Knowledge Management in Online Distance Education

Adisorn Na Ubon

University of York
adisornn@cs.york.ac.uk

Chris Kimble

University of York
kimble@cs.york.ac.uk

ABSTRACT

Most organisations realise that "knowledge" is a strategic resource that gives them sustainable competitive advantage and helps them achieve long-term organisational goals. With the realization that knowledge is a core resource, organisations are now attempting to manage knowledge in a more systematic and more effective way. However, managing knowledge is not always an easy task. In particular contexts, such as online distance education, knowledge is distributed across both time and space and may be constrained by social, cultural and language differences. In such cases, the support of best practices in Knowledge Management (KM) could be problematic. This paper studies online distance education provision to identify the major problems that hinder KM practices. Focussing on online learning communities in which knowledge creation and knowledge sharing are essential elements, it tries to develop a set of guidelines to help overcome problems using tools and techniques from KM.

Keywords

Knowledge Management, online distance education, online learning community

INTRODUCTION

Most organisations realise that 'knowledge' is a strategic resource that gives them sustainable competitive advantage (Drucker, 1993). With this realization, they are now attempting to manage knowledge in a more systematic and effective way. Knowledge Management (KM) is also used by organisations to encourage the creation and sharing of knowledge that, it is claimed, results in improvements in productivity, innovation, competitiveness, and better relationships among people in those organisations.

Education today is subject to the same pressures of the marketplace. According to Brown and Duguid (2000), profound changes in competition have made universities and higher education institutions think like business. The educational markets are becoming global as universities attempt to internationalise their curricula and offer high-quality programs to students regardless of location. Universities also have to adjust themselves and develop strategies to respond rapidly to the changes in technologies and increasing demands of stakeholders. Many have turned to a new paradigm that merges conventional distance education with computer and telecommunication technologies: "online distance education".

Although this mode of education is growing, there are some potential problems. Knowledge, according to Nonaka and Takeuchi (1995), is transformed from an individual to a collective dimension, and from the tacit to explicit form. It can be argued that transforming tacit knowledge into explicitly communicable messages can only be done by creating opportunities for people to engage in face-to-face, group or other social activities. It is at social occasions like these that people are most likely to talk and discuss, and convert their tacit knowledge into explicit knowledge.

This paper will argue that, in contrast to much of the literature, the most serious obstacle to online distance education remains the constraints of time and space. Online distance education means there are less social opportunities for people to engage in face-to-face meeting; it may also involve social, cultural and language differences. Because of time and space constraints, there is a loss of physical interaction and contextual cues between teacher and students, and among students themselves. These problems can result in a lack of trust, making people unwilling to share knowledge and collaborate with others in online learning communities.

In business context, many organisations apply KM to improve their efficiency and effectiveness, and to encourage the creation and sharing of knowledge among people in the organisation. Can we apply the concepts, tools and techniques from KM to solve the problems of online distance education? This paper studies online distance education provision focussing on online learning communities in which knowledge creation and sharing are essential elements. It also tries to develop a set of guidelines to help overcome problems using tools and techniques from KM.

KNOWLEDGE MANAGEMENT (KM)

This section describes the general definition and concepts of KM and outlines some KM strategies, tools and techniques, which can be applied to an educational context.

What is KM?

The term "Knowledge Management" (KM) is used to describe everything from the application of new technology to the harnessing of the intellectual capital of an organisation (Sallis and Jones, 2002). It is not one single discipline; rather, it is an integration of numerous endeavours and fields of study. Rowley (2000) describes the term KM as follows:

> "Knowledge management is concerned with the exploitation and development of the knowledge assets of an organisation with a view to furthering the organisation's objectives. The knowledge to be managed includes both explicit, documented knowledge, and tacit, subjective knowledge. Management entails all of those processes associated with the identification, sharing, and creation of knowledge. This requires systems for the creation and maintenance of knowledge repositories, and to cultivate and facilitate the sharing of knowledge and organisational learning. Organisations that succeed in knowledge management are likely to view knowledge as an asset and to develop organisational norms and values, which support the creation, and sharing of knowledge" (Rowley, 2000).

In brief, KM is the management of processes that govern the creation, dissemination, and utilisation of knowledge by merging technologies, organisational structures and people to create the most effective learning, problem solving, and decision-making in an organisation.

KM strategies

An effective KM initiative requires the combination of the three strategies: the utilisation of both explicit and tacit knowledge, the promotion of knowledge creation and sharing at all levels, and the application of the right mix of KM tools and techniques.

Codification vs. Personalisation

The first strategy is the utilisation of both explicit and tacit knowledge in organisations. Hansen et al (1999) describe two approaches, which can be found in today's organisations: the "codification" and "personalization" approaches. Codification focuses on the codification, storage, and subsequent re-use of knowledge. The objective of this approach is to maximise the gain from "explicit knowledge" available within the organisation by increasing the efficiency with which this knowledge can be captured, stored and retrieved. This approach relies heavily on information technology, and can also be described as a 'people-to-document' approach (Nottingham, 1999). The second approach, personalization, focuses on the management of conversation and social interaction between individuals, and the knowledge transferred during these social activities. This type of knowledge, called "tacit knowledge" (Polanyi, 1966), is harder to articulate and may be considered of higher value as it encourages a more creative approach to the application of knowledge (Nottingham, 1999).

Knowledge conversion and the spiral of knowledge

The second strategy can be applied is that of "knowledge conversion" and the "knowledge spiral". According to Nonaka (1991), tacit and explicit knowledge are not totally separate but mutually complementary entities. They interact with each other in the creative activities of human beings. Nonaka calls the interaction of these two forms of knowledge, the "knowledge conversion" process. This conversion process is composed of four steps: socialisation, externalisation, combination, and internalisation. The first step, "socialization", transfers tacit knowledge between individuals through observation, imitation and practice. In the next step, "externalisation", triggered by dialogue or collective reflection, relies on analogy and metaphor to translate this collective tacit knowledge into documents and procedures. "Combination", consequently, reconfigures bodies of explicit knowledge through sorting, adding, combining, and categorising processes, and spreads it throughout an organisation. Lastly, "internalisation" translates explicit knowledge into individual tacit knowledge. Nonaka believes that this four-step knowledge conversion process is the key of knowledge creation. Furthermore, if the interaction of these two forms of knowledge, through four-step conversion process, becomes larger in scale as it moves up to higher ontological levels: knowledge creation and sharing become part of the culture of an organisation. Nonaka calls this phenomenon the "knowledge spiral". Encouraging this process in an organisation is, therefore, a key KM strategy.

Combination of 'tools' and 'techniques'

The last strategy is the application of the right mix of KM tools and techniques. This paper defines 'technologies' as KM tools in the management of explicit knowledge in an organisation. Technology can support collaborative work and interaction among individuals within the community in which knowledge creation and sharing takes place. E-mail, groupware, and computer networks are commonly used to connect people with a need to share knowledge over a distance. However, while it is true that no modern organisation can manage its knowledge without technology, it is only a part of the equation. As Davenport and Prusak note:

> "The installation of Notes or the Web or case-based reasoning software will not in itself bring about that change. Technology alone won't make a person with expertise share it with others. The mere presence of technology won't create a learning environment, a meritocracy, or a knowledge-creating company" (Davenport and Prusak, 2000).

Effective KM therefore requires a hybrid solution of KM tools or technologies with KM techniques. This paper defines the appropriate management of 'space' and 'process' as KM techniques. On the one hand, space management is concerned with the creation of the new working space. The space, which can be a physical space (e.g. building), virtual space (e.g. MUDs), or mental space (e.g. shared experience), is a shared place in which knowledge is created, shared, and used. Process management, on the other hand, is concerned with the creation of a supportive organisational structure or practice that encourages people to create new knowledge easily, and allows them to share their knowledge freely. Thus the concepts from KM research such as "knowledge enablers", "ba" (Nonaka, Von Krogh and Ichijo, 2000), "knowledge fair" (Davenport and Prusak, 2000), and "storytelling and learning conversations" (Sallis and Jones, 2002) can be applied to support these KM techniques.

KM AND ONLINE DISTANCE EDUCATION

In this section, the current themes and concepts in KM are introduced. It will show that the themes and concepts that contribute to knowledge creation and sharing in organisations also have an application in online distance education.

KM: The implications for online distance education

Today education is subject to the same pressures of the marketplace and educational institutions need to perform just as well as any other organisation (Brown and Duguid, 1996). In the recent years a wide range of business techniques, including performance management, quality assurance and total quality management, have had a direct or indirect impact on education, and KM is set to do the same (Sallis and Jones, 2002). KM should have a resonance in education, as one major function of education is the imparting of knowledge. This implies that just as businesses attempt to improve the efficiency and effectiveness of their operations through KM, so educational institutions could use the potential of KM to enhance the learning of students. We can see that KM and online distance education share some common elements.

Community

Community is a group of people bound together by certain mutual concerns, interests, activities, and institutions. From KM perspectives, the concept of communities is essential because knowledge in an organisation is often built up and generated by small, informal, self-organising network of practitioners (Senge, 1990; Lave and Wenger, 1991; Argyris, 1993; Brown and Duguid, 2000). In addition, the current advances in Information and Communication Technologies (ICT) also create new forms of setting in which people can communicate and share their knowledge across both geographical and temporal boundaries.

Community is also regarded as the model for dynamic, productive knowledge creation and sharing in education. Lave and Wenger (1991) argue that all learning involves enculturation in communities. Though the content may differ, the form of academic communities is much like other communities.

Collaboration

Most organisations realise that they will improve performance if their staff work together. However, building collaboration is not an easy task. KM practitioners apply many different approaches to develop the type of culture that builds the desire for teamwork and a collaborative working (Senge, 1990; Nonaka and Takeuchi, 1995). Techniques such as meetings, forums and discussions are used extensively to create knowledge through the processes of social interaction and collaboration. Tools such as e-mail and intranets are also used to encourage active collaboration among people in organisation.

Collaboration is one of the most critical issues in educational context, especially in online distance education where people and knowledge are distributed across time and space. A number of studies in education have examined the relationship between collaboration and learning (Johnson and Johnson, 1985; Slavin, 1987; Johnson and Johnson, 1989; Sharan and Shaulov, 1990; Dobos, 1996). According to Christiansen and Dirckinck-Holmfeld (1995), collaboration is a way of overcoming two major problems in distance learning: the problem of accommodating to the academic discourse and the problem of becoming part of the academic community living at a distance.

Trust and knowledge sharing

In business organisation, trust has been identified as an essential condition for people to share knowledge and expertise (Nottingham, 1998). People are reluctant to share their knowledge because of the risk of loss of control and influence. Remarking a recent survey on KM in Europe, Murray and Myers (1998) indicate that respondents acknowledge that the most valuable knowledge in their organisations is in people's heads but they are reluctant to share their knowledge for fear of losing influence and control.

Although this situation seems extreme in educational context, the issues of trust also play an important role in knowledge sharing in learning communities. As Sallis and Jones (2002) note:

> "It starts at an early age. School examinations and the culture of grading and assessment, as well as many games and sports, encourage early individual competitiveness. While this develops many good qualities, it needs to be counterbalanced by collaborative activity. Otherwise, people learn that they get on better on their own. They feel that they have to differentiate themselves from others in order to succeed" (Sallis and Jones, 2002).

Shared understanding

For effective knowledge sharing, individuals need to have the same meaning in their communication process, and need to converge it to shared understanding. Research in KM area shows that a shared understanding and a common ground among people in a community is essential for collaboration and productive knowledge transfer (Lave and Wenger, 1991; Clark, 1996). Without it, individuals will neither understand nor trust one another (Davenport and Prusak, 2000).

In online distance education, a shared understanding is crucial for learning processes among students. A shared understanding can stimulate the student's social imagination and encourage them to go behind every-day knowledge, seeking a shared view based on relevant information (Christiansen and Dirckinck-Holmfeld, 1995). Through shared understanding, students in online learning communities can develop their ability to communicate and participate in collaborative work.

ONLINE DISTANCE EDUCATION

This section provides a more formal definition and scope of online distance education. It also describes some potential problems that exist in this sort of education from different perspectives using the concepts of KM and computer-supported cooperative work (CSCW).

What is online distance education?

With the increasing availability of ICT, the breadth and scope of distance teaching and learning process has changed dramatically. Many terms describing technology-assisted distance teaching and learning have been created. Often, these terms overlap in characteristics and meanings. This paper defines online distance education as "formally and systematically organised teaching and learning activities in which the instructor and the learner (or learners) are geographically separated, using ICT to facilitate their interaction and collaboration".

Some potential problems

No one seems to doubt that the development and deployment of ICT can have a profound impact on this mode of education and that it offers a number of advantages and opportunities for both teaching and learning. Although much of literature in education claims that problems, especially time and space constraints, in online communities have been overcome using recent technologies (Kaye, 1989; Keegan, 1996), this is not the case in KM and CSCW areas. From KM and CSCW perspectives, working in a distributed environment is still seen as problematic. Working in this context places strains on the way a group works as they not only have to cope with geographical distance, but also time, culture and language differences (Kimble et al, 2000).

Space and time constraints

Though advances in computer and telecommunication technologies have linked people together, 'space' is still a major concern. The evidence from case studies and previous research has clearly indicated that geography does matter in the new knowledge economy (Hepworth, 1989; Li, 1995; Jarvenpaa and Leidner, 1998; Hildreth et al, 2000). The emergence of 'electronic' space does not mean the significance of the 'physical' space has decreased (Kimble et al, 2000). Despite the rapid pace of technology and the ability to move data across distances, people still want to come together for events and hand shaking and hugging (Sherron and Boettcher, 1997).

The issue of 'time' is regarded as another major concern in online communication. Although number of academics claim that we are in the 'post-industrial' era, the standardisation of time from the industrial era still affects our lives, as we are confined to standardised time zones. No team member in an online community, for example, wants to work at three o'clock in the morning simply to collaborate with other members from other continents. Time in virtual and online communities is therefore an important issue that must be addressed.

The lack of face-to-face interaction and social cues

In our culture the face-to-face encounter is the ideal paradigm for the meeting of minds. Communication seems most complete and successful when the person is physically present. This presence is supposed to be the guarantor of authenticity in the community. However, the space and time constraints in online communication make face-to-face interaction impossible. KM and CSCW researchers strongly advocate "Hot Distributed Collaborative Work", which is highly interactive and requires the active presence of other members of the community, as they believe that co-located interaction is the key for effective knowledge creation and sharing.

However, in today's environment where many activities, such as working and learning, become geographically and temporally distributed, active presence or co-located interaction may be problematic. In order to solve the problems, technologies such as video conferencing, MUDs and MOOs, have been used to create a 'telepresence' or a 'virtual presence'. Nonetheless, people in so-called virtual teams still find that collaborative work is most effective when performed in face-to-face meetings where the issue of trust and ambiguity that surrounds identity in the virtual world are most easily overcome (Hildreth et al, 1998; Kimble et al, 2000).

Language and cultural barriers

In addition to the physical distances and time differences, members in online community may experience other barriers to effective communication and learning, such as language and cultural differences. Language can cause possible communication problems in online communities where people come from countries that use different languages. Although English has established itself as the worldwide scientific and business language, many people still lack the proficiency in English to understand and communicate complex concepts and reasoning (Van den Branden, 2001). Linguistic constraints therefore can make people in online community unable to transform their tacit knowledge into explicitly communicable messages so that it can be shared with other people.

Cultural factors may also hinder knowledge creation and sharing among people in online community. Students who come from different cultural backgrounds may also have different learning behaviours, learning goals, frames of reference, and motivation that make it difficult for them to understand what other people are trying to explain.

Problem of trust

Trust is at the heart of collaboration (Herriot et al, 1998). However, communication and social interaction in an online community can present a serious challenge to the existence of trust. From KM perspectives, personal contact and trust are intimately related. Good relations among people in community purge the process of distrust and fear, and break down personal and organisational barriers (Nonaka and Takeuchi, 1995). Through well-established relationships, people develop the sense of trust, identity and commitment that allows them to create new knowledge and share that knowledge to other people in the community.

In KM and CSCW literatures, trust plays an important role in knowledge sharing. It plays a more crucial role when it has to be created in an online or virtual context. Handy (1995) has highlighted the importance of trust in an online community and thought that trust can only exist between people who are not complete strangers to one another. He believes that trust is hard to establish if people have not worked together previously, or have no face-to-face contact.

Low level of collaboration

Online interactions in virtual communities differ from face-to-face interaction. As mentioned earlier, space and time constraints, and the lack of face-to-face interaction may result in the lack of trust, identity and commitment in online

communities. This can make people unwilling or reluctant to share their knowledge and collaborate with others. In KM literature, there is strong evidence that a climate that fosters trust, care, and personal networks among employees is one of the most important conditions for high level of collaboration, knowledge creation and knowledge sharing (Nonaka, Von Krogh and Ichijo, 2000; Kimble et al, 2000).

In online distance education, the lack of face-to-face and personal interaction may result in the minimal degree of trust, identity and commitment among students in online learning communities. While some researchers report cases of online education that achieve high rates of learner participation and group interaction (Hiltz, 1986; Harasim, 1987), other researchers have found that achieving an active membership has been a problem in online activities (Umpleby, 1986, cited in Harasim, 1989).

CAN KM PROVIDE THE SOLUTIONS?

This section mainly focuses on developing guidelines using KM strategies, tools and techniques from the previous section to solve potential problems in online distance education. Of the three KM strategies described earlier, the first two strategies aim to provide the guidelines in applying KM in online distance education effectively. The last strategy is used to suggest the possible tools and techniques that can be applied to this mode of education.

Utilise both 'explicit' and 'tacit' knowledge

One key to successful KM initiatives in online distance education is the exploitation of all forms of knowledge, both explicit and tacit. Explicit knowledge in online distance education comes in a wide range of media such as computer files, emails, videotapes, CD-ROMs, and textbooks. It can be the result of the work of individuals or project groups, recorded and stored within any type of media so that it can be accessed and used when needed. Explicit knowledge can also be shared easily between stakeholders in an online learning community. This type of knowledge is very common but is still important in online teaching and learning. However, tacit knowledge is also valuable in online distance education. Tacit knowledge is personal and deeply rooted in an individual's experiences, values and cultures, thus making it difficult to capture, codify, store, and share to other people. Although this type of knowledge is intangible, it must not be overlooked as it is regarded as central to innovation in learning communities.

Promote knowledge creation and sharing at all levels

In building up an effective online learning community, knowledge should be created and shared with all members of the community. Knowledge is created by individuals. This implies that a community does not create knowledge but it can only support individuals or provide a supportive context for them to create knowledge. In addition, knowledge is useless unless it is transformed into action or shared with other people. To promote knowledge creation and sharing at all levels in the community, the "knowledge conversion process" and the "knowledge spiral", must be created.

Apply the right mix of KM tools and techniques

To solve the problems in online distance education, applying the right mix of KM tools and techniques is also considered the critical success factor.

KM tools

As stated earlier, technologies are regarded as effective KM tools in managing explicit knowledge in online learning community. Technologies such as, intranets, videoconferencing, and collaborative groupware allow members of an online learning community to capture and disseminate explicit knowledge. Course Management Systems (CMS) such as WebCT, and Lotus Learning Space, can be used to distribute selected learning materials, facilitate access to various sources of information and data, and enable teacher-student, as well as student-student interaction.

Applying KM tools properly not only helps members of an online community manage explicit knowledge effectively, but also reduces time and space constraints. Advanced technologies, such as videoconferencing and chat rooms, allow people to discuss over synchronous, interactive media (e.g. shared text and diagrams), and increase the level of interactivity in online communication. This should increase in the sense of trust, identity and commitment, making members of an online community more comfortable and willing to collaborate and share their knowledge.

KM techniques

Using KM tools to solve the problems in online distance education is just one part of the equation. Technology alone is not enough to create trust and personal context necessary to achieve a true network. It is therefore necessary to apply some KM techniques to help members in an online community deal with problems more effectively. As noted, KM techniques represent two managerial approaches: process management and space

management. Process management indicates the creation of supportive organisational structures and practices that would encourage people in an online learning community to generate, share, and use knowledge easily. Process management may involve the introduction of a reward system for knowledge creation and sharing. It may include the new standard and practices ensuring that each member in an online community has equal opportunity to gain access to the sources of knowledge.

KM techniques using space management approach create a favourable learning environment that helps members in an online learning community become acquainted with their colleagues. In this context, members start to develop a shared understanding and common language, which is essential to productive knowledge transfer. They subsequently develop identity, trust and commitment, and share their knowledge with others. Finally, the common ground that members in the community possess may help reduce linguistic and other cultural barriers as they can easily understand 'what' other members want and 'why'.

CONCLUSIONS AND FUTURE WORK

This paper has tried to apply the concept of KM to solve some potential problems in online distance education that hinder knowledge creation and sharing among the members of an online learning community. It has argued that the major problem in online distance education is probably still the constrains of time and space. Although many researchers in education have claimed that these constraints have been overcome using new ICT, researches in KM and CSCW provide strong evidence that communication and interaction in an online or virtual community is still problematic. Moreover, the problems of time and space can potentially lead to the lack of face-to-face contact and the issues of trust, which make collaboration in an online learning community less efficient.

As online teaching and learning is growing, the online learning community will inevitably become larger. The topic of this paper is undoubtedly an interesting and important topic, as KM would enhance teaching and learning processes in online distance education. Thought it is clearly interesting and important, more work is needed. We need to study the problems of online distance education based on actual case studies, explore KM tools and techniques in more detail, and evaluate the results from the studies.

REFERENCES

Argyris, C. (1993) Knowledge for Action: A Guide to overcoming barriers to organizational change. Josey Bass Wiley, San Francisco, CA.

Brown, J. S. and Duguid, P. (1996) Universities in the digital age. *Change*: *The Magazine of Higher Learning,* **28**, 4, 1996, 10-19.

Brown, J. S. and Duguid, P. (2000) The Social Life of Information. Harvard Business School Press, Boston, MA.

Christiansen, E. and Dirckinck-Holmfeld, L. (1995) *Making Distance Learning Collaborative.* http://www-cscl95.indiana.edu/cscl95/christia.html (14 Nov. 2001).

Clark, H. (1996) Using Language. Cambridge University Press. Cambridge.

Davenport, T. H. (1998) *Some Principles of Knowledge Management.* http://www.bus.utexas.edu/kman/kmprin.htm (15 Nov. 2001).

Davenport, T. H. and Prusak, L. (2000) Working Knowledge. Harvard Business School Press, Boston, MA.

Dobos, J. (1996) Collaborative learning: effects of student expectations and communication apprehension on student motivation. *Communication Education*, **45**, 118-134.

Drucker, P. (1993) Post-Capitalist Society. Harper Business, New York, NY.

Handy, C. (1995) Trust and the Virtual Organization. *Harvard Business Review*, May/June.

Hansen, M., Nohria, N. and Tierney, T. (1999) What's your Strategy For Managing Knowledge?, *Harvard Business Review*, March/April.

Harasim, L. (1987) Teaching and learning on-line: Issues in computer-mediated graduate courses. *Canadian Journal of Educational Communication*, **16**, 2,117-135.

Harasim, L. (1989) On-Line Education: A New Domain. In *Mindweave: Communication, Computers and Distance Education,* eds. R. Mason and A. Kaye, Pergamon Press, Oxford.

Hepworth, M. (1989) Geography of the information economy. Belhaven, London.

Herriot, P., Hirsch, W., and Reilly, P. (1998), Trust and Transition: Managing Today's Employment Relationship. John Wiley and Son, Chichester.

Hildreth, P., Kimble, C. and Wright, P. (2000) Communities of Practice in the Distributed International Environment. *Journal of Knowledge Management*, **4**, 1, 2000, 27-37.

Hiltz, S. R. (1986) The virtual classroom: Using computer-mediated communication for university teaching. *Journal of Communication*, **36**, 2, 95-104.

Javenpaa, S. L. and Leidner, D. E. (1998) Communication and Trust in Global Virtual Teams. Journal of Computer-Mediated Communications, **3**, 4, 1998. http://www.ascusc.org/jcmc/vol3/issue4/jarvenpaa.html (21 Jan. 2002).

Johnson, D. and Johnson, R. (1985) Motivational process in cooperative, competitive and individualistic learning situations. In *Research on Motivation in Education*, eds. C. Ames and R. Ames, Academic Press, Orlando, FL.

Johnson, D. and Johnson, R. (1989) Cooperation and Competition: Theory and research. Interaction Book Company, Edina, MN.

Kaye, A. (1989) Computer-mediated communication and distance education. In *Mindweave: Communication, Computers and Distance Education,* eds. R. Mason and A. Kaye, Pergamon Press, Oxford.

Keegan, D. (1996) Foundations of Distance Education. Routledge, London.

Kimble, C., Li, F. and Barlow, A. (2000) Effective Virtual Teams Through Communities of Practice. http://mansci.strath.ac.uk/papers.html (21 Jan. 2002).

Lave, J. and Wenger, E. (1991) Situated Learning. Cambridge University Press, Cambridge.

Li, F. (1995) The Geography of Business Information. John Wiley and Son, Chichester.

Murray, P. and Myers, A. (1999) *The Facts about Knowledge*. http://www.info-strategy.com/knowsur1 (20 Oct. 2001).

Nonaka, I. (1991) The knowledge-Creating Company, *Harvard Business Review*, November/December.

Nonaka, I. and Takeuchi, H. (1995) The knowledge-Creating Company. Oxford University Press, New York, NY.

Nonaka, I., Von Krogh, G. and Ichijo, K. (2000) Enabling Knowledge Creation. Oxford University Press, New York, NY.

Nottingham, A. (1998) Knowledge Management as the Next Strategic Focus. *Proceedings of The 8th Annual BIT Conference* (Manchester Metropolitan University, UK, November 1998), paper no.42.

Nottingham, A. and Park, B. (1999) Knowledge Management: Reconsidering Knowledge Workers. *Proceedings of The 9th Annual BIT Conference* (Manchester Metropolitan University, UK, November 1999), paper no.78.

Peters, O. (2001) Learning & Teaching in distance education. Kogan Page, London.

Polanyi, M. (1966) The Tacit Dimension. Double Day, NY.

Rowley, J. (2000) From learning organisation to knowledge entrepreneur. *Journal of Knowledge Management,* **4**, 1, 2000, 7-14.

Sallis, E. and Jones, G. (2002) Knowledge Management in Education. Kogan Page, London.

Senge, P. (1990) The Fifth Discipline: The art and practice of the learning organization. Century Business, London.

Sharan, S. and Shaulov, A. (1990) Cooperative learning, motivation to learn and academic achievement. In *Cooperative Learning: Theory and research*, ed. S. Sharan, Praeger, New York.

Sherron, G. and Boettcher, J. (no date) *Distance Learning: The Shift to Interactivity*. CAUSE Professional Paper Series # 17. http://www.educause.edu/ir/library/pdf/PUB3017.pdf (07 Dec. 2001).

Slavin, R. (1987) Developmental and motivational perspectives on cooperative learning: reconciliation. *Child Development*, **58**, 1987, 1161-1167.

Van den Branden, J. (2001) Scenarios for PhD courses in a European network environment, as supported by EuroPACE. In *Teaching & Learning Online*, eds. J. Stephenson, Kogan Page, London.

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