transmitted and what may not be transmitted in a learning relationship. Where framing is weak, there is a blurred boundary between what may and may not be transmitted . . . A community of practice may be strongly framed when transmission of knowledge occurs closely between members or weakly framed when transmission of knowledge is less frequent or consistent. (Boud & Middleton, 2003, p. 201)

In considering the contributions that knowledge management makes to the empirical development of CoP theory we may look to the structures that are in place to facilitate, sustain and in some cases thwart CoP functioning. Thus, consideration should be given to the modes of communication used within and between CoPs. These modes of communication include face-to-face interactions as well as the use of various information technologies.

The literature regarding the place of "virtual communities of practice" most often looks at the role of information technology within the context of the existence of on-line CoPs (Rogers, 2000; Davenport, 2001; Hung & Nichani 2002a; Daniel et al., 2002; Davenport & Hall, 2002; Henri &

Pudelko, 2003; Ardichvili et al., 2003; Voss & Schafer, 2003; Alatta, 2003; Schlager & Fusco, 2004; Storck & Storck, 2004; Kimble & Hildreth, 2004; Preece, 2004; McMahon et al., 2004; Dube et al., 2006; Branch, 2008). These studies point to the importance that CoP theory has taken on as a tool to assess the quality of on-line communities, and the role that information technology (both from a hard ware and a software perspective) can take in the process. The transaction costs of using technology is an important consideration in this context and has, to date, not received much attention.

Whether it be through face to face interactions or via electronic forums, CoP members will engage in some form of dialogue with each other. Studies have been conducted examining the quality of "virtual discourse" (Voss & Schafer, 2003), the role of storytelling and narrative development (Daniel et al., 2002; Moore, 2006), the adoption of common language (Somekh & Pearson, 2002; Ballard & Seibold, 2004), assessment of the quality of dialogue (Gajda & Koliba, 2007; Branch, 2008) and even the place of humor (Holmes & Marra, 2002) in CoPs. These studies confirm the important role that the quality of dialogue plays in the cultivation of effective communities of practice. CoP dialogue has been measured in terms of frequency, degrees of structure and quality of exchanges, and aligned to systemic evaluation of data and decision-making (Gajda & Koliba, 2007; Branch, 2008).

In addition to the structures of communication in place to support or hinder CoP functions, the knowledge management field has also focused on the quality of knowledge created and used within a CoP. CoPs may create, share or transfer knowledge that is of poor quality (however that determination may be rendered) (Roberts, 2006). "[CoPs can] become resistant to other interpretations [of knowledge] that they have not themselves validated by trial and error. This resistance, given the inevitable solidarity that comes to characterize well-established communities of practice, becomes a barrier to innovation and a barrier to the transfer of knowledge across CoPs" (Zorn & Taylor, 2004, p.109). Zorn and Taylor's observations regarding the potential negative consequences of CoP activity are important. They suggest that as CoPs develop, they tend to evolve their own base of knowledge that can begin to become a part of its own cannon, and, in the worst cases, can fall prone to adhering to it dogmatically. Roberts has asserted that a CoP may develop and use knowledge derived through what Bourdieu first described as *habitus*, a concept that, "consists of modes of thought that are unconsciously acquired, resistant to change, and transferable between different contexts" (2006, p. 629). Roberts further suggests that CoPs develop certain habitus for handling knowledge that may lead them to be, "predisposed to the absorption and creation of certain knowledge and the negotiation of particular types of meaning to the detriment to other possible interpretations" (2006, p. 629).

The development of knowledge within a CoP is an essential feature of it, particularly if we consider the relationship between CoPs and professional expertise and competence. As Schon lays out in his book, *The Reflective Practitioner:*

How Professionals Think in Action (1983), professionals can and do begin to build up a set of assumptions that, if they remain tacit, can have detrimental effects. How and if the accumulation of knowledge built up within a CoP begins to blind its members to new knowledge and "outsider" perspectives is a phenomena that begs for further study. The place of knowledge production and diffusion should have a bearing on the quality of a CoP. As Brown & Duguid (2002) attest, "Communities of practice, while powerful sources of knowledge, can easily be blinkered by the limitations of their own world view . . ." (26).

Ultimately, CoPs must make decisions based on what they know. Decisions may be focused exclusively on CoP activity, or have implications beyond the CoP itself. Molleman (2000) and Alper et al. (1998) look at the role of decision-making within the context of self-managing teams, which points to useful frameworks for assessing the types of decision-making possible within a given CoP. Community of practice members can be asked about the level of efficacy they feel for their CoP decision-making processes and decision-making authority. We may assess the extent to which the CoP possesses the capacity to make or influence decisions that affect its own practice and the larger organization's (or network's) performance (Koliba & Gajda, 2007).

Role clarity and the extent to which the CoP as a whole or individuals within it exercise "consultative" or "deliberative" decision-making capacities (Vella, 2002) is another dimension through which to document a CoP's decision-making capacity. Decision-making can be considered in relation to quality or type of dialogue and the extent to which CoP members engage in individual and collective action. Traditionally, decision-making processes within interpersonal groups have been characterized in terms of consensus (though which all members play a deliberative role) to more hierarchically determined decision-making structures (in which one member may have the final decision-making authority).

Degrees of Formality

Some suggest that the real value of CoP theory lies in its capacity to recognize the informal nature of CoPs (McDermott, 1998; Wenger & Snyder, 2000; O'Donnell et al., 2003; McNabb, 2007). The learning organization field tends to emphasize informal learning carried out predominantly through self-organizing CoPs. While, the knowledge management field tends to focus on "information systems and the structural design of organizations . . . and reify environments so that it is understood as a set of external forces rather than a latent pool of ideas and opportunities" (Peltonen & Lamsa, 2004, p. 251).

There are those such as O'Donnel et al. (2003) who suggest that teams and CoPs are distinct, arguing that teams exist as expressions of instrumental action undertaken through formal organizational channels, while the CoP is an informal structure defined by what Habermas would define as the

"communicative action" it undertakes, characterized as being self-organized and informal in nature. This view of CoPs situates them as largely "participatory" in nature. The extent to which a CoP is viewed as an informal structure, latently produced, or as a formal structure, somehow officially recognized by those external to it, is a matter of contestation within the literature.

Wenger draws a distinction between "reified" and "participatory" aspects of organizational life, discussing the roles that boundaries, boundary objects, and boundary spanners play within organizations. Concerning the relationship between an organization's reified and participatory elements, Wenger asserts that, "Participation and reification are not defined merely by opposition to each other. The tacit is that which is not made explicit; the informal that which is not formalized; the unconscious that which is not conscious" (1998, p. 66). Thus, the reified elements of an organization (characterized by its organizational chart, mission statements, employee handbooks, action plans, memos, and other "boundary artifacts") are generally explicit and exist in a symbiotic relationship with the participatory elements of an organization (characterized by people's actual engagement within the organization) that are generally tacit.

To Wenger, communities of practice exist amidst the reified and participatory elements of organizations (and across organizations). They may all possess a certain degree of self-organization and rely on the voluntary association of its members (most work places do not rely on slave labor or conscription, after all). "Even when a community's actions conform to an external mandate, it is the community—not the mandate—that produces the practice. In this sense, communities of practice are fundamentally self-organizing systems" (Peltonen & Lamsa, 2004, p. 253). Thus, the literature across these fields is relatively clear in asserting that a community of practice possesses voluntary association and self-organization *to some degree*, suggesting to us a broad appeal for asserting the degree of formality of a CoP.

If the CoP is to be advanced as an empirically sound unit of analysis it must be said to posses varying degrees of formality relative to an organizational or network structure. The more reified a community of practice is, the more formal may be said to be. At one extreme, membership in a CoP can be dictated on legalistic, or in the very least, contractual basis. We find these highly reified CoPs in cases of assigned work teams, departments or other formal structures that appear in the organizational chart. On another extreme, membership in a CoP can be based exclusively on the informal participation of the individual's comprising it. These CoPs are likely to exist latently below the surface of organizational consciousness—be it a group of people who routinely take lunch or breaks together, or colleagues who collaborate on projects entirely of their own volition. Some have begun to document the evolution of informally organized CoPs into formal ones (Breu & Hemingway, 2002).

Strength of Coupling

The notion of "coupling" is a widely recognized analytical construct in organizational development theory (Perrow, 1967; Weick, 1976). In essence, the degree of coupling of a social entity is aligned with its quality of cohesiveness.

In his 1998 book, Wenger addresses the importance of balancing reification with participation. We hypothesize that for those CoPs that are more tightly coupled, these two elements are more balanced. When either the reified or participatory elements dominate, the CoP is more likely to be weakly coupled—membership is coerced (on one end) or so fluid as to be almost ephemeral in character (on the other). Boud & Middleton (2003) have recognized the link between the degree of coupling of a CoP and its ability to facilitate learning and knowledge transfer. Taking Wenger's list of practices undertaken within most CoPs (see Figure 1) and systematically applying them

- Sustained mutual relationships—harmonious or conflictual;
- Shared ways of engaging in doing things together;
- The rapid flow of information and propagation of innovation;
- Absence of introductory preambles, as if conversations and interactions were merely the continuation of an ongoing process;
- Very quick setup of a problem to be discussed;
- Substantial overlap in participants' descriptions of who belongs;
- Knowing what others know, what they can do, and how they can contribute to an enterprise;
- Mutually defining identities;
- The ability to assess the appropriateness of actions and products;
- Specific tools, representations, and other artifacts;
- Local lore, shared stories, inside jokes, knowing laughter;
- Jargon and shortcuts to communication as well as the ease of producing new ones;
- Certain styles recognized as displaying membership;
- A shared discourse reflecting a certain perspective on the world

Source: Wenger, 1998, p. 125

Figure 1. Practices undertaken in tightly coupled communities of practice.

to a set of CoPs in schools setting under study, they found a range of variability across CoPs. They took Wenger's practices and used them as codes to analyze the characteristics of different groups of educators within the Australian school system. Some CoPs under study exhibited some or many of these characteristics, while others did not. They found that this list of indicators did not provide an adequate account of all groups in which some kind of knowledge transfer or learning took place and concluded that, "Some of these [groups] meet some of Wenger's (1998) [practices], however, some of the relationships reported to us reflect more loosely coupled groupings than those described by him" (2003, p. 200). They go on to add, however, "This does not imply that the notion of communities of practice is not useful in such settings but that degrees of coupling may be an important feature to consider" (201). Hodkinson and Hodkinson (2004b) note that Wenger's list of practices may apply to more tightly coupled CoPs, but do not adequately account for weaker, more fragmented CoPs. Thus, their remarks, combined with Boud and Middleton's observations, suggest the need for a deeper, more empirically grounded exploration of the characteristics of CoPs and to consider the degree of coupling at work in them.

An attempt to judge the degree of coupling that exists within a given CoP could include an assessment of the CoP's degree of formality and the levels of trust and comfort that individual members associate with it. The utilization of instruments designed to evaluate the degree of social capital existing within groups may be helpful in this regard. We believe some of the quantitative research tools currently employed within network analysis may be particularly helpful in this regard. Network analysis may be used to study the degree of centrality of a "node" in the network or the density of the relationships within the network as a whole. These constructs are being considered within the context of coupling (Carrington et al., 2005). We know of no studies that have, to date, employed the tools of network analysis to a CoP framework, a point we will return to in our conclusions.

IMPLICATIONS FOR FUTURE RESEARCH

Based on our findings from the literature review and our attempts to build upon existing CoP theory, we offer a series of research questions that we hope will stimulate and focus the further development and investigation of communities of practice as a unit of analysis. We have arranged these questions within the three approaches to research outlined by Patton (1997):

1) knowledge/theory testing questions related to operationalizing the characteristics of CoPS;
2) formative inquiry questions related to CoP development; and
3) summative evaluation questions related to determining the merit/worth of CoPs.

Some have argued that there are risks to empirically identifying, describing, and evaluating CoPs. A paradox persists: to name CoPs we run the risk of ruining them (Stamps, 1997) by essentially undermining their capacities to self-organize. Yet, to ignore the CoPs in our midst could mean that we unconsciously suppress them or allow dysfunctional CoPs or "toxic hubs" (Reeves, 2006) to persist.

Knowledge / Theory Testing Questions

Future research and empirical study should focus on testing the principles that make up community of practice theory and forward our thinking about the specific variables that characterize CoP behavior and development.

Communities of Practice are Characterized by What Variables?

As our accounts of the literature have found, there is a need to develop a set of "defining characteristics" of CoPs, and thereby move beyond Wenger's (1998) narrow construction of CoPs as a tightly coupled ideal type. A great deal of work still needs to be done to take these characteristics and operationalize them into empirically testable variables. The operationalization of a set of variables can be undertaken through the design of survey instruments. Entire organizations can have their CoPs "mapped," with CoP characteristics aggregated (Gajda & Koliba, 2007; Koliba & Gajda, 2007; Koliba & Gajda, 2008). Dube et al. (2006) have advanced the development of such a typology by identifying CoP demographics, organizational context, membership characteristics, and technological environment. These characteristics, added additional parameters being advanced by Gajda and Kolba (2007) begin to provide a basis for the development of a wholisitic typology that may be used to describe and evaluate CoP activity. We believe that network analysis will be particularly useful in eventually accomplishing this.

Formative Inquiry Questions Related to CoP Development

In addition to isolating and operationalizing the variables through which CoPs can be understood and examined, future research should focus on questions related to CoP *development*. Areas of suggested inquiry include the effects of participation in CoPs, conditions that advance or impede CoP development, administrative actions that foster or hinder CoP development, and how relationships between CoPs are formed.

What Effect Does CoP Participation Have on an Individual?

Efforts have been made to look at the relationship between CoP participation and an individual's experience (O'Brien & O'Brien, 2002; Hodkinson &

Hodkinson, 2003; Adams & McCullough, 2003), although more can be done to explore the relationship between an individual's membership in a community of practice and her or his trajectory within and across CoPs. Wenger has asserted that an individual's trajectory within a CoP can be peripheral, inbound, insider, boundary, and outbound in nature (1998).

Some studies have already contemplated how CoP theory can be used to form professional identity and how an awareness of one's membership and trajectories within workplace CoPs can be tied to job satisfaction and professional competence (Grisham et al, 1999; Gallucci, 2003; de Laat & Broer, 2004; Chalmers & Koewn, 2006; Andrew et al., 2008). Zolan (2001) has used CoP theory to link "self-ethnography" and reflective practice, suggesting a possible role for CoP theory within individualized action research.

More research needs to be conducted investigating how individuals belong to "several over-lapping communities of practice" (Hodkinson & Hodkinson, 2004b). Also, the role of individuals as boundary spanners or knowledge brokers (Zook, 2004), linking the practices of different CoPs deserves deeper examination. An individual's communities of practice can be mapped and used to gain a deeper understanding of his or her practices and performance. Handley et al. (2006) suggest that individual identity is not only shaped by one's membership within a CoP, as Wenger suggests, but influenced by an individual's involvement within multiple CoPs, as well as the wider environment that provides external forces onto the CoP. Wenger (1998) lays out an extensive examination of how one's identity is shaped by involvement in communities of practice.

What Conditions Foster Individual Participation in CoPs?

Margaret Wheatley (2000) discussed conditions that support an individual's willingness to participate in a CoP. In her words, ". . . we willingly share what we know if we think it is important to the work, if we feel encouraged to learn, if we want to support a colleague. The discovery in every organization of self-organized Communities of Practice is evidence of this willingness." She goes on to define the conditions that make people willing to voluntarily join a CoP: people understand and support the work objective or strategy; people understand how their work adds value to the common objective; people know and care about each other; and people feel personally connected to their leaders; people feel respected and trusted (p. 7). The challenge for researchers will be to operationalize the variables of participation (and by necessity, collaboration) that Wheatley and others (Gajda, 2004; Gajda & Koliba, 2007) have identified and, ultimately, measure the degree to which a CoP is self-organizing. In addition to assessing the degree of participation, the extent to which CoPs employ reified elements or tools needs to be documented and analyzed vis a vis the quality of participation among CoP members.

What is the Connection Between Administrative Leadership and the Wider Environment, and CoP Development?

Further research is needed to shed light on the relationship between administrative leadership and CoP development, and to discover and document concrete means to support (or in some cases thwart) the self-organizing capacities of CoPs. Wenger and his associates have begun to explore the leadership conditions that foster highly functioning CoPs (Wenger & Snyder, 2000; Snyder et al., 2003) and identified some of the questions leaders will need to grapple with in their efforts to support CoPs in their organizations. Future research should explore the effects of management systems on the functioning of CoPs. Some of the existing literature pertaining to the role of leadership (Lundberg, 1998; Swan et al., 2002; Snyder et al., 2003, Bloom & Stein, 2004; Storck & Storck, 2004; Frost & Schoen, 2004), factors that help and hinder the development of CoPs (Lesser & Fontaine, 2004; Manville, 2004; Martin et al., 2004; Vestal & Lopez, 2004; Stuckey & Smith, 2004; McNabb, 2007) and the life cycles of CoPs (Wenger, 2000b; Gongla & Rizzuto, 2004) are useful here. In addition, more attend needs to be paid to the role that power plays within CoPs (Contu & Willmott, 2003; Huzzard, 2004).

In addition we need to ask, "If learning differs in different communities of practice, what aspects of those differences are determined by more macro factors of occupational organization, structure and purpose—the large-scale version of a community—and what by particular, localized patterns of social interaction—the small-scale version?" (Hodkinson & Hodkinson, 2004b, p. 5). Systems theory, with its focus on external inputs and outputs, is particularly useful in conceptualizing the translation between macro and micro level frames. The external environment in which a CoP persists, including such factors as organizational culture, political climate, occupational norms, etc., needs to be accounted for within our research designs. The diversity of such contextual factors will likely limit the possibility of rendering sweeping generalizations regarding CoP dynamics through such an analysis

How are Relationships Constructed Between and Among CoPs?

CoPs often persist admits a "constellation" of other CoPs (Wenger, 1998), as seen in the "hubs and links" maps common to network analysis. The relational dynamics occurring between CoPs is in need of deeper assessment (Hislop, 2004). These CoP constellations may be arranged vertically or horizontally. Blacker et al. (2003) note the particular problems posed by vertical integration between communities of practice, pointing to important areas for further study. While studies that look at the role of CoPs within inter-ogranizational networks (Somekh & Pearson, 2002; Luque, 2001) provide examples in which CoPs exist within more laterally arranged relationships. The systematic examination of collaboration among CoPs within (inter) and across (intra) organizations and the effects of collaboration on intended outcomes is an imperative for the field.

Summative Evaluation Questions Related to Determining the Merit/Worth of CoPs

An important line of inquiry should explore the extent to which the intentional development of effective CoPs—as a key organizational change strategy—merits implementation and/or continuation. The need to establish an empirical link between indicators of CoP quality and indicators of organizational performance is becoming increasingly important.

How do we Assess the Quality of CoPs?

More research that aims to determine and document the attributes of highly functioning CoPs and the articulation of "ideal types" of CoPs, linked to the literature on "professional learning communities"(Dufour & Eaker, 1998) and highly functioning self-regulating groups (Alper et al., 1998; Molleman, 2000), is needed. The success or failure of a given CoP will likely be contingent upon both internal factors (the ability of CoPs members to collaborate) and external factors (how the CoP's activity connects to and supports organizational or network objectives). Additionally, differing perspectives of what connotes "success" between CoP members and between CoPs themselves will likely need to be sorted out qualitatively.

What is the Relationship Between CoPs and Organizational Effectiveness?

We concur with Huang et al.'s call (2003) for more evaluation of the efficacy of using CoP development as an intervention to enhance organizational effectiveness. The relationship between CoPs and the development of positive organizational culture (Schein, 1997; Yanow, 2003; Sergiovanni, 2004; Drake et al., 2004) is an important launching point for further study, begging the question: What is the role of CoPs in supporting an organization's capacity to learn, innovate and become more effective? Assertions regarding the important (and presumably positive) role of CoP within professional development and teaching pedagogy are prevalent in the literature. Yet, empirical studies that have attempted to correlate the degrees of functionality of CoPs to the achievement of organizational goals and outcomes have yet to be conducted.

How can Formal Evaluation and Applied Research be Used to Align CoPs and Organizational Goals and Outcomes?

The relationship between applied research and organizational learning was first articulated by Argrysis and Schon in their description of the "Mercury Case" (1996). Although they did not use the term community of practice, their framework for linking action research with organizational change is very relevant to this discussion. The role of evaluation, research and formal assessment

Table 2. Utilization of Communities of Practice as a Structured Intervention

Goal of Intervention	Themes	References
To Improve the Utilization of Information Technology	By transforming electronic forums into effective CoPs	Johnson, 2001; Kling & Courtright, 2003; Koku & Wellman, 2004; Schwen & Hara, 2004; Dube et al., 2005; Hafeez & Alghatas, 2007; Branch 2008
	By merging of professional development and on-line CoPs	Moore & Barab, 2002; McMahon et al., 2004; McAndrew et al., 2004; Guldberg & Pilkington, 2006
	By using interactive television to create CoPs	Squire & Johnson, 2000
To Promote Professional Competence and Reflection on Practice		Ayas & Zeniuk, 2001; Nicolini et al., 2003; Adams & McCullough, 2003; Buysse et al., 2003
	Among physicians	Parboosingh, 2002; Pereles et al., 2002; Swan et al., 2002; Popay et al., 2004
	Among nurses	Adams et al., 2005
	Among university faculty	Mandl et al., 1996; Van Note Chism et al., 2002; Kwon, 2003
	Among chief information officers	Moran & Weimer, 2004
	Among doctoral students	Pallas, 2001; Hager, 2003

	Among teachers	Roschelle & Clancey, 1992; Palincsar et al., 1998; Thomas, 1998; Grisham et al., 1999; Pugach, 1999; Perry et al., 1999; Stein et al., 1999; McRobbie & Thomas, 2000; Evenbeck & Kahn, 2001; Wesley & Buysse, 2001; O'Neill, 2001; Au, 2002; Cobb & Hodge, 2002; Moore & Barab, 2002; Cobb & Hodge, 2002; Hung, 2002; Barab et al., 2002; Hung, 2002; Burton, 2002; Buysse et al., 2003; Wixson & Yochum, 2004; Starkey et al, 2004; Foulger, 2004; Schlager & Fusco, 2004; Zaslavsky & Leikin, 2004; Corso, 2004; Palincsar et al., 2004; Sergiovanni, 2004; Hung et al., 2005
To Advance Business Innovation	Through promoting knowledge transfer and organizational learning	Brown & Duguid, 1991; Liedka, 1999; Wenger, 2000a; Wenger, 2000b; Snell, 2001; Lee & Valderrama, 2003; Kimble & Hildreth, 2004; Martin et al., 2004; Manville, 2004; Lundkvist, 2004; Justesen, 2004; Starkey et al., 2004
To Support Governmental Innovation	By fostering innovations in the public sector via restructuring of bureaucracies	Burk, 2000; Kliner, 2002; de Laat & Broer, 2004; Dekker & Hansen, 2004; Garcia & Dorohovich. 2005
	By advancing multi-sector collaborations to advance policy objectives	Luque, 2001; Lathlean & le May, 2002; Somekh & Pearson, 2002; Gabbay et al., 2003; Zanetich, 2003; Dewhurst & Navarro, 2004; Drake et al., 2004; Bouwen & Taillieu, 2004; White, 2004; Rohde, 2004

within CoPs themselves and as a vehicle to foster CoP development has surfaced within the literature, with links made between CoPs and action research (Ayas & Zeniuk, 2001; Buysse et al., 2003; Ennals, 2003; Gajda & Koliba, 2007), evaluation, (Fetterman, 2002), and collaborative inquiry, (Wesley & Buysse, 2001). Both Zolan (2001) and Howard (2002) connect CoP theory to the utilization of ethnography at the individual and organizational levels respectively. The use of CoP theory in the analysis of action research and utilization-focused evaluation appears to be very promising.

Fetterman (2002) has articulated how a CoP can be formed around the creation, implementation and utilization of formal evaluation projects, suggesting an important link between CoPs and the utilization of evaluation data. Fetterman's conceptualization of the evaluator-client relationship as one of a mutually constructed CoP is an important step toward the alignment of applied research and the support of CoPs. Along this line, Ennals addresses the place of action research within the academy, presenting the university as a series of CoPs, with a role to play in the cultivation of knowledge transfer with other CoPs (2003).

CoP theory can provide a useful framework through which to understand the personal and institutional relationships that are possible between social scientist evaluators/researchers and the organizational or network partner. The role of evaluation as a part of an ongoing dialogue about "data" that provides the means to learn and evolve practice and inform decision-making is just recently being conducted (Gajda & Koliba, 2007; Gajda & Koliba, accepted for publication).

Action research employed in the study of CoPs need not be undertaken by trained academics. If CoPs are to be constructed to advance shared learning and knowledge transfer, the de-privatizing of their practices needs to take place (Dufour & Eaker, 1998). Recognizing the role that evaluation and reflecting-on-action can play in a CoP, Wesley and Buysse observe, "What is missing in current practice is the role and responsibility of participation in a community. . . whose goal is to engage in mutual analysis of each other's experiences and observations as a way to continually refine their practice and ultimately contribute to the formal knowledge base" (2001, p. 124).

CONCLUSION

Admittedly, much work needs to be done if the community of practice is to be evolved as an empirically sound analytical construct. We believe that is a potentially powerful unit of analysis in part because it situates the role of organizational learning, knowledge transfer, and participation among people as the central enterprise of collective action. As we have seen, the term is being employed across a broad spectrum of disciplines and professions to describe and signify groups of people working to achieve common goals and objectives.

The more we can operationalize and make visible the characteristics of high and low functioning CoPs, and the greater insight we gain into their development and impacts, the better equipped administrative leaders, network facilitators, and front line practitioners will be to harness the capacity of inter-personal, intra-organizational and inter-organizational collaboration in order to achieve effective outcomes. CoP theory has emerged as a truly trans-disciplinary framework, employed as both a descriptive and proscriptive construct. Communities of practice are increasingly being utilized as an analytical framework to describe the dynamics of interpersonal collaboration and as an intervention strategy to promote organizational change. As such, CoPs is a high-stakes construct that warrants further empirical development.

We believe that the evolution of the CoP as a viable intermediate unit of analysis hinges on two factors, one being methodological, the other being theoretical. The large number of characteristics that may be employed to describe and evaluate CoP dynamics, and as equally important for researchers, the relationship between these characteristics considered as the interplay of dependent and independent variables, will require some standard descriptive measures that may be employed to CoPs across different contexts. Most empirical studies of CoPs to date have been qualitative in nature. The inductive observations rendered though such case studies have, as we have seen, enriched our understanding of CoP dynamics well beyond the specific context of apprenticeship relationships first laid out by Lave and Wenger. It should come as no surprise that at this stage in the evolution of CoP theory, the field may be ready to embark on more deductive forms of analysis. We have postulated a few hypotheses within this article. The application of quantitative methods employed in network analysis and complex systems modeling to a community of practice framework will be very useful in carrying out such an effort.

There may be doubt expressed by some that there really is no community of practice "theory," per se. Although we have been intermittently referring to CoP theory here, the matter of whether CoP theory should be understood as its own discrete theory, apart from organizational learning (OL) or knowledge management (KM), does not really concern us. It may be more useful to understand the community of practice as an empirical framework that is used across a variety of theories that include OL and KM, as well as social network, systems and complexity theories.

Our discussion has, largely, been carried out by incorporating literature using a broad array of disciplinary fields. The implications for public administration and policy studies have not been explicitly made here. However, the community of practice has begun to appear within this literature (see Table 1), suggesting many ways in which the CoP can be applied to public and non-profit sector organizations and inter-organizational governance networks. Applying a CoP framework to a public sector context, Snyder, Wenger, and de Sousa-Briggs (2003) suggest that, ". . . [CoPs] provide . . . a foundation for a new kind of national governance model that emphasizes participation,

inquiry and collaboration . . . Communities of practice—addressing issues ranging from E-Government to public safety, and operating across organizations, sectors, and levels—can address national priorities in ways no current organizational structure can match" (p. 6). We believe that achieving such an objective will be more likely if the field pursues some of the research objectives laid out here.

NOTES

1. Our review of the literature regarding the utilization and interpretation of CoPs involved a survey of major social science databases, including Social Science Abstracts, ERIC, Expanded Academic, Applied Science and Technology Index, Anthropology Plus, PubMed, Social Work Abstracts, Sociological Abstracts, World Wide Political Science Abstracts and Google Scholar. In total, over 230 references were reviewed. Although we took measures to ensure that this review is comprehensive, the reader should note that as with all reviews of the literature, missing references are likely.
2. See Lave & Wenger, 1991; Wenger, 1998; Henning, 1998; Trowler & Knight, 2000; Pereles et al., 2002; Au, 2002; Barab et al., 2002; Lathlean & le May, 2002; Somekh & Pearson, 2002; Swan et al., 2002; Gabbay et al., 2003; Huang et al., 2003; Ardichvili et al., 2003; Boud & Middleton, 2003; Faber et al., 2003; Gallucci, 2003; Hodkinson & Hodkinson, 2004a; Starkey et al., 2004; Schnekel, 2004; Youngblood, 2004; Zanetich, 2003; Bouwen & Taillieu, 2004; Corso, 2004; Dube et al., 2005; Fontaine & Millen, 2004; Fuller et al., 2005; Rohde, 2004; Anthony, 2007.

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