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Virtual Learning Communities

Supporting Learning through Interaction

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INTRODUCTION

The synthesis of global communication networks available at low cost, enormous growth in popular uptake of personal computers and communication devices and the need for more sophisticated discussion of complex issues are continually pushing the boundaries of our expertise. *Virtual learning communities* (VLCs) are emerging constructs that depend on the notion of socially constructed learning to provide a focus for informed discussion and lifelong learning. They make use of increasingly sophisticated technologies to establish, support and maintain communities – collections of individuals with a common purpose, acting in social settings, geographically disparate.

Virtual learning communities are defined as groups of individuals that come together to study some area of common interest. They are *virtual communities* in the sense that they depend on a variety of *Information and Communication Technologies* (ICT) to coordinate their activities. They share many characteristics with *virtual communities of practice*. The nature of the relationships between these three constructs is explored below. The role of ICT and multimedia in supporting VLCs is reviewed. This article concludes with a summary of the challenges facing both organizations in stimulating the presence and growth of VLCs and the individuals who participate in such communities.

BACKGROUND

Virtual Communities

A *virtual community* is a cyber-location where a group of individuals can meet on the basis of a shared interest. Virtual communities are enabled by ICTs such as the Internet, World-Wide Web, electronic mail, discussion forums, chat rooms, conference calls and so on. Access may be restricted or unrestricted; activity or discussion may be moderated or unmoderated. Such communities may have a physical location or they may be purely virtual.

Virtual Learning Communities

Learning communities form where individuals come together to study, often in connection with some formal course. Social constructivism is a process of learning where knowledge about a topic is actively constructed (Jonassen & Duffy, 1992) and that all participants in the community have a role to play in the development of knowledge (Jarvis, Holford & Griffin, 2003). This social aspect is central to the notion of a learning community – meaning is negotiated by the group as a whole. A learning community can capture the experience of current and prior participants and act as a resource for future ones.

A virtual learning community is a kind of virtual community where the motivation of group members is the study of some topic, to learn or construct knowledge about it. Virtual learning communities extend traditional learning communities by meeting in spaces that have an online component. As with *virtual communities of practice*, virtual learning communities benefit from face-to-face contact (Kowch & Schwier, 1997).

When learning communities become *virtual*, the activities of inquiry and interaction are mediated by technology rather than face-to-face attendance. There are factors that affect social learning as a result – while the barrier of distance may be removed, the barriers of access and information literacy are raised instead. The *virtual learning environment* is a collection of tools and technologies that support the activities of the community.

Communities of Practice

A *community of practice* is described as "... a set of relations among persons, activity and world, over time and in relation with other tangential and overlapping CoPs" (Lave and Wenger, 1991, p98). Hildreth *et al.* (1998) described communities of practice that coordinate work in a geographically distributed sense.

A community of practice is characterized by "individuals with common expertise participating in an informal relationship to resolve a shared problem or situation that impacts upon their shared futures" (Bowles, 2002), reported in (Kilpatrick, 2003). The construction of knowledge is enabled by a sophisticated process of negotiation and collaboration and the social capital that results develops the understanding of professional practice. The characteristics of negotiation, collaboration, shared understanding and shared interest are in common with virtual learning communities.

Virtual communities of practice are enabled by the same kinds of ICT as virtual learning communities. Such constructs come into being to support collaboration among professionals across wide geographic distribution, for example. While they are enabled by ICT, face-to-face interaction appears to be a crucial element of such communities, in order to cement relationships and build trust among participants (Schwier, Campbell & Kenny, 2004).

M A I N F O C U S : L E A R N I N G T H R O U G H I N T E R A C T I O N

In a virtual learning community, problems, issues and activities are defined by negotiation amongst participants (McConnell, 2004, Schwier, 2004). Participants build knowledge in a social setting and engage in discourse related to the purpose of learning in the chosen area. Virtual learning communities are thus socially-centered and task-oriented. Participants learn from each other by doing authentic tasks.

The patterns of interaction which can occur during the activities of a VLC are complex and vary with the nature of a task, the participants involved and the technology used. Although VLCs depend on technology for their existence, any particular technology is viewed as a tool, not a central artifact. In this section, we review the role of different ICTs that can support VLCs and explore the types of social construct that can emerge.

The Role of Technology in Mediating Interaction

Technology can provide support for different forms of leadership and styles of working found in group organizations. We consider groups to negotiate their position along several key dimensions (Table 1) that characterize the learning environment. Flexibility in the environment to support negotiation is a key factor in the effectiveness of the VLC.

Table 1. Dimensions associated with learning activity.

Focus of activity	Group	↔	Individual
Working environment	Shared	↔	Private
Nature of interaction	Discourse	↔	Argument/rhetoric
Mode of interaction	Synchronous	↔	Asynchronous
Management method	Self-organized	↔	Delegated
Nature of leadership	Co-operative	↔	Traditional (power)
Style of Learning	Co-operative	↔	Collaborative

The position occupied along each dimension affects the nature of activity in a virtual learning community. For example, if a group member undertakes activity in a private workspace, the others must trust their integrity and commitment to complete the task and report back to the group. Conflicts can arise when individuals adopt positions significantly different to those negotiated by the group. The group must record their rationale for taking positions and re-negotiate them as needed.

Certain technologies can be deployed to support these positions. For example, the use of electronic mail, discussion forums and shared workspaces can support an “empowering leader” (Hansson, 1999) to coordinate work by allowing the leader and delegates to accomplish work in their own timeframes. The agility of the group is determined partly by how they can assimilate into their environment a variety of technologies. Their ability to do this is often constrained by organizational factors (cost, availability), inflexibility (environment does not support) or capability (group members ability to use the technology.)

The main challenge to supporting a learning community is in providing an environment to facilitate collaboration and communication. The challenge is made greater by the need to relegate technology into the background, allowing participants to concentrate on task-related activity. The role of technology in supporting activity is complex and it is useful to consider each technology in terms of what potential it affords and how it affects the learning process or interaction (Table 2, synthesized from (Barner-Rasmussen, 1999, Dillenbourg, 2000)).

Table 2. Technologies for VLCs, affordances and affect on the learning process.

Technology	Synchronous/ Asynchronous	Affords	Affects/Affected by
Chat room	S	Multiple conversations;	Participation due to ability required
Video (conference)	S	Enhanced social presence	Turn-taking, eye contact
Audio (conference)	S		Non-verbal communication
Video/animation (recorded)	A	Individual study; annotation; portrayal of action	Engagement with group
Hypertext/Web pages	A	Context; accessibility; delivery mechanism.	Engagement
Shared collaborative space (whiteboard)	S	Multiple activity focused on objects; non-verbal interaction; less interference	Moderation
Electronic mail	A	Negotiation of schedules; task-oriented activity	Information load
Newsgroup / discussion forum	A	Multiple threaded discussions; reflection	
Portal		Access; sense of belonging and personal space	Technical constraints
Audio + shared space	S	Efficient combination of attention streams	Accessibility due to ability required
Simulation / visualization	Both	Explanation of complex phenomena	Technical constraints and quality

Effective interaction is enabled by a blend of mutually-supporting technologies that allow the user to concentrate on the task at hand. For example, audio, video and text combined provide the greatest impression of social presence, but are difficult to coordinate. For a task involving some object, a shared view of the object combined with an audio stream may be more effective than when combined with video. Videoconferences have interaction issues due to the contention for visual attention, lack of eye-contact and non-verbal cues for turn-taking. Animation, simulation and visualization can help to explain complex phenomena but raise technical challenges with regard to equipment, communication and the design and annotation of resources for learning.

Note that, while hypertext and Web sites may be important techniques for delivery of information, they need to be enhanced to enable social collaboration and extension of knowledge created by others. The way in which resources are designed, created and maintained within the environment raises interesting technical challenges as to how such annotations can be made and how they propagate through the community.

Several studies (Juhlin et al. 2001; Wenger, 1998; Heath & Luff, 1991) have shown that it is crucially important to be able to visually refer to what one is discussing. For example, Heath & Luff (1991) found that the decision-making capacity of London Underground managers was impaired when they could not see the shared situation board. This kind of interaction requires a shared workspace in a *synchronous* setting. For a group that engages in vigorous discourse, synchronous communication enabled via chat rooms or teleconferences are useful and can enhance the quality of learning (Mercer, 2003). However, for large groups, it can be hard for everyone to take part and keep track of the discussion.

Asynchronous technologies provide participants with time for reflection in their practice. Halverson & Ackerman (2003) provide an example of how an asynchronous mechanism can support a community (in this case a community of practice). They describe the evolution of an artifact – in this case a document – that captures many facets of organizational memory constructed in a cooperative environment.

Face to face communication remains important, even with a virtual community. There are many reports (Hildreth et al, 1998; Li & Williams, 1999; Isahaya & Macauley, 1999) that interaction in the virtual world is enhanced after meeting and activity “in real life (IRL)”. This is especially important for virtual communities since building trust is a more complex process (Duarte & Snyder, 1999).

The Nature of Group Interaction

Trust is a key factor in the construction of social capital (Kilpatrick, 1999). This is the stuff that defines expected behaviours and values, fosters a sense of trust and shared values, and establishes communication paths. The nature of the groups and the characteristics of the individual members determine how such social capital is constructed. Constantine (1993) defines four classes of group (Figure 1) and illustrates how their characteristics are suited to different classes of problems.

Random (breakthrough) bottom-up decision making promotes creativity chaotic, competitive operates in a chaotic, undirected way good for creative breakthroughs	Open (problem-solving) Decision making by consensus adapt to & solve complex problems chaotic, might not solve anything operates in a flexible, explorative way works best on solving complex problems
Synchronous (vision-sharing) decisions implied by visions efficient, smooth can drift, lose sight of reality operates in a coordinated way repetitive problems, high performance	Closed (tactical) traditional leadership stable and secure can be over-controlled operates in a group-oriented way good for routine projects

Figure 1. Types of group and their characteristics.

There are differences in the nature of activity, communication and management style for each type of group. Some management styles and discussion formats are inappropriate for some groups (*e.g.* power-based leadership can affect the nature of open discussion). It seems that for the purposes of virtual learning communities, breakthrough and open collaboration teams are the most appropriate. In the former, creative activity takes place by individuals through their own inquiry in a sub-area and later contributed to the work of the entire team. In the latter, the team functions as a whole, with each member actively contributing, discussing and extending the work of others.

Sub-groups can form or be established within virtual learning communities. Some of the following sub-groups have wider relevance, but the discussion here is focused primarily on educational contexts.

The cohort – a group of peers come together because they share common characteristics, typically age and academic maturity and because they engage in common activities of study. The cohort can be an extremely strong social force within a community.

Cliques and factions – a clique is a cohort that forms spontaneously but which excludes others that are not recognised by its members. The members of a faction are motivated by political or ideological influences and see themselves as diametrically opposed to other groups within the community. Both types of sub-group can have negative effects on the community, through exclusion, alienation and conflict.

Birds of a feather – can form spontaneously where group members wish to pursue a particular area of specialization within the community.

The loner – although a community can focus learning and activity, there will be individuals who either are not motivated to engage with the community, or are *unable* to engage. The learning community must respect the rights of the individual to pursue private activities in association rather than by immersion.

The shared interest that virtual communities possess makes the first three of these groups likely to appear. The environment that supports the community needs to provide space for loners and mediate the negative effects of cliques and factions by negotiation.

Role of the Facilitator

Due to the nature of their primary communication mechanisms, leadership in virtual learning communities may be difficult to establish and such communities have greater difficulty reaching decisions than those that meet face to face (Farnham *et al.*, 2000). There

is a role for a facilitator to guide and moderate discourse and to take on a wider leadership role in a virtual learning community.

The nature of a discussion may be affected by the personality mix of the contributing individuals. Task-oriented or self-oriented individuals may contribute information or insights directly related to the work at hand; interaction-oriented individuals may enjoy the actual activities of discussion and working with others. The role of the facilitator is to progress activity and discourse from shallow, trivial exchanges into deeper learning.

The facilitator acts as a friend and coach to the community, mediating the discussion and allow issues to emerge, coaxing where necessary. They have a complex technical role to play, often acting as a troubleshooter to resolve technical difficulties. The facilitator can benefit from tools that are constructed to support task-oriented activities (*c.f.* Bellotti *et al*, 2003; Takkinen, 2002) in carrying out their managerial role to schedule task-related activity and negotiate timetables among participants.

To show the various skills, roles and activities associated with the facilitator, Figure 2 has been synthesized from (Paulsen, 1995; Kemshal-Bell, 2001; Collision, 2000; and Backroad Connections, 2002). Skills are divided into organizational, social and technical; activity is categorized into technical, managerial and facilitation and the roles of “group process facilitator”, “instructor/group leader” and “guide” are shown to cut vertically across skill sets. Overlap between activities shown in boxes indicates that an activity is performed in a particular role.

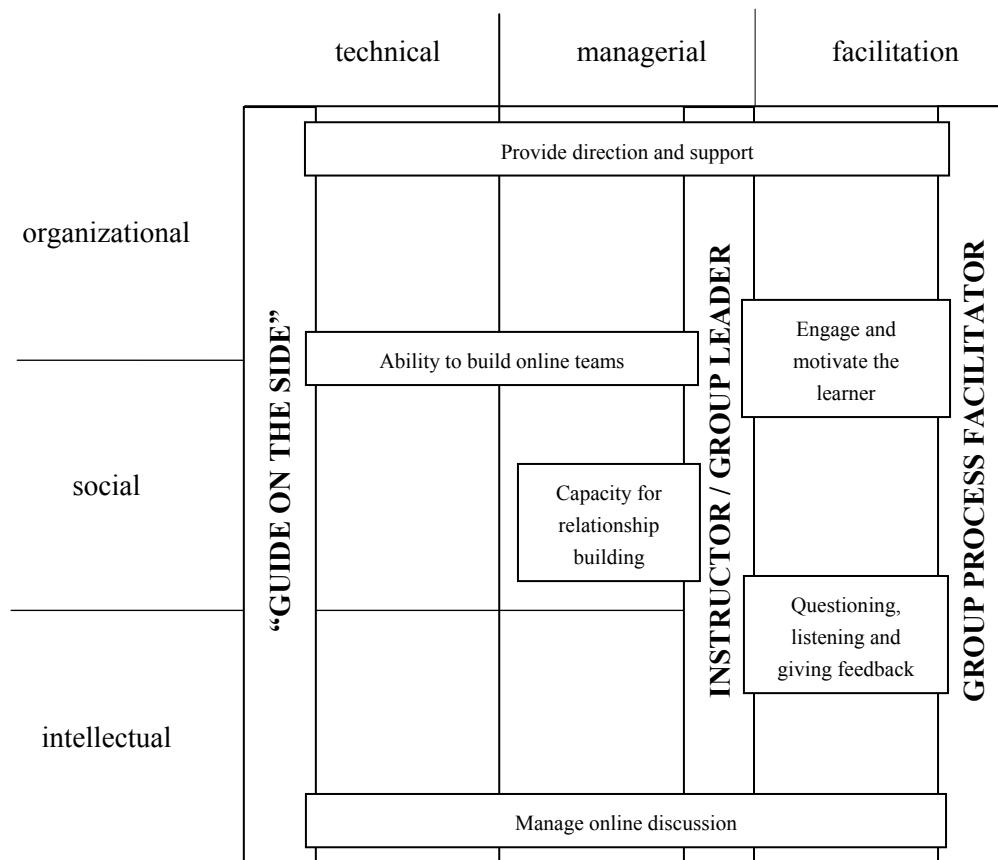


Figure 2. Skills, functions, roles and activities of the facilitator.

F U T U R E T R E N D S

Technical Challenges

It seems feasible to combine and use contemporary multimedia and ICTs to support virtual learning communities. Indeed, large-scale installation of learning platforms such as Blackboard (Blackboard Inc, 2002) and WebCT (WebCT Inc, 2003) indicate that many institutions have recognized the value that such communities can offer. The current technical challenges are concerned with the design of course materials, the acquisition, deployment and maintenance of suitable ICT infrastructure and the design of learning environments to suit the task of collaborative learning. Table 3 lists some desirable characteristics for such environments.

Table 3: Desirable characteristics of learning environments

- Readily accessible to all participants,
- Promotes the principles of negotiation, intimacy, commitment and engagement and enables control by the participant,
- Reflects the image of the organization to reinforce a sense of belonging,
- Permits customization to reinforce sense of private and personal space,
- Acts as a repository of organizational memory of current and past participants,
 - Archives, indexes and enables searching of the repository to allow effective access to previously constructed knowledge.
 - Allows the repository to grow by incorporating annotations, discourse and materials produced by participants.
- Highlights and makes accessible the terminology (vocabulary) of the area of inquiry; guidelines for discourse; and roles and expectations,
 - Provide access to online materials, particularly online journals.
- Readily allows assimilation of a variety of technologies and tools.

An interesting challenge for multimedia development is in the area of annotation and rights management. To support the needs of social construction of learning, individuals must be able to synthesize their own materials from resources within and external to the environment. At a technical level, this may be hard to achieve or difficult for the individual to do; in terms of copyright and intellectual property there are conflicts with controls imposed by digital rights management technologies.

Organizational Challenges

In virtual learning communities, activity is guided by the influence of participants on each other, not the nature of any power relationships that may exist. This can lead to a conflict within organizations that are based on hierarchies and authority relationships. Communities of practice face the same issues – many organizations cannot support them within their structure. Organizations, particularly established institutions of learning, have to face the challenge of deciding whether the value added by social and intellectual capital outweighs the difficulties in establishing and maintaining such communities.

The challenges for educational institutions are not only to adjust their structures in order to incorporate virtual learning communities, but whether they can justify the level of expenditure necessary to provide the appropriate level of technology support. They have to resolve the problems associated with changes to the status and role of academic staff and the activities that they perform in working with virtual learning communities.

Educational Challenges

A virtual learning community requires strong leadership in order to become established. While this can be done initially by an academic leader, the desire is that new leaders will emerge as the community develops. The establishment and maintenance of a virtual learning community lead to changes in the role of teachers as facilitators of learning.

Modern trends in higher education point towards constructivist approaches that emphasize the importance of social learning. Learning communities facilitate construction and sharing of knowledge. In particular, Vygotsky (1978) proposed the idea of a “zone of proximal development” – the level that an individual can attain in conjunction with a group of others – is most relevant as it indicates the potential for an individual to develop through interaction.

Virtual learning communities begin to meet the challenge of how to enable social learning in a mass education system, whilst preserving the characteristics of task engagement and substantive discourse. The scale on which this is done affects the workload associated with creating and sustaining a virtual learning community. The changing role of staff and their workload are important factors in the growth of virtual learning communities.

C O N C L U S I O N S

Virtual learning communities are important, dynamic and exciting constructs. They emerge to support a variety of activity related to learning and are sustained by their members as long as they are useful. Multimedia, information and communication technology play a strong supporting role in the establishment and maintenance of these communities.

The future development of such communities is driven by the increase in distance education and the trend of social learning in higher education. Institutions need to consider carefully the advantages and costs of establishing these kinds of community to support learning. In wider terms, because of the overlap with virtual communities of practice, many of these challenges will be faced by organizations outside higher education.

R E F E R E N C E S

Backroad Connections Pty Ltd. (2002). *Effective Online Facilitation*: Australian National Training Authority.

Barner-Rasmussen, M. (1999). *Virtual Interactive Learning Environments for Higher-Education Institutions*. Paper presented at the Nordic Workshop on Computer-supported Collaborative Learning, Göteborg, Sweden.

Belotti, V., Ducheneaut, N., Howard, M. A., & Smith, I. E. (2003). *Taking e-mail to task: the design and evaluation of a task management centered e-mail tool*. Paper presented at the ACM Conference on Human Factors in Computing Systems, Fort Lauderdale, Florida.

Blackboard Inc. (2002). *Blackboard Learning System: Product Overview White Paper*. Washington DC, USA.

Bowles, M. (2002). *Forming a community of practice in North/NorthEast Tasmania on responsive and flexible VET*. Launceston, Australia: TAFE.

Collision, G., Erlbaum, B., Haavind, S., & Tinker, R. (Eds.). (2000). *Facilitating online learning: Effective Strategies for Moderators*. Madison: Atwood Publishing.

Constantine, L. (1993). Work Practice and Organization. *Communications of the ACM*, 36(10), 34-43.

Dillenbourg, P. (2000). *Virtual Learning Environments*. Paper presented at the EUN Conference 2000 Workshop on Virtual Learning Environments, Brussels, Belgium.

Duarte, D. L., & Snyder, N. T. (1999). *Managing virtual teams: Strategies, tools and techniques that succeed*. San Francisco: Jossey-Bass.

Farnham, S., Chesley, H. R., McGhee, D. E., & Kawal, R. (2000). *Structured Online Interactions: Improving the Decision-Making of Small Discussion Groups*. Paper presented at the Conference on Computer Supported Cooperative Work - CSCW 2000.

Hansson, H. (1999). *Demands on Virtual Teams and Virtual Leadership to Support Sustainable Learning Processes*. Paper presented at the Nordic Workshop on Computer-supported Collaborative Learning, Göteborg, Sweden.

Heath, C., & Luff, P. (1991). *Collaborative Activity and Technological Design: Task Coordination in London Underground Control Rooms*. Paper presented at the Second European Conference on Computer-Supported Cooperative Work.

Hildreth, P., Kimble, C., & Wright, P. (1998). *Computer Mediated Communications and Communities of Practice*. Paper presented at the International Conference on the Social and Ethical Impacts of Information and Communication Technologies, Erasmus University, The Netherlands.

Ishaya, T., & Macauley, L. (1999). *The importance of social awareness in global information systems*. Paper presented at the Fourth UKAIS Conference, York.

Jarvis, P., Holford, J., & Griffin, C. (2003). *The Theory and Practice of Learning (2nd Edition)*. London: Kogan Page.

Jonassen, D. H., & Duffy, T. M. (Eds.). (1992). *Constructivism and the Technology of Instruction*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Juhlin, Oskar, & Weilenmann. (2001). *Decentralizing the control room: Mobile Work and Institutional Order*. Paper presented at the Seventh European Conference on Computer-Supported Cooperative Work, Bonn, Germany.

Kemshal-Bell, G. (2001). *The Online Teacher*: ITAM ESD, TAFENSW.

Kilpatrick, S., Barrett, M., & Jones, T. (2003). *Defining Learning Communities*. Paper presented at the AARE International Education Research Conference, New Zealand.

Kilpatrick, S., Bell, R., & Falk, I. (1999). The role of group learning in building social capital. *Journal of Vocational Education and Training*, 51(1), 129-144.

Kowch, E., & Schwier, R. A. (1997). *Characteristics of Technology-Based Virtual Learning Environments*. Paper presented at the Second National Congress on Rural Education, Saskatoon, Canada.

Lave, J., & Wenger, E. (1991). *Situated Learning. Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Li, F., & Williams, H. (1999). *Organizational innovations through information systems: some lessons from geography*. Paper presented at the Fourth UKAIS Conference, York.

McConnell, D., Lally, V., & Banks, S. (2004). *Theory and Design of Networked Learning Communities*. Paper presented at the Networked Learning Conference, Lancaster, UK.

Mercer, D. (2003). *Using Synchronous Communication for Online Social Constructivist Learning*. Paper presented at the Canadian Association for Distance Education Conference, St Johns, Newfoundland.

Paulsen, M. F. (1995). Moderating Electronic Conferences. In Z. L. Berge & M. P. Collins (Eds.), *Computer-mediated communication and the online Classroom in Distance Learning*. Cresskill, NJ: Hampton Press.

Schwier, R. A. (2002). *Shaping the Metaphor of Community in Online Learning Environments*. Paper presented at the International Symposium on Educational Conferencing, Banff, Canada.

Schwier, R. A., Campbell, K., & Kenny, R. (2004). Instructional designers' observations about identity, communities of practice and change agency. *Australasian Journal of Educational Technology*, 20(1), 69-100.

Takkinen, J. (2002). *From Information Management to Task Management in Electronic Mail*. Unpublished PhD Dissertation, Linköping University, Linköping, Sweden.

Vygotsky, L. (1978). *Mind in Society*. Cambridge, MA: Harvard University Press.

WebCT Inc. (2003). *WebCT Product datasheet*. Lynnfield, MA.

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.

Terms and Definitions

Virtual community: a social and technical construct that exists to coordinate the group-based activity of a number of individuals who share a common interest or sense of purpose. Virtual communities are maintained in the online world and supported by communication technology to support geographically-separated groups.

Virtual learning community: variant of the above where individuals come together, often in connection with a course of study or academic activity, to study or investigate problems related to a theme or area of shared interest.

Community of practice: a community of professional individuals who have the shared sense of purpose in a work situation – for example professionals at different institutions collaborating on “best practice”, or individuals that perform the same function in different parts of an organization.

Social learning: process of constructing knowledge by individuals working in groups. A shared understanding emerges from the individual understanding coupled to communication or collaborative exploration of an area of interest. This style of learning generates intellectual capital (knowledge that is jointly held) and social capital (trust, mutual respect).

Learning community: a community that is established or which comes together with the purpose of study or learning. Often created to support a course of study in real life, or can emerge spontaneously when common purpose or interest are identified.

Intellectual capital: knowledge or information that is created through collaborative activity by a community. It can be difficult to ensure clear notions of ownership since knowledge is jointly-held. The organization of communities must define codes of behaviour to deal with ownership issues.

Computer-mediated communication or computer-supported collaborative work: the use of information technology to support the interaction between people, directed to the resolution of a problem, or activity in a task context.

Self-organizing group: A subset of a community where individuals decide for themselves how work structures, study activity etc are coordinated. Such structures make use of social interactions and commonality to be sustained for as long as they are needed.