

Informal learning theories and tools to support knowledge management in distributed CoPs

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Abstract. In this work *informal learning* theories and practices and *social networking* features are taken as starting points to build a reference collaboration model to support collaborative knowledge construction in Distributed Communities of Practices. Sample web 2.0 applications to fit the collaboration model purposes are then described. The provided model can give contribution to the design and to the improvement of a specific collaborative virtual environment to support knowledge management in DCoP.

Keywords: Informal learning, learning 2.0, web2.0, distributed CoPs, knowledge management

1 Introduction

Communities of practices cover a central role in the processes of knowledge management [1][2] as they are “the heart and the soul of knowledge sharing”[3]. Since the purpose of the CoP is typically achieved through the understanding and continuous renegotiation of joint enterprises by its members, a crucial problem that must be addressed in the online environment is to devise methods and tools to support:

- expression, representation and sharing of practices
- development and exploitation of knowledge inside and outside of the CoP
- self/group-reflexivity and metacognition about the practices and about the life of the CoP itself

Indeed, these knowledge management functions have close relation with the collaboration features typically emerging in *informal learning* contexts since in the attempt to maintain a reciprocal engagement in the achievement of a common goal the

CoP members aim at acquiring *significant learning*; from this perspective, as it was pointed out by Wenger [2], a CoP can be seen as “shared learning histories”.

This work is therefore framed and rooted in the background context of *informal learning theories and practices*.

Definitions of informal learning have been given in Cedefop glossary [4] and in the Communication of European Commission in 2001 [5][6]. In these documents *informal*, *formal* and *non-formal learning* are respectively defined as:

- *Formal learning*; learning that occurs within an organized and structured context (formal education, in-company training) and is intentional from the learner’s perspective. Normally it leads to a formal recognition (diploma, certificate).
- *Non-formal learning*; learning embedded in planned activities that are not explicitly designated as learning, but which contain an important learning element. Non-formal learning is intentional from the learner’s point of view.
- *Informal learning*; learning resulting from daily life activities related to work, family, or leisure. It is often referred to as experiential learning and can to a certain degree be understood as accidental learning. It is not structured in terms of learning objectives, learning time and/or learning support. Typically, it does not lead to certification. Informal learning may be intentional but in most cases, it is non-intentional (or ‘incidental’/random).

In the new-born research context of *informal e-learning* theoretical reflection and applied research is still at the beginning and e-learning and knowledge management can derive a significant boost from these “social networking attitudes and practices”. Informal learning is a highly natural practice because it is deeply rooted in our daily behavior; spontaneous relations, interactions and conversations support informal learning practices, contributing to the creation and transmission of knowledge [7]. In informal learning practices the social behavior and the support of technologies converge toward the “network”; a network made by people and resources, a *social network*, unified by personal needs or common goals, interaction policies, protocol and rules and telematic systems all together favoring the growth of a sense of belonging to a community.

In this paper we try to provide a reference model to support online collaboration accounting for new practices and technologies of social networking currently wide spreading in the Internet. The need to reflect and research on such a model is grounded in some critical issues: just to mention some as, reference literature points out [1] [8] [9][10]online collaboration suffers the mediatization of interaction context, has to face the problems of social grounding, is conditioned by trust and reputation, requires group culture development and must face the issues related to the representation and management of knowledge.

To this extent in paragraph 2 we analyzed background conditions for networks of subjects collaborating online deriving *enabling functions* in informal learning

contexts emerging in social networks. Then, in paragraph 3, we present the reference collaboration model which envisages a layered structure where the layers of “Organization” and “Collaboration Management” are supported by functions and conditions of an enabling layer named “Social Networking”. In paragraph 4 we discuss tools and technologies which could support the collaboration model.

The model aims at giving suggestions to designer of online collaboration environment for CoPs in order to maximize the advantages deriving from the effective networking to enhance and improve knowledge management functions.

2 Enabling conditions for collaboration in Distributed CoPs

Collaboration in online environment is harder than in presential situation [1] [3]. This is due to the fact that the integration level normally achievable in presence is typically higher than in network-mediated environment where technology itself is erroneously considered to be capable of providing “group awareness”. Actually, just to mention two underestimated problems that technology can bring, the difficulties of representing a group and the competences of its members in the technological environment as well as the lack of direct contact could weaken the sense of belonging and quickly lower the motivation to collaborate.

A crucial role is therefore played by designing a collaboration system (that is a grounding method availing of several tools) in its integrated aspects, accounting for subjects, technologies and environment.

Scenarios which become always more common highlight that through informal channels new learning and knowledge management spaces more easily are enabled, thanks to people and their ability to “networking” and reciprocally learn in a natural and spontaneous way [11]. The reference model for collaboration proposed in the next paragraph aims at fostering these potentialities. This model was inspired by the analysis of the strengths emerging in the context of informal e-learning in social network, to evaluate the integrability and/or transferability in other context, such as knowledge management in CoPs.

From this perspective in Table 1 the main difference between social networks and CoP are schematized as fort their sharing/cooperation/collaboration characteristics.

Table 1. Distinctions among the CoP and Social Network, adapted from [1]

Entity	Social Network	CoP
Goal	Relation based on individual interests, debate, confront on specific topics; multiplicity and heterogeneity of joining interests and motivations	Create and expand knowledge; develop individual skill
Belonging	Spontaneous and autonomous motivation	Self-selection based on expertise or passion for the topic
Duration	Non-defined	It evolves and ends organically

		according to the relevance of the topic and of the reciprocal interest
Cohesion and enabling factors	High level of trust (relevance of reputation), sense of responsibility, high technological skills, distributed reflexivity and evaluation (non autonomous, nor heteronomous but socially spread) Type of relation: share/evaluate	Passion, trust, identification with the groups and their expertise Type of relation: share/collaborate/cooperate

A model for collaboration in online communities should first of all satisfy some general “effectiveness conditions” (the term *satisfy* is on purposely adopted instead of *implement*, because the functions that follow are hardly hardcoded in a technical system; they are more likely enabled or supported by the implementation of specific functions whose analysis is beyond the scope of this paper but could be object of future investigation).

The effectiveness conditions are [1] [10]:

- to avoid non sustainable situations (ex. lack of technology expertise, non availability to collaborate, etc.)
- to reduce initial gaps as for contents as well as for technology
- to favour group creation
- to favour social interactions and development of sense of belonging
- to assume collaborative roles and tasks (timing, roles, interactions)
- to support self and group reflexivity and metacognition

These conditions can only partially be sought in tools and technical solutions, but can be enabled by a proper methodology [1][13].

Under these premises, in order to support expression, representation, development and sharing of knowledge in the CoP, we need to look for tools and methods allowing to represent, manage and value *interactions and connections among people, relations discussions and conversations, knowledge objects*.

3 A Model for Collaboration in Distributed CoPs

To comply with the objectives detailed in the previous paragraph, we hereafter propose a model for collaboration. This model is derived from a collaboration model presented by A.Calvani in [1], which we consider the starting point of our analysis. Indeed, the model in [1] accounts for effectiveness conditions and principles which are considered to be fundamental for collaboration as highlighted in reference literature [10]. However, while in [1] the model is conceived to provide useful steps to support an online collaborative group, the model is rooted in a *formal* educational context, thus being framed by a “technology alignment” external layer. In contrast the model we present is framed by a Social Networking external layer which accounts for the benefits of informal learning and collaboration contexts, as described before. Moreover, in [1] the purpose is to support generic “online groups”, while the

reasoning here conducted is motivated by the analysis of the specific type of group (a Distributed Community of Practice). Although the model could be easily extended to other group types, we believe that the distinction in the analysis is crucial to the effective implementation of the collaborative functions in telematic environments [12]

The model in Fig. 1 envisages four concentric layers each of them implementing the conditions to support the effective realization of the functions of the contained layers.

The most external layer is the “SOCIAL NETWORKING” layer implementing the proper contextual conditions to create a social climat and a shared social grounding, supporting:

- *generation and support to motivation*: in informal e-learning contexts the *motivation* is *spontaneous*; it is often induced by *fun* and *pleasure* that individual have in their network activity; it is also rooted in the *positive interaction* among people (a subject can more effectively and efficiently pursue his objective if the other subjects pursue theirs);
- *group culture*: in informal environment the sense of belonging (*membership*) to a group is spontaneously supported by the intensity of sharing interests on a topic; regardless from the expertise – which can be widely disomogeneous among members – it is still the awareness of the positive interaction with others that sustain *mutual understanding* and *social grounding*;
- *social climat*: in informal contexts it is the awareness of being useful to other community members which increases the *self-esteem* and foster the *motivation* for a wider visibility (for instance being linked, have positive reputation, produce and/or proposed new contents); in this contexts the respect to others, the (often tacit) agreement of *respect*, and *socioquette* (rules for an aware conversation)¹, make the online relational environment a “*trusted*” environment.

In more formal context, such as for CoP, these conditions are certainly more difficult to attain.

Indeed, it is the very purpose of the Social Networking layer to constitute the effective condition for the activation of more structured collaborative activities such as those required in the life of DCoPs.

In order to borrow the potential above illustrated, the designer of the environment will therefore need to adopt technologies and methodologies to support:

1. *the perception of the meaning*: the subject must perceive as really meaningful (useful to himself) the objectives attainable in the DCoP activities and acknowledge that collaboration can derive real advantage;
2. *visibility/reputation/self-esteem*: the dialectic individual-group must enable activities to value the individual in the group and allow each member of the group being valued by others;

¹ The term “Socioquette” has been used in applied research by the Educational Technology Laboratory of the University of Florence. It indicates a set of rules and behaviour criteria that should be followed by people engaged in online collaboration. See also [1]

3. *self-perception of usefulness*: the subject must perceive the significance of its contribution to group activities in order to consider himself a useful contributor to other's goals.

Putting emphasis on this dimensions will not only support sharing, cooperation and collaboration in Distributed Communities of Practices, but can indirectly promote participation of the individuals to other informal learning networks, which certainly is a uncontrollable but desirable and enriching side in this context.

“ORGANIZATION” and “COLLABORATION MANAGEMENT” layers have the functions to support more specifically the activity of collaborative groups (also in more formal contexts). They must be implemented according to appropriate instructional methodologies [13], typically oriented to project work and based on a system of rules (objective, roles, etc.) to which the DCoPs members are required to comply. Both layers could consequently be implemented by a methodology and sustained by technological functions available in current collaborative learning environments.

Eventually the central nucleus of the model, the “RIFLEXIVITY” layer supports the fundamental function of the subject and the community in its capability of becoming aware of its collaboration and learning processes to this extent this layer must implement:

- self-representation and group-representation functions
- self-evaluation and group-evaluation-functions
- distributed-evaluation functions

In collaborative activities basing on Social Networking distributed-evaluation functions could also be envisaged through which the individual, the group and the community refer in specific moments of the collaboration process (for instance during the production of a product or a document or at a end of a given activity). Contacting external experts in the domain, receive feedback etc. are functions accountable to this purpose. The centre of the model brings thus back to its periphery of Social Networking.

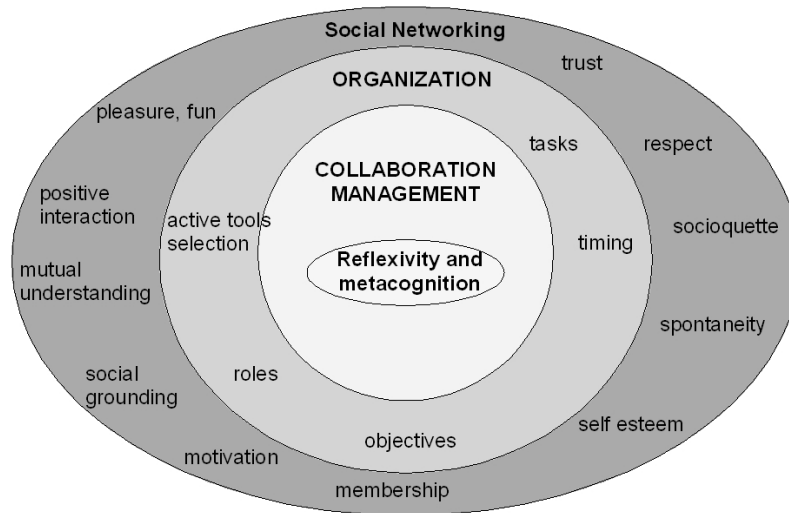


Fig. 1. Reference model to support collaboration in Distributed CoPs

4 Tools and technologies for the collaboration model

The further step in the analysis leads us to the problem of evaluating and devising if tools and technologies exist or can be developed in order to match the requirements and purposes expressed by the former model.

A possible answer can be given by the technologies and tools now referred to as *web 2.0* software [14] [15]. We acknowledge that *web 2.0* is a term which is hard to define because of the amorphousness of the concept. However we share Paul McFedries [16] tentative definition according to which *web 2.0* is “a second phase of the evolution of the World Wide Web in which developers create Web sites that act like desktop programs and encourage collaboration and communication between users”².

McFedries identifies the main characteristics of the *Web 2.0* “movement”, highlighting the social perspective of relation, collaboration and user-participated architecture:

- *content is user-created and maintained* (peer production, user-content ecosystem)
- user-created and maintained content require *radical trust*
- *application usability* allows rich user experience
- *combining data from different sources* leads to creation of new services (mashup)

² <http://www.wordspy.com/words/web2.0.asp>

- services get better as the number of users increases in an *architecture of participation*

With respect to the model depicted in Figure 1, for each layer we indicate technologies and tools which could serve to desired scopes.

SOCIAL NETWORKING layer

Conditions and functions of this layer can be widely supported by the use of web 2.0 technologies. Indeed, such technologies will provide useful functions for Collaboration Management and Organization layers, but their use, framed in a proper methodology, will provide the enabling conditions for *generation and support to motivation, group culture and social climat* development.

Social Networking layers and its contained layers will therefore be bridged by the adoption of technologies and methodologies. In Table 2 where we highlight McFedries [16] “social” characteristics of some sample web 2.0 tools which could support Social Networking layer needs.

Table 2. Sample web 2.0 applications: description and “social networking” characteristics

Web Application	Description	Characteristics
Social networking, online social networks	Category of Internet applications to help connect friends, business partners, or other individuals together using a variety of tools.	Architecture of participation
Social network search engines	Social network search engines are a class of search engines that use social networks to organize, prioritize, or filter search results.	Architecture of participation
Blogs	A weblog, (or blog), is a website where entries are made displayed in chronological order. They often provide commentary or news on a particular subject, typically combining text, images, and links to other blogs, web pages, and other media related to the specific topic.	User-created and maintained content
Blog guides	Specialized search engines for searching blog and news contents	Architecture of participation
Social tagging, (folksonomy)	Ad hoc classification scheme (tags) that web users invent as they surf to categorize the data they find online	Architecture of participation, trust
Social bookmarking	Saving and applying keywords to one's personal collection of Web site bookmarks on a site that enables other people to share those bookmarks	Architecture of participation, trust
Web Syndication, Web feed management	Web syndication is a form of syndication in which a section of a website is made available for other sites to use through to making Web feeds available from a site in order to provide other people an updated list of content from it (for example one's latest forum postings, etc.).	User created and maintained content, Content aggregation
Tag clouds	A list of tags user in the site with some kind of visual indication of each tag's relative popularity (ex. large font). Web sites that implement tag clouds functions	Architecture of participation

	allow both finding a tag by alphabet and by popularity. Selecting a single tag within a tag cloud will generally lead to a collection of items that are associated with that tag	
Peer production news	Websites combining social bookmarking, blogging, and syndication with a form of non-hierarchical, democratic editorial control. News stories and websites are submitted by users, and then promoted to the front page through a user-based ranking system	User created and maintained content, trust
Wikis	Collaborative web sites that allows users to add, edit and delete content	User created and maintained content, trust
Collaborative real time editing	Simultaneous editing of a text or media file by different participants on a network.	User created and maintained content
Content aggregation and management, Mashup (web application hybrid)	A website or web application that combines content from more than one source	User created and maintained content, trust, architecture of participation

ORGANIZATION and COLLABORATION MANAGEMENT layers

Functions needed for the services of these layers are typically supported by collaborative learning environments³.

The purpose of the collaboration model here envisaged is that the functions of these layers be combined and supported by contextual functions of the Social Networking Layer. More specifically the virtual learning environments could evolve their functions according to the directions schematized in Table 3:

Table 3. Current and envisaged functions of a telematic collaborative environment

Virtual Learning environment macro functions	Typical	Extra collaboration-oriented functions in the direction of Fig. 1 model
User management	Roles (authentication, authorization, registration), workspaces, group management, portfolios, student tracking, etc.	User links (blog connections, web syndication etc.), representation of multiple presence of the users in different communities and groups
Content	Content edition and upload, document	Group content creation (es.

³ See for instance Edutools reviews and comparisons on available e-learning environments <http://www.edutools.info/index.jsp?pj=1>

Management	repository, learning object repository, whiteboard, journal, etc.	digg news, wikis, social tagging, social bookmarking, collaborative editing etc.), link to related contents (blog guides, social network search engines, mashups, etc.)
Communication Management	File exchange, forum, mailing list, chat, VoIP, etc.	Link to podcasting records, etc.
Organization/planning management	Calendars, todos,	Shared calendars, project management tools
Self-group evaluation	Quizz, assignments, etc	Support to self- and group-reflexivity (es. tag clouds, thinking types, connection to external experts, reflection boards [1] etc.).

REFLEXIVITY and METACOGNITION layer

The functions of this layer are at the heart and centre of the model in that they constitute the process of knowledge construction (reflection on the processes and products, self-reflexivity and self-evaluation); they are transversal to technologies but can find valuable support in web2.0 tools.

From one side the representation of the sociality which is typical of such applications already provides input which support awareness towards the objectives and aims undertaken by the participants; functions such as social bookmarking and social tagging are solutions encouraging confront and reflection and providing possible useful link to other information sources. Blogging and social networking functions favour self-narrative and conversational practices which imply self-reflexivity and “distributed” evaluation. Therefore, collaborative environment can be improved with “reflection” [1] tools and spaces which encompass the social dimensions and represent the subject scollaborating in the social network.

5 Conclusions

In this paper we provided a model for online collaboration which could meet the needs of collaborative knowledge construction in a Distributed Community of Practices.

The envisaged model aims at indicating enabling conditions to support “relation and interaction” in information sharing, learning, cooperation and collaboration for the members of a Distributed Community of Practice, basing on informal learning and social networking theories and practices.

The conditions highlighted for each layer of the presented model are the grounding dimensions to support the activities of the community itself. We believe that the provided model together with a collaboration methodology and available web 2.0

technologies (such as those here described as sample) can give contributions and to the realization and improvement of a specific environment tailored for a DCoP needs.

The analysis conducted in this work provides ways for further investigations aimed at defining a reference model where new social networking practices and attitudes and available and upcoming technologies could harmonize in methods and proper development guidelines to lead toward a situation of truly enabled collaboration and lifelong learning.

References

1. Calvani, A.: Reti, comunità e conoscenza: costruire e gestire dinamiche collaborative. Erickson, Trento (2005)
2. Wenger, E.: *Communities of Practices: learning meaning and identity*. Cambridge University Press, New York (1998)
3. Denning, S.; Pommier, M.; Shneier, L., Are There Laws of Knowledge Management? February (2002). In Internet: <http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan007798.pdf>
4. Cedefop Glossary. In: *Making Learning Visible*. Cedefop, Thessaloniki (2000)
5. European Commission: *Communiqué Making a European Area of Lifelong Learning a Reality*. Brussels (2001)
6. Colardin, D., Bjornavold, J.: Validation of Formal, Non-Formal and Informal Learning: policy and practices in EU Member States. *European Journal of Education*, 1 (2004) 69-89
7. Cross, J.: *Informal Learning for Free-range Learners*. Internet Time Group LLC. In Internet: http://www.jaycross.com/informal_book/nutshell.htm
8. Jonassen, D.: *Computers in the classrooms: Mindtools for Critical Thinking*. Prentice Hall, New Jersey (2000)
9. Bullen, M.: Participation and critical thinking in online university distance education. *Journal of Distance Education*, 2 (1998) 1-32
10. Dillenbourg, P., Baker, M., Blaye, A., O'Malley, C.: The evolution of research on collaborative learning. In Reinmann, P., Spada, H. (eds.): *Learning in humans and machines: Towards an interdisciplinary learning science*. Pergamon, Oxford (1996) 189-205
11. Downes, S.: E-learning 2.0. *eLearn Magazine*, 10 (2005)
12. Pettenati, M.C., Ranieri, M.: Dal sé alle reti: nuove pratiche di social network per la collaborazione in rete. In Bonaiuti, G.: *E-learning 2.0*. Erickson, Trento (in press)
13. Ranieri, M.: *E-learning: modelli e strategie didattiche*. Erickson, Trento (2005)
14. Hinchliffe, D.: Web 2.0 Blog. In Internet: <http://web2.wsj2.com>
15. O'Reilly, T.: What Is Web 2.0. In Internet: <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>
16. McFedries, P.: The Web, Take Two Technically Speaking. *IEEE Spectrum*, June (2006)
17. Granieri, G.: *Blog Generation*. Laterza, Bari (2005)