Virtual Communities of Practice: do they work, where and why?[1]

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ABSTRACT

This paper highlights various results from a research on communities of practice in Canada, in particular the main conditions and challenges of such new modes of knowledge creation and management. It does this on the basis results to a questionnaire survey administered to the participants of these communities of practice. Participants' commitment and motivation in the project, dynamism and continuity of leadership, organizational support and recognition of employees' involvement appear to be the key elements. Some of these variables present interesting differences by age and by gender, and these will be adressed.

RESUMO

Este artigo apresenta resultados de uma pesquisa sobre comunidades de prática realizada no Canadá, abordando, em particular, as principais condições e desafios desse novo modo de criação e de gestão de conhecimento. O trabalho é realizado com base nos resultados de uma pesquisa *survey*, na qual foram aplicados questionários aos participantes de comunidades de prática. O comprometimento e a motivação dos participantes no projeto, o dinamismo e a continuidade da liderança, bem como o apoio e o reconhecimento organizacionais ao envolvimento dos empregados, revelam-se elementos-chave no processo. Algumas dessas variáveis apresentam diferenças por idade e gênero, as quais são exploradas no trabalho.

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Introduction

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Over the years, there has been increased interest in various modes of knowledge creation and management and the preconditions to succeed in such initiatives. Much of this interest stems from the fact that organizations expect substantial gains from knowledge development. Knowledge management is thus seen in many organizations as a source of competitiveness and innovation. The concept of communities of practice arises from this interest, but it is viewed as a specific form of knowledge development, in principle more centred on the individuals and their exchanges than on "management" by the firm, although the firm does seem to have a role to play in fostering such initiatives. Thus, the use of communities of practice has emerged as a way to develop collective skills and organizational learning, in order to foster innovation and success for organizations.

Organizational learning is part of a broader concern related to the development of collective skills. We know that a large proportion of effective relations within organizations are informal, a characteristic that relates to the concerns of the communities of practice, which are usually based on informal relations. Organizational learning goes beyond individual learning, which can lead to relatively permanent changes in the individual's behaviour, because it results in the development of a knowledge basis which could translate into a more significant change of another kind within the organization. The knowledge is disseminated throughout the organization, is transmissible between members, is subject to consensus and is integrated into the work processes and the structures of the organization. From this perspective, organizational learning is closely linked with "meaningful" organizational processes, which are basically routines used by decision-makers to detect certain problems, define priorities, find solutions and attempt to improve performance.

In this paper, we will first define this new form of learning and knowledge management through communities of practice. We will then present some of the results, centering on the conditions of success and challenges that emerge and underline a few interesting differences observed according to age and gender, as well as limits in the learning and sharing process, which are often underestimated. Let us add that amongst a series of demographic variables, age generally came out as most significant, while professional category and level of schooling were not sufficiently differentiated amongst our respondents to present significant differences and gender presented less significant differences.

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Communities of Practice

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The term 'communities of practice' was first used by Brown and Duguid (1991) and by Lave and Wenger (1991), and it was popularized more widely in two major works (WENGER *et al.* 2002, 2000). It refers to the idea of sharing information and knowledge within a small group, as well as to the value of informal learning for a group and an organization. Wenger *et al*. (2002, p.4-5) describe a community of practice as a group of participants who:

> Don't necessarily work together every day, but they meet because they find value in their interactions. As they spend time together, they typically share information, insight, and advice. They help each other solve problems. They discuss their situations, their aspirations, and their needs. They ponder common issues, explore ideas, and act as sounding boards. They may create tools, standards, generic designs, manuals, and other documents – or they simply develop a tacit understanding that they share. However they accumulate knowledge, they become informally bound by the value that they find in learning together. This value is not merely instrumental for their work. It also accrues in the personal satisfaction of knowing colleagues who understand each other's perspectives and of belonging to an interesting group of people. Over time, they

develop a unique perspective on their topic as well as a body of common knowledge, practices, and approaches. They also develop personal relationships and established ways of interacting. They may even develop a common sense of identity. They become a community of practice.

The advantages of communities are said to be the following: informal diffusion of relevant knowledge, exchange of knowledge between peers and, as a result, improvement of innovation and productivity.

In the 90s, observers mainly studied informal communities that were created spontaneously in a workplace. However, over the years and since 2000 particularly, there has been increasing interest in creating and cultivating such communities in workplaces (McDERMOTT, 2000, 1999; SWAN *et al*., 2002; WENGER, *et al.,* 2002). Many of these communities are teleworking communities that use information and communication technologies, and this was the case in the communities we studied.

The following definitions help us to better understand what this concept actually means (MITCHELL, 2002):

- Communities of practice are people who share a concern, a set of problems or a passion about a topic, and deepen their knowledge and expertise in this area by interacting on an ongoing basis
- A group whose members regularly engage in sharing and learning, based on their common interests

Table 1- Various Forms of Communities of Practice

Aspects	Informal	Supported	Structured
Objective	Provide a discussion forum for people with affinity of interest or needs within their practice	Build knowledge and capability for a given business or competency area	Provide a cross-functional platform for members who have common objectives and goals
Affiliation	Self-joining or peer invited	Self-joining, member invited or manager suggestion	Selection criteria outlined Invited by sponsors or members
Sponsorship	No organizational sponsor	One or more managers as sponsors	Business unit or senior management sponsorship
Mandate	Jointly defined by members	Jointly defined by members and sponsor(s)	Defined by sponsor(s) with endorsement of members
Organizational support	General endorsement of communities of practice Provision of standard collaborative tools	Discretionary managerial support in terms of resources and participation Supplemented array of tools and facilitation support	Fully-fledged organizational support on the same basis as organizational segments Budget allocation as part of business plans

Infrastructure	Most likely meets face-to-face; primary contact Has a means of communication for secondary contact	Uses collaborative tools Meets face-to-face on a regular basis	Uses sophisticated technological infrastructure to support collaboration and store knowledge objects generated in the community Highly enabled by technology
Visibility	So natural that it may go unnoticed	Visible to colleagues affected by the community's contribution to practice	Highly visible to the organization through targeted communication efforts that are stewarded by sponsors.

Source: from Davel and Tremblay (2008, forthcoming), adapted from Saint-Onge and Wallace (2003, p.36-37).

Wenger *et al*. (2002) as well as Mitchell (2002), among others, indicate that communities of practice take on various forms, and table 1 highlights the differences that exist between types of communities. In the cases we studied, communities were of the structured type, most of them being formally supported by one organization, a few being inter-organizational, but all having to do with their work activity and not personal interests, as is more often the case in the informal type of community.

Much existing literature centers on face to face communities (GHERARDI and NICOLINI, 2000), but many communities actually function in a context of distance or telework (HILDRETH *et al*., 2000). This brings us to the issue of virtual communities of practice, which are more and more common in a global environment, and are the type of community we have studied. In our view, this virtual dimension is an important aspect of communities of practice theory, especially in the global context, and it requires more detailed analysis. We carried out this research in order to extend this analysis, and to identify the main challenges related to virtual or distance communities of practice.

Also, much of the literature does not take into account the temporal dimension, which we always do in our work (DE TERSSAC and TREMBLAY, 2000), since it appears essential in analyzing organizations, which by definition evolve over time. The most detailed model of the evolution of communities of practice was presented by Wenger *et al*. (2002), but in our view it again presents a very normative portrait of communities of practice, from which reality often departs.

Wenger *et al*. (2002) define five stages (WENGER *et al*., 2002; BOURHIS and TREMBLAY , 2004). At the beginning, the community is an informal network, a potential community. It then unites itself and acquires maturity, and then momentum, and becomes productive (MITCHELL, 2002) until at some point, an event makes it essential for the community to change or renew itself. Again, this seems a little normative in comparison to the real life of communities, and we wanted to better understand the variables which influence the life of communities.

Let us now turn to conditions of success of these communities. First, group work always requires a number of conditions and the communities of practitioners (CoPs) are not an exception to this rule. On the contrary, these conditions are certainly even more important in the CoP context, since participants must in principle share tacit knowledge, collectively build up knowledge, and solve production or service problems. In this context, in our view, the social relations between actors and demographic characteristics cannot be neglected, although they tend to be in the literature on communities of practice. We therefore turned to the literature on collaborative learning to dig into the reality more deeply and put forward new questions to the participants of the communities.

One of the main conditions mentioned in the literature on collaboration and collaborative learning (HENRI and LUNDGREN, 2001) concerns the commitment of participants to the task or the community, as well as the interest and motivation of individuals to work together as a group. In the Community of practice (CoP) literature, some authors refer to a "joint enterprise" to describe the mission or common objective that participants give to a CoP. However, few authors have determined how to foster this commitment, which appears to be taken for granted regardless of the context and the social relations of work, whereas in reality this is not the case. Second, many authors emphasize the importance of having a shared set of resources or what could be referred to as "common baggage," or common language, in order to facilitate exchanges and avoid misunderstandings and conflicts.

Results from our Research

The results presented in this paper are derived from action research on a dozen communities of practitioners (CoPs) conducted under the aegis of the *Centre francophone d'informatisation des organisations* (CEFRIO). In fact, seven CoPs have actively participated in the research, which was carried out from 2001 to 2003. One hundred and eighty (180) participants answered questionnaires on starting up a CoP and slightly less than 100 participants answered evaluation questionnaires six months later. In addition, focus groups and recordings of critical incidents in each of the communities were also conducted so as to better understand the dynamics of each of the CoPs. We will focus on the aspects related to learning and training, paying particular attention to the conditions and challenges that emerge from our results.

Let us first present a few demographic characteristics of our respondents. The majority of respondents, that is 60% (105 out of 173 respondents to this question), were aged from 35 to 49. However, there is a good differentiation in ages, which permits some statistical analyses, as we will see later.

Figure 1 - Respondents According to Age
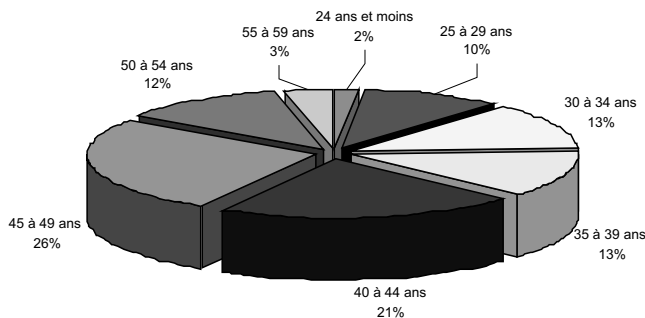
Let us add that there were 61 % women against 39 % men (105 @…; 68 B…out of 173 respondents.

Attainment of objectives

Although the objectives of the communities of practitioners studied differed (JACOB *et al*., 2003), they were mainly aimed at learning through exchange and collaboration. From this perspective, it is interesting to note how the objectives have evolved over time. When the communities were starting up, the objectives

identified by the participants were usually related to exchange and sharing of information and knowledge, better utilization of delocalized resources, as well as the creation of a collective memory — objectives which actually pertain to knowledge sharing.

It must first be stressed that the majority of respondents to this question had mixed feelings about the success and usefulness of the community, even though they think that it has had a positive impact on the work climate. Thus, although the participants do not appear to be enthusiastic, collaboration within the CoPs seems to be rather positive. (BOURHIS and TREMBLAY, 2004).

However, after a few months of work in a virtual CoP, the achievement of objectives seemed to be uneven. In fact, although certain CoPs felt that they had achieved their objectives (TREMBLAY, 2004a), this was not so true of other CoPs. Perhaps it was still too soon to assess the achievement of objectives since, unlike project teams or groups, CoPs are not supposed to have a specific schedule and they have to learn new operating modes in a short time.

Concerning the partial achievement of the objectives of CoPs, there are various possible reasons for this, including the frequent change of CoP leader, the loss of interest on the part of management or participants, or the lack of time for participation. However, it must be stressed that developing learning and experimenting with a new problem-solving approach, which were not always among the objectives considered to be the most important at first, seemed to have been relatively well achieved by a number of CoPs and these forms of learning are greatly appreciated by the participants. There appear to be criteria and conditions for CoPs to function and clearly, this type of arrangement cannot be transferred anywhere or globalized without taking into account these considerations.

It must be stressed that all of the CoPs operated with a knowledge-sharing telesoftware. The participants were either not very familiar with the software or had to more or less master it in a few months, depending on how easy or difficult it was for them to use this software and the time - which is generally limited - that they had. The use of software such as Knowledge Forum or Lotus Notes, which was different in each case, allowed CoP participants to exchange messages. These were then grouped together on a space and could be reviewed and re-organized according to the themes discussed in the exchanges. In principle, this is how virtual (i.e., teleworking) communities must jointly develop knowledge.

We analyzed the data on success or attainment of objectives according to various demographic variables, but only two (gender and age) came out significantly in some of the analyses. For various reasons, often lack of variance in the respondents, the other variables tested did not show up as significant: level of schooling, professional category, language have however been tested and should eventually be the object of more analyses.

There were 178 respondents in the first phase of the research (1st questionnaire) and 106 in the second phase, six months later, which essentially addressed issues of impact and results.

The success of the CoP was evaluated in different ways, amongst which the attainment of the strategic and operational objectives of the CoP according to the demographic variables and, as mentioned, analyses revealed few significant links, except with gender and age, which we highlight here.

Differences by gender

It is often interesting to look at gendered differences, when use of technology is analysed (TREMBLAY, 2003, 2002), as is the case with the CoPs we are studying. Table 2 highlights some gendered differences, but also an interesting convergence in many answers, since most answers do not differ significantly (n-s = non significant difference). However, women systematically rate higher the various elements. They consider that the first objective of CoPs is to facilitate exchange and sharing of informatioin, followed by favouring excellence, developing competencies, favouring learning, better quality, better use of delocalized resources, valuing innovation and stimulating creativity. The most important objective to them is also the one

that is attained at a higher level, but less than expected. Let us recall that impotance was measured at time 1, while attainment of objectives is measured at time 2.

Table 2 – Importance and Attainment of Strategic and Operational Objectives, According to Gender

| Objectives | gender | | | | | |
| | men | | women | | Total | |
	Importance[A] Moyenne N Écart-type	Attaiment[B] Moyenne N Écart-type	Importance Moyenne N Écart-type	Attaiment Moyenne N Écart-type	Importance Moyenne N Écart-type	Attaiment Moyenne N Écart-type
Value innovation [A]t(142)= -3,32*** [B] n-s	4,00 55 *0,82*	3,54 26 *0,81*	4,44 89 *0,74*	3,53 51 *1,06*	4,27 144 *0,80*	3,53 77 *0,98*
Better relation with client [A]t(138)= -2,78** [B] n-s	3,83 52 *1,00*	3,10 21 *0,89*	4,26 88 *0,82*	3,18 38 *0,83*	4,10 140 *0,92*	3,15 59 *0,85*
Better quality [A]t(140)= -2,86** [B] n-s	4,15 53 *0,93*	3,25 24 *0,79*	4,53 89 *0,64*	3,41 44 *0,95*	4,39 142 *0,78*	3,35 68 *0,89*
Value excellence [A]t(142)= -2,09* [B] n-s	4,38 53 *0,69*	3,29 28 *0,76*	4,62 91 *0,65*	3,65 49 *0,97*	4,53 144 *0,67*	3,52 77 *0,91*
Rationalisation n-s	3,39 51 *1,22*	2,61 18 *0,92*	3,57 86 *1,14*	3,07 28 *0,94*	3,50 137 *1,17*	2,89 46 *0,95*
Value competencies [A]t(140)= -4,98*** [B] n-s	3,90 53 *0,81*	3,22 27 *0,93*	4,53 89 *0,66*	3,38 40 *1,00*	4,30 142 *0,78*	3,31 67 *0,97*
Efficiency n-s	3,96 52 *0,91*	3,23 22 *0,92*	4,17 88 *0,90*	3,35 37 *0,95*	4,09 140 *0,90*	3,31 59 *0,93*
Facilitate exchange and sharing of information [A]t(94,58)= -2,11* [B]t(81)= -2,42*	4,49 55 *0,74*	3,48 31 *0,89*	4,74 92 *0,59*	4,00 52 *0,97*	4,65 147 *0,66*	3,81 83 *0,97*
Experiment a new type of problem resolution [A]t(140)= -2,20* [B] n-s	3,98 55 *0,89*	3,60 30 *1,00*	4,29 87 *0,75*	3,78 51 *0,86*	4,17 142 *0,82*	3,72 81 *0,91*
Better use of delocalised resources [A]t(143)= -2,42* [B] n-s	4,09 55 *0,97*	3,44 25 *1,00*	4,46 90 *0,82*	3,81 43 *0,96*	4,32 145 *0,90*	3,68 68 *0,98*
Reduce workforce n-s	2,17 54 *0,97*	2,45 11 *0,93*	2,32 78 *1,04*	2,39 23 *1,08*	2,26 132 *1,01*	2,41 34 *1,02*
Maximise working time n-s	3,49 53 *1,15*	2,86 21 *1,01*	3,75 85 *1,08*	3,00 39 *0,95*	3,65 138 *1,11*	2,95 60 *0,96*
Reduce duplication [A]t(137)= -2,33* [B] n-s	3,98 54 *1,00*	3,28 25 *1,06*	4,37 85 *0,91*	3,39 44 *1,02*	4,22 139 *0,96*	3,35 69 *1,03*
Stimulate creativity [A]t(140)= -3,93*** [B] n-s	3,87 54 *0,91*	3,32 28 *0,86*	4,43 88 *0,77*	3,64 50 *1,06*	4,22 142 *0,87*	3,53 78 *1,00*
Favor learning [A]t(140)= -3,96*** [B] n-s	4,06 54 *0,76*	3,59 29 *0,82*	4,57 88 *0,74*	3,90 52 *0,89*	4,37 142 *0,79*	3,79 81 *0,88*
Légende : [A] : Scale of importance where 1=not at all important; 2=slightly important; 3=average importance; 4=quite important; 5=very important [B] : Scale of attainment of objectives where 1=not attained at all; 2=slightly attained; 3=more or less attained; 4=attained; 5=perfectly attained n-s = T-Test non-significant *** p = 0,001 ** p = 0,01 * p = 0,05						

As concerns differences according to gender, in terms of strategic objectives, only the objective of valuing excellence presented a significant gendered difference. (tables available in BOURHIS and TREMBLAY, 2004). For operational objectives as well, differences according to gender are not numerous, since only the objective of facilitating exchange and sharing of information was differentiated according to gender. This is interesting since it indicates that in general, men and women agree

on the objectives the organization aims at when introducing communities of practice.

We mentioned that success was measured in different ways, not only in terms of attaining objectives as shown in table 2, but as well in termes of learning and professional and personal enrichment. We only highlight the significant differences. We observed that success from the individual point of view is not strongly differentiated according to gender as concerns professional enrichment and satisfaction in participation, but women value more the personal enrichment they gained through the CoP. In other evaluations of success of the CoP, it is interesting to observe that the numbers given by women are systematically superior to those of men, although not significantly.

Table 3 - Measures of Success from the Individual Point of View, by Gender

Gender		I found my participation in the CoP very enriching from a personal point of view	I found my participation in the CoP very enriching from a professional point of view	I am very satisfied of my participation in the CoP	I contributed a lot to the CoP
Men	Mean	4,1765	4,6176	3,5000	3,0588
	N	34	34	34	34
	Standard Deviation	1,76619	1,68801	1,69223	1,73975
Women	Mean	5,1176	5,2115	4,0769	3,7170
	N	51	52	52	53
	Standard Deviation	1,70466	1,69586	1,78057	1,85407
Total	Mean	4,7412	4,9767	3,8488	3,4598
	N	85	86	86	87
	Standard Deviation	1,78054	1,70795	1,75913	1,82874

Personal and professional enrichment as well as satisfaction were slightly differentiated according to professional category, but since there is little variance (most of the respondents are professionals), we do not show them here.

As concerns measures of learning, it is differentiated according to gender, women indicating that they gained more professional and personal learning in this context. As for the general measure of success (« the CoP was a success »), it is also differentiated according to gender, but this is not the case for other measures presented in table 4.

Table 4 - Measures of Success According to Gender

Gender		Cop Teamwork had a positive effect on work climate	CoP was a success	I think the global objectives of the CoP were attained	I would be interested in continuing to participate	the CoP was useful for my employer
Men	Mean	3,5625	4,1935	4,3333	4,8387	4,5333
	N	32	31	30	31	30
	Standard deviation	1,54372	1,79665	1,80676	1,79066	1,83328
Women	Mean	3,9375	4,9592	4,7143	5,3269	4,2979
	N	48	49	49	52	47
	Standard deviation	1,58995	1,87037	1,82574	1,77920	1,78051
Total	Mean	3,7875	4,6625	4,5696	5,1446	4,3896
	N	80	80	79	83	77
	Standard deviation	1,57266	1,86876	1,81647	1,78839	1,79294

Differences are more significant when data is analyzed according to age, and we will turn to them now.

Differences by age

Let us again recall that we have different measures of success and attainment of objectives, which measure the results of the CoPs. In comparison with gender, differences are more significant when data is analyzed according to age, as is shown in table 5. Again, for these statements, there were no significant differences according to professional categories, level of schooling or mastery of computer, which is interesting, since we might have thought that familiarity in use of computer would be more important for virtual communities of practice. This does not seem to be a structuring characteristic that would determine success.

Table 5 - Measures of Success of the CoP According to Age

AGE		Cop Teamwork had a positive effect on work climate	CoP was a success	I think the global objectives of the CoP were attained	I would be interested in continuing to participate	the CoP was useful for my employer
Under 35	Mean	4,2632	5,1500	4,7368	5,1905	4,8000
	N	19	20	19	21	20
	Standard deviation	1,44692	1,38697	1,69450	1,72102	1,70448
35 to 49	Mean	3,6863	4,7200	4,7143	5,4314	4,5208
	N	51	50	49	51	48
	Standard deviation	1,66722	1,89564	1,76777	1,48667	1,68838
50 and over	Mean	3,4000	3,4000	3,6364	3,7273	2,7778
	N	10	10	11	11	9
	Standard deviation	1,17379	2,17051	2,11058	2,57258	1,85592
Total	Mean	3,7875	4,6625	4,5696	5,1446	4,3896
	N	80	80	79	83	77
	Standard deviation	1,57266	1,86876	1,81647	1,78839	1,79294

As for attainment of objectives, we can see that these are generally evaluated more positively by those aged 35 and under, then by the 35 to 49 and finally 50 and over. A certain number of evaluations are differentiated according to age, as is seen in table 6. However, all agree that the objective best attained was the exchange and sharing of information and knowledge, while the least attained is the reduction in workforce, which sometimes worries participants in CoPs.

Table 6 – Level of Attainment of Objectives, According to Age

	Age		
	Under 35 yrs	**35 – 49 yrs**	**50 and over**
	Average [A] N *Standard Deviation*	Average N *Standard Deviation*	Average N *Standard Deviation*
Value innovation [B]	3,75 20 0,85	3,62 47 0,87	3,53 77 0,98
Better relation with client	3,13 15 0,74	3,22 37 0,82	3,15 59 0,85

Better quality	3,41 17 0,80	3,38 42 0,79	3,35 68 0,89
Value excellence	3,58 19 0,84	3,56 48 0,88	3,52 77 0,91
Rationalisation ᴮ	3,06 16 0,85	3,00 24 0,88	2,89 46 0,95
Value competencies	3,40 20 0,82	3,38 39 0,96	3,31 67 0,97
Efficiency ᴮ	3,61 18 0,85	3,35 34 0,85	3,31 59 0,93
Facilitate sharing of information and knowledgeᴮ	4,05 20 0,83	3,88 52 0,88	3,81 83 0,97
Experiment a new approach to problem resolutionᴮ	3,90 20 0,72	3,80 50 0,81	3,72 81 0,91
Better use of delocalised resourcesᴮ	3,84 19 0,63	3,80 40 0,88	3,68 68 0,98
Reduce workforce	2,31 13 0,63	2,71 17 1,16	2,41 34 1,02
Maximise working time ᴮ	2,89 18 0,76	3,14 35 0,94	2,95 60 0,96
Reduce duplication	3,28 18 0,75	3,50 44 0,95	3,35 69 1,03
Stimulate creativity ᴮ	3,68 19 0,75	3,63 49 0,97	3,53 78 1,00
Favor learning ᴮ	3,95 20 0,60	3,85 52 0,83	3,79 81 0,88

ᴬ Average on a scale of 5 points were : 1=not at all attained ; 2=not much ; 3=more or less attained; 4= attained; 5=perfectly attained
ᴮ Significant statistical differeences between means; see the analysis of tests in following table
Boxed = Highest and lowest averages.

Table 7- Links between Attainment of Objectives and Age

Mesure d'atteinte des objectifs	Resultat of variance analysis	Age groups (Results of S-N-K test)		
		Low level	Average level	High level
Value innovation	F (2,74) = 4,68*	50 yrs and +		- Under 35 ans - 35 - 49 yrs
Rationalisation	F (2,43) = 3,40*	50 yrs and +	- Under 35 - 35 - 49 yrs	
Efficiency	F (2,56) = 6,10**	50 yrs and +	- Under 35 ans - 35 à 49 ans	
Facilitate exchange and sharing of information and knowledge	F (2,80) = 5,07**		50 yrs and +	- Under 35 yrs - 35 - 49 yrs
Experiment new approaches in problem-solving	F (2,78) = 4,40*		50 yrs and +	- Under 35 yrs - 35 - 49 yrs
Better use of delocalised resources	F (2,65) = 4,83*	50 yrs and +	- Under 35 ans - 35 à 49 ans	
Maximise working time	F (2,57) = 3,45*	50 yrs and +	- Under 35 yrs - 35 - 49 yrs	
Stimulate creativity	F (2,75) = 4,23*	50 yrs and +	- Under 35 yrs - 35 - 49 yrs	
Favor learning	F (2,78) = 3,32*		50 yrs and +	- Under 35 ans - 35 - 49 yrs

Legend :   *** p = 0,001 ** p = 0,01   * p = 0,05

Table 7 indicates that participants aged 50 and over are those who distinguish themselves the most concerning the attainment of objectives, generally having a lower evaluation than other age groups. This may be due to the fact that they have a longer experience of the organization, that they may be more critical of what has been learned or done in the context of CoPs. Surely, it indicates, that these elements of past experience should be taken into account and the age and experience issue taken into account in the organizations that want to create and structure a CoP.

Links between demographic variables and learning

As we indicated earlier, success was measured in different ways, amongst which learning and personal enrichment. Table 8 highlights differences in learning according to age.

Table 8 – Learning According to Age Groups

	Age groups			
	Under 35 ans	**35 - 49 yrs**	**50 and over**	**Total**
	Average [A] N *Standard Deviation*	Average N *Standard Deviation*	Average N *Standard Deviation*	Average N *Standard Deviation*
I did important personal learning in the CoP	4,50 20 1,57	4,40 47 1,44	3,42 12 1,68	4,28 79 1,54
I did important professional learning in the CoP	4,80 20 1,44	4,73 48 1,45	3,50 12 1,73	4,56 80 1,54
I found my participation in the CoP very enriching on the personal level	4,95 21 1,77	4,83 52 1,71	4,00 12 2,04	4,74 85 1,78
I found my participation in the CoP very enriching on the professional level	5,24 21 1,55	5,11 53 1,59	3,92 12 2,19	4,98 86 1,71
Other participants brought me a lot in the CoP	4,80 20 1,36	4,79 48 1,46	4,33 12 1,83	4,73 80 1,48
My competencies for teamwork increased in the CoP	4,45 20 1,28	4,02 48 1,25	3,45 11 1,69	4,05 79 1,34
The transfer of my learning in the CoP was or will be recognised by my peers	3,26 19 1,79	3,44 39 1,89	3,00 6 1,55	3,34 64 1,81
I learn a lot in the CoP	4,67 21 1,32	4,50 54 1,56	3,42 12 1,68	4,39 87 1,56

[A]   Average on a scale of 7 points where   : 1=totally disagree ; 2=disagree; 3= slightly disagree; 4=neither agree or disagree; 5=slightly agree; 6=agree ; 7=totally agree.
*** p = 0,001   ** p = 0,01 * p = 0,05

We can see in table 8 that the group of 35 and under present the highest evaluations, while the 35-49 present intermediate evaluations, while the 50 and over present the lowest evaluations. Is this due to the fact that older participants have learnt more over their lifecourse and therefore the specific CoP learning is necessarily judged as less important? Or do they appreciate less the CoP format? Some qualitative work on a few CoPs indicates that the animation of the community might be deficient in some organizations, leading to less interest of participants (TREMBLAY, 2005a, b). This would need to be analysed in more detail, but these are interesting questions for firms who want to introduce learning and sharing throught the CoP format. Age groups might need to be taken into account in such projects, their familiarity with formal written exchanges on the web or email may be somewhat lesser in some economic sectors or professional and management categories.

Table 9 – Links between Learning and Age

Measure of attainment of objectives	Results of variance analysis	Age groups (Results of S-N-K test)		
		Low level	Average level	High level
I did important professional learning in the CoP	F (2,77) = 3,59*	50 and over	- under35 yrs - 35 - 49 yrs	

Legend :   *** p = 0,001 ** p = 0,01   * p = 0,05

It is interesting to note that the only significant difference is that for professional learning. Again, this is probably due to the fact that this age group has done more important professional learning to this date than younger groups.

Table 10 – General Measures of Success According to Age

	Age groups			
	Under 35 yrs	35 - 49 yrs	50 and over	Total
	Average N Standard Deviation	Average N Standard Deviation	Average N Standard Deviation	Average N Standard Deviation
Teamwork had a positive impact on work climate at my employer's	4,26 19 1,45	3,69 51 1,67	3,40 10 1,17	3,79 80 1,57
I am very satisfied with my participation in the CoP	3,76 21 1,61	4,00 53 1,77	3,33 12 2,02	3,85 86 1,76
I am interested in continuing to participate in the CoP	5,19 21 1,72	5,43 51 1,49	3,73 11 2,57	5,14 83 1,79
The CoP is very useful for the organisation that supports it	5,16 19 1,64	5,21 43 1,28	3,90 10 2,42	5,01 72 1,61
The Cop is very useful for my employer	4,80 20 1,70	4,52 48 1,69	2,78 9 1,86	4,39 77 1,79
The CoP is a success	5,15 20 1,39	4,72 50 1,90	3,40 10 2,17	4,66 80 1,87
I think my global objectives were attained	4,74 19 1,69	4,71 49 1,77	3,63 11 2,11	4,57 79 1,82
My professional objectives are attained	4,11 18 1,53	4,43 47 1,23	3,40 10 1,58	4,21 75 1,38
My personal objectives are attained	4,11 19 1,45	3,94 47 1,22	3,50 10 1,43	3,92 76 1,30
What is your global evaluation of the CoP ? B	3,90 21 0,70	3,68 57 0,87	3,33 12 1,07	3,69 90 0,87

Unless indicated, it is a 7 point scale where : 1=totally disagree; 2= disagree; 3=slightly disagree; 4=neither agree or disagree; 5=slightly agree; 6=agree; 7=totally agree.
B Average on a scale where : 1=very negative; 2=negative ; 3=neutral; 4=positive; 5=very positive;

Table 11 – Links between General Measures of Success and Age

Mesure	Resultat of variance analysis	Age groups (Results of S-N-K test)		
		Low level	Average level	High level
I would be interested in continuing to participate in a CoP	F (2,80) = 4,47*	50 and over		- under 35 yrs - 35 - 49 yrs
The CoP was a success	F (2,77) = 3,15*	50 and over	- Under 35 yrs - 35 - 49 yrs	
The CoP is useful for my employer	F (2,74) = 4,71*	50 and over	- Under 35 yrs - 35 - 49 yrs	

Légende :   *** p = 0,001   ** p = 0,01   * p = 0,05

Table 10 gives general averages for the evaluation of success according to age and table 11 lets us see that 3 of these are diffentiated according to age. Again, the group of 50 and over judge more severely the level of success attained and the usefulness of CoPs, and they are less interested in continuing to participate.

Sources of satisfaction

We will add a few elements concerning satisfaction and dissatisfaction as this is an important issue. In general, participants appreciated the pertinence of the topics addressed in the exchanges in relation to their work, the collaboration between members, the solving of work problems, the establishment of consensus, group work, and the development of new skills. They were slightly more critical of the quality of the exchanges, which was viewed differently by different CoPs. It must, however, be noted that younger participants seemed to appreciate all these aspects more than participants aged 50 or over. More in-depth analysis is needed to determine whether age alone explains this finding or whether other variables might be more important in the explanation.

Participants were also asked to assess different aspects of their experience. It was clear that the most interesting aspect for participants was learning from other people as well as exchanging and sharing information and knowledge. Nevertheless, it is interesting to note that the majority of participants thought that they had learned more from others than had contributed to the exchanges themselves. It thus seems that there was a deficit in active participation by CoP members, since many of them remained somewhat on the periphery of the community's central core, in what is referred to as "peripheral participation." (more detail in TREMBLAY, 2004, 2004a).

It must be noted that women's involvement in the project was often slightly higher than that of men, at least according to their own evaluation. More research needs to be done however on this issue of involvement and participation, according to gender, since it was not possible to determine whether other elements of context (organizational culture, financial context of the firm, the interest of the CoP project itself, etc.) might explain the stronger involvement of women in the cases covered here.

Sources of dissatisfaction

The main sources of dissatisfaction identified by the participants relate to the lack of recognition of participation by the employer, sometimes also the lack of peer recognition, and in particular the too often limited time (given the objectives), spent on the community's activities. In fact, the majority of participants were not released from other tasks to participate in the CoP and this activity therefore ate up their working time (TREMBLAY, 2004). However, the most satisfied CoP in this regard is made up of a group of some 20 female health professionals, whose CoP was not supported by their employer but by a professional association, and thus the participants used their personal time to participate (TREMBLAY, 2004). Once again, motivation and commitment to the project emerged as the key variables in the success of this CoP. Participants were willing to put personal time in a project because the knowledge acquired and the achievements seemed to be worth their while.

In contrast, in other cases, the achievements were apparently too minor or not sufficiently visible or satisfactory. This negative view was confirmed by the fact that the majority did not think that the CoP activity would be recognized in their performance evaluation, career progression, and skills assessment. However, it seemed that participants were generally more optimistic about the recognition of their learning by colleagues, although this did not yield concrete results in career terms.

It must be noted that most of the participants in the CoPs studied did not know each other well beforehand, but were designated to participate in these CoPs. Therefore not all of them were volunteers. Moreover, one CoP in which most participants did not know each other at all - composed of the female health professionals - was the most successful case in our view, which means that other factors (professional commitment in this case) can compensate for prior acquaintance. Nevertheless, the latter is deemed to be important by many authors, as it is

considered to be a source of trust and greater collaboration between participants. Indeed, it was found that although prior acquaintance can make it easier to collaborate in certain CoPs, it is not a sufficient condition for them to achieve their objectives. Thus, although being in the habit of collaborating can result in trust, which is generally considered to be essential to collaboration and learning, it is evident that participants need additional motivation to move the CoP forward and achieve its objectives. Moreover, it should be noted that women spent twice as long as men on CoP activities, on average, one hour versus half an hour for men.

These observations contribute to the existing literature on communities of practice, since it nuances the importance of prior acquaintance and organizational support, often considered as determinant characteristics of the success of communities of practice. Our research tends to highlight the importance of commitment, personal involvement and interest in learning from others. It may also be that the most successful groups had less difficulty working from a distance or teleworking (TREMBLAY, 2003, 2002)

The research has some limits and the following questions should however be explored further: Are women more motivated by this form of learning and collaboration? Do they trust people more and are they more willing to share knowledge? Or, were the projects in which they participated more motivating or characterized by a better animation?

Conclusion

Finally, we would like to get back to a number of factors related to the conditions and challenges associated with CoPs to conclude on the issues which we think need to be dwelved upon in future research.

It was mentioned above that participants' commitment was considered to be a crucial factor in the success of CoPs. In fact, the most successful CoP was one in which the participants' commitment was indeed important (TREMBLAY, 2005b). However, other factors can play a role in explaining the more mixed success of other cases: for example, the lack of dynamism on the part of the CoP leader, the frequent change of leaders, or the fact that some participants did not contribute much to the CoP although they maintained that they had learned a great deal by participating. These factors must be taken into account when developing learning through communities of practitioners. One of the communities which functioned the best was headed by a female health professional who had been hired specifically for this task, and therefore invested the necessary time in the project. (TREMBLAY, 2005a,b).

It was also shown in other research that the support offered to participants by the organization is viewed as a factor of success. However, our own results indicated that most of the participants would not necessarily have wanted more resources or training (in conflict management, communication or problem solving) even though few had received the training. Therefore, our findings suggest that training and support resources are not such a key factor in the success of CoPs as is indicated in the litterature. Our results suggest that commitment of participants is a more determinant factor and can easily counterbalance the lack of support.

The modes of maintaining interest over time in these learning and sharing activities of the CoPs seem to constitute a major challenge. One of the most successful cases was one composed entirely of female health professionals which was outside of the employer organizations and therefore this indicates that organizational support is not necessarily the most important source of success, personal commitment being possibly as determinant, as we observed in this case (TREMBLAY, 2005b)

In any case, although relatively new, the CoPs seem to present interesting avenues for learning, but organizations need to consider various dimensions: age, gender, commitment, and various characteristics of the community need to be taken into account, since they may have an impact on success and attainment of objectives of the community.

Also, research clearly needs to be pursued and in the context of management and organizational preoccupations, we think it needs to be pursued mainly on the conditions and factors of success for structured CoPs. There has been much work in the 90s and 2000s on the informal CoPs, especially in the field of education, but there has been much less work in management on the issues and challenges that CoPs pose, much of the literature being of a normative nature. This is why we wanted to contribute by doing some empirical research to test to what extent learning and sharing was actually occurring and to try to identify the factors that make it happen.

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