Measuring The Impact of Communities of Practice: A Conceptual Model

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Abstract: The impact communities of practice (CoPs) make can be understood in several different ways, depending on which theoretical perspective is used. For example, CoPs have been studied from a learning-theory perspective, from organizational development theory, and from a small-group theory. To understand the effects of participating in a CoP on individuals, groups or the organization in which they function, we could use traditional learning theory, organizational learning theory, information-processing theory or small-group process theory, etc. Or we could look at the internal processes of CoPs; the output they generate, or employ a synthesized view. CoPs can also be seen as impacting different actors in the organization in which they operate; individuals, groups or the whole organization. This means, for example, that we could look at CoPs from an organizational learning perspective to see how CoPs impact strategy development or renewal. At the level of the group, we could look at how CoPs lead to increased group performance and how that in turn leads to a higher output of knowledge products. And as learning is one of the key processes in a CoP, an important aspect of we need to study is *how* the individual learns, as well as *what* the individual learns. The complexity of impact a CoP can have on the diverse actors requires a pluralistic and multi-perspective approach. However, a review of the literature showed no comprehensive model that neither integrates these different levels of impact nor employs multiple theoretical perspectives. Furthermore, most models of measurement or assessment use traditional types of output measurement, such as ROI, or anecdotal evidence that the CoP has improved organizational capability. Much like any human resource development initiative – which is the perspective of CoPs we take in this paper – there has been no real attempt to develop measures for assessing impact. We try to fill this gap by presenting a comprehensive, multidisciplinary, conceptual model that approaches measuring certain aspects a CoP has on individuals, groups and organizations.

KeyWords: Communities of practice, learning, organizational learning, group learning, organizational impact, measurement.

Biographical notes: Don Ropes is a research fellow at the Centre for Research in Intellectual Capital where he is looking at how communities of practice can be implemented in higher educational organizations as professionalization trajectories. He is currently writing his PhD dissertation at the University of Amsterdam, department of Educational Science, on the same topic.

1 Introduction

Since Lave and Wenger (1991) first used the term "community of practice" (CoP) in their study of learning groups, the concept has been widely discussed in many different fields, including education, business and organizational development. Each one of these fields looks at the internal processes and resulting products of CoPs in a different way, probably because the concept of CoPs has been treated in the literature in four rather different ways. This makes evaluations of CoPs more difficult to find in the literature as well, because each theoretical perspective has a different concept of impact.

Evaluations of CoPs have typically looked at two aspects; the internal functioning (related to proper facilitation of the CoP) and the impacts CoPs have on the organization, reflected in interview questions such as " What has the overall value of the CoP been to you and your team?" or "How much time have you saved because of participating in your CoP?" These types of evaluations play an important role in understanding value, but they fall short of a systematic, theoretically sound process of assessing actual impact (Wang, Dou, and Li 2002). And, as for any human resource development initiative undertaken in an organization, there needs to be clear, verifiable results (Spitzer 2005).

In this first section we introduce different conceptions of CoPs, and then integrate these conceptions. This conceptualization forms the basis for a preliminary model that will help us find variables associated with CoPs, and that we can measure. Then we expand the conceptual model to a more operational one that can be used in practice.

1.1 CoPs: Four seminal works, four different conceptions

Lave and Wenger (1991)

Lave and Wenger's seminal work on five different learning groups discussed a form of learning that focused on social-cognitive learning processes in a specific context. Lave and Wenger studied five authentic groups in a phenomenological work to see how the individuals in the group learned. The resulting theory, which portrayed novices as learning while participating in a community of practice, they called Legitimate Peripheral Participation (LLP). LLP considers that learning is situated in practice and takes place in a mixed social configuration of experts, less experienced practitioners and novices. Through observation and social interaction, new members of the community of practice learn and progress toward expert level. In Lave and Wenger's book, the CoP is understood to be the environment in which one learned; there was no explicit goal related to the CoP itself (such as innovation or new knowledge building). The result of participating in a CoP was that one became an expert in the domain of the CoP by becoming more competent in it.

This means that if we want to measure the effects of participation in a CoP using Lave and Wenger's learning perspective, then we can define the competence field of the CoP, determine the different levels of each competence, and test for learning effects using these competences. (We define competences as a mix of skills, attitudes and behaviors, which is congruent with Lave and Wenger's (1991) concept of 'becoming' an expert in the domain of the CoP.) By using domain specific competences as one

variable, the impact of participation in a CoP on the individual can be linked to increasing the organization's capabilities and possible effectiveness. Furthermore, if we understand learning as an outcome (increased competence), then we can also see participation in a CoP as contributing to organizational learning (Driver 2002).

Brown & Duguid (1991)

In their article on organizational learning and communities of practice, Brown and Duguid looked at how a group of copy-machine technicians built knowledge while working. Using a social-cognitive perspective, the authors describe how the technicians solve complex problems together by avoiding the use of the organization's 'canonical' knowledge and relying on their community of practice. Through shared stories about their practice, the technicians are able to expand and develop new knowledge about the machines they repair – knowledge that is missing from the service manuals distributed by the main organization. In this way, learning, work, innovation and performance are intertwined in the daily activities of the technicians. Shared understandings are developed through social participation in the CoP. New knowledge, embedded in practices, procedures and insights, is saved, distributed and used by the community of technicians themselves. Participation in the CoP has increased the technician's capabilities as well as effectiveness. This increase in effectiveness is one indication that organizational learning has taken place (Brown and Duguid 2001).

Brown and Duguid's perspective on CoPs opens new possibilities for our model. Whereas Lave and Wenger's original conception of CoPs was of a learning environment in which novice participants became more expert through participation, Brown and Duguid understand CoPs as learning environments made up of more or less equals who build knowledge together in a social situation. Conceptionalizing CoPs in this way, we see that they play an important role in facilitating problem solving, building new knowledge and contributing to organizational learning. Using this as a basis, our conceptual model can be expanded from individual learning in a CoP to include the effects of functioning as a CoP on the group as well as the impact of the CoP on the organization as a whole.

Wenger (1998)

Wenger (1998) studied a group of claims processors in a large insurance firm for a year long. This research helped him to further develop the idea of a CoP and to see how it is, as Brown and Duguid proposed, a concept that links individual learning, social practice and organizational learning. What Wenger found was that the group of claims processors was going through several different and simultaneous processes. Newcomers were being introduced and participating in the CoP on a regular basis, and much of their learning on the job could be ascribed to participation in it. In this sense the CoP functioned as a strong, social-cognitive learning environment for novices, much like the one described in the work of Lave and Wenger. In the narrative of the claims processors, we read that the CoP was also important for participants because it helped them to form an identity, to give meaning to their work and to allow for reflection on their practice. Wenger also maintains that CoPs contribute to organizational learning through producing artifacts in the form of stories, new processes and new knowledge that, through the practice of the participants, becomes part of the organizational routine.

Wenger's research thus confirms the dimensions of learning variables proposed earlier. It also points toward other variables we can measure, such as artifacts produced by the CoPs in the form of new knowledge.
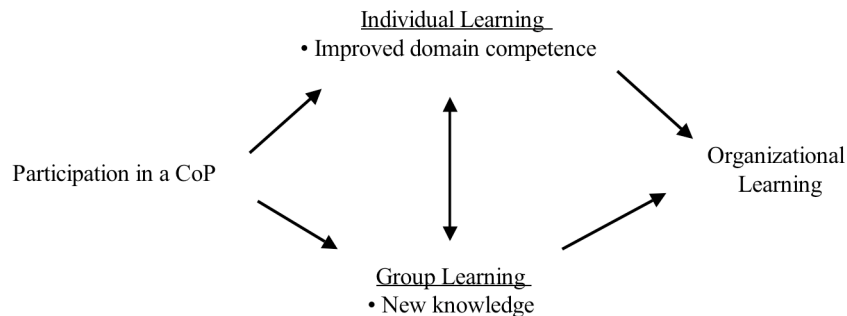
Wenger, McDermott and Snyder (2002)

In their book, "Cultivating Communities of Practice" (Wenger, McDermott, and Snyder 2002), the authors use a new perspective on CoPs. Their approach to CoPs is rather managerialistic and, unlike the previous works, prescriptive rather than descriptive. The emphasis is no longer focused on (social-cognitive) learning benefiting mostly the individual members of the CoP, but on the returns for the organization as a whole. And while both value to organizations and community members is discussed, there is a clear connection to cultivating CoPs as an instrument for increasing organizational capabilities. This we clearly see in the first chapter entitled "Communities of Practice and Their Value to Organizations".

Wenger, McDermott, and Snyder's instrumentalist conception of CoPs opens up new possibilities for our model. Now, for the first time, new knowledge is explicitly seen as a product of a situated, social-cognitive process that is produced for, and used in, the service of organization learning. This means that our links between the effects of participating in a CoP and the effects on individuals, groups and the organization as a whole are even clearer.

Implications for the model

The prescriptive approach taken by Wenger, McDermott, and Snyder (2002), gives us a deeper understanding of what the processes in a CoP can lead to in an organizational framework, as well as give us indications of variables for our model. Furthermore, by looking at CoPs through an instrumentalist perspective, we can use theories typically associated with organizational development and specifically human resource development. Learning is a very complicated process and using multiple perspectives helps us to understand it better. Using Organizational Development theory can also help to ameliorate the problems associated with a lack of empirical studies on CoPs. In the conceptual model proposed in figure 1.1 below, we integrate three important notions from the discussion on CoPs above. These are; 1) that individuals learn domain competence through participation in a CoP; 2) groups functioning as a CoP produce new knowledge, and; 3) increasing individual capability and producing new knowledge leads to organizational learning. In order to come to a more comprehensive set of variables later, we use Wenger, McDermott, and Snyder's (2002) instrumentalist conception of a CoP. This is because by taking a multidisciplinary approach, we are able to be more flexible in defining the variables.

Figure 1.1: Conceptual Model

Individual Learning
• Improved domain competence

Participation in a CoP

Organizational
Learning

Group Learning
• New knowledge

2   Defining the Variables

Communities of practice have been discussed in the literature as effective environments for promoting; individual learning (Hung and Chen 2002), group learning (Hakkarainen et al. 2004), innovation and knowledge-building (Swan, Scarbrough, and Robertson 2002), and as a source of organizational learning (Wenger 1998; Wenger, McDermott, and Snyder 2002). Also, a CoP is a learning environment, rather than a performance one, and can offer a safe environment for reflection and experimentation away from the daily pressures of the workplace (Roberts 2006).

Furthermore, CoPs have also been shown to impact individual, group and organizational performance capabilities in other ways as well. For example, participation in a CoP is one way to stimulate and maintain networks (Saint-Onge and Wallace 2003), increase job satisfaction (Hinds and Pfeffer 2003) and alleviate organizational knowledge drain (Hildreth and Kimble 2000). However, in this paper we limit ourselves to looking at the effects a CoP has on learning outcomes from individuals, groups and the organization. The other types of impact mentioned here could be a starting point for future empirical research, especially because they often form the basis of assessments used in consultancy work.

2.1   The impact of participation in a CoP on the individual

Learning

The perspective on learning we take in this paper is that it is a dynamic process which takes place in a social setting, focusing on activities associated with the domain of the community of practice in which one participates. Furthermore, we consider learning to be situated in the context of the workplace, which reflects the activities of a broader organizational structure. In Lave and Wenger's (1991) model, an individual becomes more competent through interacting with actors and artifacts within the activity

system focused on a specific domain. Learning in this way means that the longer one is a member of the CoP, the more one's behavior is situated in the activities of the social system and the more expert one becomes in practicing the activities associated with that specific domain. What is important for our model is the idea that learning is a social-cognitive *process* based on interaction between an individual and his environment, but that learning is also an *outcome*. For example, a change in competence is an outcome. Therefore, measures that consider both the process and the outcomes of learning can be designed. However, learning is a complex process with many variables (Illeris 2002) and we need to limit our scope, so considering individual learning, we look at variables that are grounded in a 'learning as outcome' concept (van Woerkom 2003).

CoPs are found in all types of organizations, and of course have varying domains that include different competences. This means that for our model to be more useful in a specific context, we would need to develop particular competence profiles for each domain of the CoPs we study, and look at each specific organization. (For example, if we use a CoP of university lecturers as our research focus, we could use the competence profile defined by the university itself as a variable. Or, if we are studying a group of managers we could use a scale that assesses management competences.) However, though CoPs are situated in an organizational context with its own peculiar competence profile, there are some learning outcomes that result from participation in a CoP that can be considered non-contextual and are related to the idea of deep learning. Deep learning is about looking at new facts critically, finding new meanings, and linking concepts (Entwistle 2007). In order to find the similarities between learning in a CoP and other types of learning, we return to the literature on CoPs, supplementing this with literature on workplace learning.

According to Wenger (2000, pp. 227-228), belonging to a social learning system such as a CoP has three aspects:

- Engagement, which is an outcome of doing things together, for example solving problems, participating in a meeting or producing new artifacts.

- Imagination, which means constructing an image of ourselves, of our communities, and of our world, in order to reflect on our situation and explore our possibilities.

- Alignment, which is checking to see if our local activities are aligned enough with other organizational processes in order for them to be effective outside of our local engagement.

From Wenger we see that learning in a CoP, besides elements of social interaction, also has elements of reflection on one's practice and one's situation. There is also an element of exploration or experimentation; thinking and rethinking existing practices and using these new practices in one's daily work. These ideas of reflection and exploration form the link with a notion found in workplace learning theory known as critical reflective work behavior. It is this concept we will use to further expand our model.
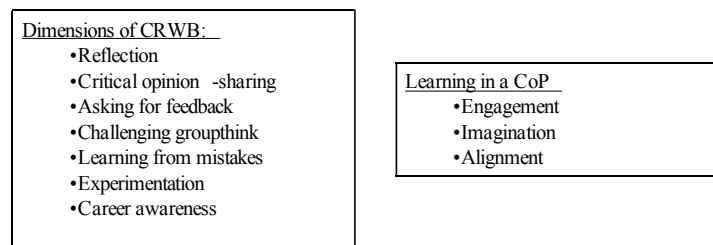
Critical Reflective Work Behavior

In her research on learning at the workplace, Van Woerkom (2003) defined a specific behavior that can be linked to increasing the learning capabilities of the organization. Her term *Critical Reflective Work Behavior* (CRWB) is strongly based on the concept

of experiential learning, and especially looks toward the importance of reflection for fostering deep learning. Van Woerkom also uses Argrys and Schön's (1996) notion of double loop learning to help conceptualize CRWB, which she defines as "...a set of connected activities, carried out individually or in interaction with others, aimed at optimalizing individual or collective practices, or critically analyzing and trying to change organizational or individual values" (p.85).

Van Woerkom understands the outcome of experiential learning – which is nearly identical to the concept of learning in a CoP (Illeris 2002) – as a behavior that effective employees exhibit and can be directly linked to organizational learning. This behavior she calls CRWB. (We introduce the qualifier 'effective' now to highlight the instrumentalist perspective of this paper; learning in an organization should have some connection with economic output.) Figure 2.1 exhibits the dimensions of CRWB next to aspects of participation in a CoP. There are clearly strong similarities between CRWB and learning in a CoP, especially the reflective and explorative aspects. Social fabric also plays a central role in both concepts. Van Woerkom (2003) states that "...for learning to be effective, one must consider two deeper levels in which job skills are embedded: the social unit that shapes the individual's reaction at work, i.e. the organization, and the immediate workgroup and the individual's perception of self with regard to the job and the organization" (p. 53).

Figure 2.1: CRWB and Learning in a CoP

Dimensions of CRWB:
- Reflection
- Critical opinion -sharing
- Asking for feedback
- Challenging groupthink
- Learning from mistakes
- Experimentation
- Career awareness

Learning in a CoP
- Engagement
- Imagination
- Alignment

A further consideration for using CRWB as a variable is that van Woerkom (2003) found participation in a workplace social learning system to be a major predictor variable of CRWB. Participation, as she formulates it, is nearly identical to active membership in a CoP (van Woerkom 2003).

In summary, we conceptualize learning in a CoP as a dynamic, interactive process between the individual and his environment that results in a change of behavior and/ or competence. We also consider that CRWB, one specific type of work-related learning, is one variable of learning in a CoP.

2.2   The impact of functioning as a CoP on the group

Group learning

The original theoretical perspective on learning in a CoP focused mostly on how individuals learned in the context of a socially constructed group, through participating either actively or passively in the activity system. However, in this paper we use a concept of collective learning that can be characterized as "… an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors "(Edmondson 1999), p.353). And although this is a learning as process approach, we also maintain the perspective of learning as output, and would amend Edmonson's definition by seeing group learning resulting in new knowledge (Brooks 1994).

While social-cognitive learning theory includes individual learning, the group forms the direct environment for learning, and is actually the CoP itself. As we discussed already, the basic tenants of social-cognitive learning theory rest on group interaction. In this section we continue expanding our model by looking at group learning through the same, learning-as-outcome perspective we used above.

Knowledge Productivity

In his second book on CoPs, Wenger (1998) broadens the original theory of CoPs by discussing how communities of practice produce new artifacts that serve as both a focus for further learning and a repository for what one can see as the collective memory. A collective memory is needed to enable the community to reify its practices and is found in such artifacts as stories, shared understandings and shared perspectives. These types of artifacts, used mainly for internal purposes, are one type of output that a CoP has. Another type of output is new knowledge; for example, new ways of approaching and solving problems or new ways of doing things (Wenger, McDermott, and Snyder 2002). This type of output can be used more explicitly in the service of the larger organizational unit. Thus, we can say that a CoP is a collective entity that produces new knowledge, leading to changes in member's cognitive structures and behavior, which is made explicit through changes in one's practice. By approaching CoPs as an entity that produces new knowledge, we can use group knowledge productivity to help us measure the outcomes of the CoP in ways that can impact the organization. For now, if we agree that learning in a CoP is implicitly situated in the organization's activities and practices, we can also argue - albeit from an instrumentalist perspective - that learning in the CoP should be in the service of the organization. The idea that learning in the workplace should lead to economic improvements is discussed in the section below, but for now what we want to do is look at *how* functioning as a CoP leads to increased group knowledge productivity; why or why not is a CoP an effective environment for collective learning and how can we clearly establish this? In the following section, we argue that the internal social-cognitive processes occurring in a CoP inherently aid group knowledge production. Because we see the internal processes of a CoP as a complex web of social interaction between different actors, we use multiple theoretical perspectives to help us gain understanding and come to measurable constructs. We start by looking at the generative mechanisms, or predictor variables, influencing the effectiveness of

collective learning, followed by a discussion that links these mechanisms with the processes occurring in a CoP.

Effective Collective Learning and CoPs

Bunderson and Sutcliffe (2003) show that learning climates effect group goal orientation, one variable of effective group learning. They first distinguish between a learning goal orientation, where emphasis is placed on *gaining* competence, and a performance goal orientation, which emphasizes *proving* competence. According to the authors, a group that has a learning goal orientation shows more adaptive behaviors than a group with a performance goal orientation (p.553). Bunderson and Sutcliffe (2003) also found that a learning goal orientation, as a variable of group learning climate, was a predictor variable for process and product innovations. They state that "...a team learning orientation reflects a shared perception of team goals related to learning and competence development; goals that guide the extent, scope and magnitude of learning behaviors within a team" (p. 553). Although the original conception of CoPs as a purely organic collective appears to be somewhat distant from the concept of a team, there are more similarities than differences between them, especially how each of the groups learn.[i] More importantly, a CoP is a learning environment rather than a performing one, and functions as a space for improvisation and experimentation, and where behaviors are constantly being adapted (Brown and Duguid 2000; Swan, Scarbrough, and Robertson 2002).

Research also shows that there are mechanisms that generate a learning goal orientation. Button, Mathieu, and Zajac (1996) refer to situational cues that lead to a specific goal orientation by 'cuing' the desired behavior, i.e. that behavior which is expected and rewarded by the group, and part of that group's shared understanding. For example, a learning goal orientation is cued by a climate of openness, trust and social discourse (Van den Bossche, Gijselaers, and Kirschner 2006). Lesser and Prusak (1999) refer to these elements of climate as the relational side of social capital, which is vital to the internal processes of a CoP (Saint-Onge and Wallace 2003).

Social capital is an important factor that improves effectiveness for both individuals and organizational groups (Pigg and Crank 2004). Nahapiet and Ghoshal (1998) explain that social capital is made up of three interrelated dimensions; structural, relational and cognitive. These dimensions refer to the network an individual has and uses in order to achieve his goals. Relational aspects of social capital are based on trust and shared norms and values, while the cognitive dimension refers to building a shared understanding, developing a common language and producing artifacts as a history. Here we see that certain of the social processes needed for a CoP to function are the same mechanisms that lead to social capital (Lesser and Prusak 1999).

Van den Bossche, Gijselaers, and Kirschner (2006) found that, among other things, psychological safety, cohesion and potency influenced group learning behavior. Psychological safety, a concept we understand to be very closely related to trust, is a shared understanding that facilitates group learning and an important element of CoPs. While social cohesion plays an important role in the functioning of any group, task cohesion has been proven to be the determining factor for effective groups (Van den Bossche, Gijselaers, and Kirschner 2006). If we examine the concept of task cohesion using CoP theory, we can interpret it as the focus on practice within the domain. Wenger, McDermott, and Snyder (2002) define communities of practice as "...groups of people who share a concern, as set of problems, or a passion about a topic, and who deepen their knowledge in this area by interacting on an ongoing

basis" (p.4). The domain of knowledge is thus the focus of the CoP, and functions much the same way as task cohesion does in other organizational work groups.

Finally, group potency is an expansion to the group level of Bandura's (1997) concept of self-efficacy, and relates to how a group's positive self-perception of its capabilities influences its behavior in a positive way. In other words, if a group feels it has the competences needed to execute a difficult task, then strong group potency will help them to actually perform it. And although there does not seem to be any literature on the concept of group potency in CoPs, we see it as a factor because the ability to easily adapt, as well as to innovate – both characteristics of a CoP - requires self-efficacy (van Woerkom 2003).

Implications for our model

At this point, we have discussed the generative mechanisms that lead to effective group learning. We have also specified that the product of learning in a CoP is new knowledge. Employing these two perspectives, we now turn to two types of variables regarding the impact of a CoP; one that looks at how participation in a CoP leads to factors promoting group effectiveness and two; the actual knowledge products of the CoP, which can take the form of new processes, new products or other innovations.

2.3   The impact of CoPs on the organization

We approach organizations in two ways; as being made up of individual actors (Berends, Boersma, and Weggeman 2003) as well as social groups (Muthusamy and Palanisamy 2004), which we consider to be natural, 'organic' communities of practice (Brown and Duguid 2001; Wenger 1991). We also see CoPs as being developed specifically in the service of the organization, whereas Wenger (1991) and Brown and Duguid (2001) see them only as naturally occurring groups. However, the influence of the different types of CoP on the individual and the organization is similar in the sense that in both cases, it is used by the members as a forum for learning and as a source of new knowledge.

Organizational learning is often conceptualized as a cyclical process involving the individual, the group and the organization as a whole (Crossen, Lane, and White 1999; Stahl 2000). We want to use this cyclical, interconnected perspective as the basis to further our discussion on the impact of CoPs on the organization. We begin by discussing the concept of organizational learning in general, followed by an explanation of how the notion can be directly tied to CoPs. We then discuss the different variables arising from the literature that we can use in order to come to some sort of measures.

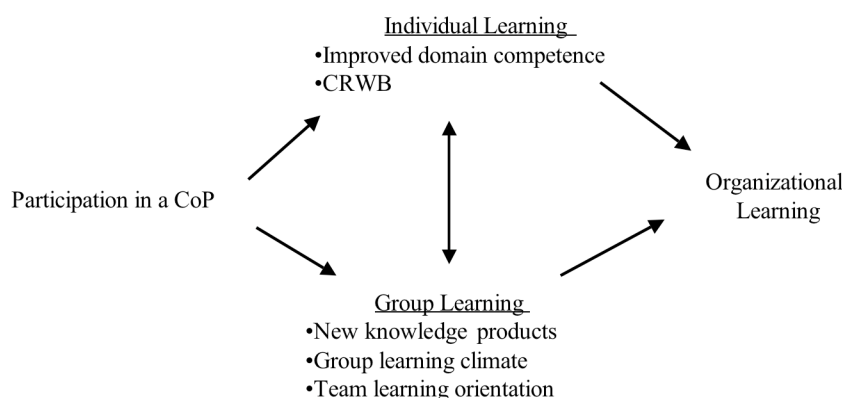*Conceptualizing Organizational Learning*

While we can conceptualize organizational learning (OL) much the same way as individual learning, in the sense that it can be understood from either a process or an outcome perspective (Argyris and Schön 1996), much of the OL literature approaches learning as a process rather than outcome (Bapuji and Crossan 2004). However, congruent with our previous discussion, we take a pluralistic view of OL, because doing so opens up new possibilities for approaching the rather complex topic (Huber 1991).

Mulholland, et al (2001) describe OL as an interactive process between workers who "…among other things, share stories, offer advice, adapt to new tools, and copy the behaviour of respected colleagues" (p. 337). Huber (1991) on the other hand, argues that not all learning leads to a change in behaviour, but that sometimes there is merely a change in the cognitive map or understanding of the individual, which increases the range of an entity's potential behaviour and thus the *potential* effectiveness. For Huber, OL occurs if "… any of its units acquires knowledge that it recognizes as potentially useful to the organization. A corollary assumption is that an organization learns something even if not all of its components learns that something"(p.89).

Understanding OL as having different outcomes, and being a product of individuals (Driver 2002), means that we can consider the learning of individuals functioning within a group as being potentially capable of contributing to organizational learning. Using this perspective helps us establish an even clearer direct link between the individual, a CoP and OL. Now we can start to establish methods to measure the impact of a CoP on OL (and thus the organization) by using changes in individual and group behaviour as well as changes only in cognition. Furthermore, using Huber's (1991) idea that not all of the organization's units need to have learned the same thing, we can use the (knowledge) products of a CoP as proof of OL. Berends, Boersma, and Weggeman (2003) also support Huber's idea that the whole organization need not receive all new knowledge, but add that OL processes must also have an element of new knowledge transfer for them to be effective.

Finally, Van Woerkom (2003) specifically linked individual learning to OL through the concept of critical reflective work behaviour (CRWB). Using the argument given above that participation in a CoP leads to CRWB, we maintain here that participation in a CoP leads to OL. Thus, we can show that OL has or has not in fact occurred by using some of the same instruments we can use for assessing individual and group level impact. We now expand our research model to look like figure 2.2, below.

Figure 2.2: Expanded Conceptual Model

3 Instrumentation

Now that we have a clear conceptualization of the variables that point towards the impact of CoPs, we can look for specific instruments that can measure them. We want to use reliable, existing scales that have a clear basis in the constructs discussed above. As we mentioned earlier, while CoPs are situated in a specific organizational contexts, it should be possible to find some constructs that are at the same time common to all contexts and independent as well. This is what we focus on here in our theoretical model. Any empirical research done within specific organizational contexts should also employ other instruments designed to measure specific competences, or other, context-bound aspects of work.

We would like to increase the value of this research by also testing the effects of participation in a CoP compared with other organizational groups. To do this we propose a pre-test/post-test quasi-experimental research design (Cook and Campbell 1979). This way we should be able to establish impact, as well as measure any changes that are due to participation in a CoP, or due to a group functioning as one. We also propose having one group function as a control, i.e. not participate in a CoP. This means we are also trying to establish if a CoP is in fact an effective learning environment compared with other organizational groups.

Becuase this is a conceptual paper we keep the explanation of the instruments quite brief. A complete list of all the items in the scales, and a statistical analysis of each instrument is available from the author.

3.1 Individual level impact

For the individual, we want to measure the impact of participation in a CoP in two main ways; through advancement in competence within the specific organizational domain and by looking to see if the behavior CRWB increases. The former type of measurements will either need to be developed for the specific organizational context, or existing scales can be adapted. For our current purposes, we need to rely on general learning outcomes.

Measuring Critically Reflective Work Behavior

In order to measure CRWB, van Woerkom (2003) developed a self-reporting scale of 57 items that have a mean alpha score of .76. The items are formulated in a way that attempts to reflect concrete behavior, which helps to avoid theorizing by the respondents and leads to more reliable answers (p.87).

3.2 Group level impact

To measure the impact of functioning as a CoP on group-level learning processes and the knowledge products this leads to we employ two methods. To find new knowledge products we can look at community artifacts such as documents pertaining to solving problems, explaining new processes or other types of communication that disseminate new knowledge to the organization.

We established the effects of a group functioning as a CoP using two different concepts, namely Group Learning Climate and Team Learning Orientation. The latter was developed by Bunderson and Sutcliffe (2003) and consists of self-assessment of five items on a 7-point Likert scale. The Cronbach's alpha for this scale is .95.

Edmonson (1999) developed two scales as a subset of group learning climate; one that measures team efficacy consisting of three items (Cronbach alpha of .63) and one that measures team psychological safety, which has seven items (Cronbach alpha of .82). Both use a seven point Likert scale from "very inaccurate" to "very accurate".

4 Conclusion

In conclusion, we would like to mention that the model presented in this paper still needs to be empirically tested. There might be some problems with the scales measuring group process, because they are worded for teams rather than CoPs. This could affect the reliability, and so some further statistical analysis is also needed. Another consideration is the complexity of the processes being measured. While the quantitative model we presented here should prove to be valuable for understanding certain aspects of community impact, it is by no means complete. We think it is important to compliment our model with qualitative research that uncovers the dynamics of the learning processes taking place in a CoP. Other forms of impact might also be uncovered using deep interviews too. However, we feel that this model lays the groundwork for understanding how communities of practice impact organizational actors, and will help to establish CoPs firmly in the field of organizational development.

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[i] While a team is bound by a management contract, a CoP is bound by a shared practice. And effective teams exhibit many of the same behaviors as effective CoPs.