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**A Literature Review on
Facilitating On-line Collaboration of Learning Teams:
Can Education Learn from Business and other Disciplines?**

Lorraine Esther Chiarelli

**A Thesis
in
The Department
of
Education**

**Presented in Partial Fulfillment of the Requirements
for the degree of Master of Arts (Educational Technology) at
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Abstract

**A Literature Review on
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Can Education Learn from Business and other Disciplines?
Lorraine Esther Chiarelli**

The information age has brought about profound social change in the ways we work, learn, and communicate. Within today's business environment the hierarchical work structures of the past are being decentralized creating the need for team-based organizations. This decentralization is slowly finding its way into higher education, as well, and challenging the traditional model of learning and instruction. In both business and education this team-oriented process is being pushed forward by the ever increasing use of technology; specifically computer-mediated communication and the internet.

However, though changes have occurred and are occurring there is research to suggest that many learners are not being prepared to enter the world of teams and technology. Business has been dealing with teamwork issues for sometime, but for instructional organizations this new phenomena poses a challenge since there are few examples of how to design and organize on-line collaborative learning environments.

As an analysis of the literature this thesis is designed to introduce aspects of business literature, as well as other closely related topic areas such as group dynamics and computer-mediated communication technology, into the educational environment. The focus is on the strategies, suggestions and organizational aids that can be implemented as part of instruction to assist learners in becoming more effective on-line team members. Also included are suggestions regarding how the institutional environment and the technology can be structured and organized to help facilitate team collaboration.

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Introduction
A Literature Review on
Facilitating On-line Collaboration of Learning Teams:
Can Education Learn from Business and other Disciplines?

In only a few short decades innovations in computer technology have taken us from an industrial economy, primarily based on manufacturing, to an information age where wealth is determined by the ability to analyze, process and utilize information (Henderson, 1991). This shift in the global economy has had a profound impact on the working world, with many of the hierarchical structures of the industrial age becoming flattened out, creating more integrative work environments (Savage cited in Kasl, Marsick, & Dechant, 1997). Within many organizations it has become the norm for workers to be organized into smaller groups where they have specific 'niche responsibilities' (Heterick & Sanders, 1993), and where teamwork is being used to solve highly complex problems (Katzenbach & Smith cited in Kasl et al., 1997; Rimmershaw, 1999). This creates a business environment that lends itself towards individuals and teams becoming more self-directed and independent. Within education, these concepts can be expanded further to self-directed learning teams where students learn through self-directed teamwork. Self-directed strategies of instruction are learner centred by providing the means and opportunity for learners to direct their own learning.

The formation of teams is not only an easy way for an organization to combine the individual knowledge of team members; it can also be viewed as a means to bring together a variety of skills in order to discover solutions not always possible without a team structure (Schoenfeld cited in Brown, Collins & Duguid, 1989; Benbunan-Fich & Hiltz, 1999). However, for any organization (business or education) to evolve into a team-oriented environment it is necessary that team members obtain and learn skills that may be new to them. It has been found that team development has to be a group learning experience in order for members of a team to

understand the importance of interdependence (Mankin, Cohen & Bikson, 1996). This means that for collaborative learning to be effective learners must be actively involved in taking responsibility for their part in the learning process (Seaton, 1993).

However, studies of higher education have shown that learners are not being sufficiently prepared to enter the present global environment (U.S. Department of Labour report cited in Confessore, 1992) of teams and technology. According to a study by the American Assembly of Collegiate Schools of Business (AACSB) organizations have been finding that many of today's graduates are not acquiring an approach to problem-solving which is team centred (Government-University-Industry Research Roundtable cited in Metheny & Metheny, 1997). With the push for teamwork in business it is becoming an environment where individuals cannot expect to carry out their work without considering collaboration with others (Riel, 1996; Cleland, 1996). If learners are expected to develop the abilities of 'experts' (in this context experts means team workers), these same students must therefore have the opportunity to be involved in cognitive situations which are similar to the real world of teamwork (Riel, 1996). This is what Choi and Hannafin (1995) describe as 'authentic tasks in authentic contexts' where authentic tasks refer to learning situations which are congruous, significant, and practical to the real world tasks or 'culture' they are suppose to depict (Brown et al. cited in Choi & Hannafin, 1995). To facilitate this, tasks which are authentic representations of a culture or situation will encompass how the 'experts' (workers) of this environment deal with situations which reflect 'real problem-solving' instead of merely recreating a traditional formal school environment (Wilson cited in Choi & Hannafin, 1995).

Nevertheless, facilitating teamwork is not the only issue organizations have to deal with. Today's workers and learners are more dispersed globally than ever before, requiring organizations to adapt to this new environment (Turoof, Hiltz, Bahgat & Rana cited in Vance Wilson, Morrison & Napier, 1997-1998). Where collaboration in the past was generally done face to face it is now often being carried out through computer-mediated communications

(CMC) (Chidambaram & Jones, cited in Vance Wilson et al., 1997-1998). With a computer, phone line, modem, and communications software anyone can electronically send and receive text, graphics, images, video, and sound to any other computer which is connected to the internet (Stewart, 1994). The internet has been described as a web of global network connected computers (December, 1994) which has become the fastest growing communications medium in history (Stewart, 1994). Whether described as CMC, computer conferencing, groupware, on-line or electronic communication, it is this technology which enables people to share information and data as never before, by reducing the barriers of time and distance (Swerdlow, 1995).

Access to a global communications network enables new ways of working and learning that have never been seen before (Bannon, 1989). Because CMC is such a new tool for learning, it creates unique challenges for both instructors and learners (Harasim, 1993; Harasim, 1999). For instructional organizations the novelty of this phenomena means that there are few examples of how to design, and organize on-line collaborative learning environments (Davie, Feenberg, Feenberg & Bellman, Harasim et al., cited in Harasim, 1993). Though there are advantages to using CMC there is also a definite need to develop structures and mechanisms for users of this new medium (Harasim, 1993; Harasim, 1999). Computers in themselves do little to contribute to collaborative learning (Wiburg, 1994; Salomon, 1995) unless an educational institution furnishes an environment that encourages collaboration (Salomon cited in Wiburg, 1994). This includes not only creating the on-line team environment, but also providing a means for learners themselves to self-direct their own teamwork (Scardamalia, Bereiter, McLean, Swallow & Woodruff, 1989).

Statement of the Problem

Business has been dealing with teamwork issues for sometime, but most educational institutions, due to their ethos and organizational structures, have been slow to incorporate the concept of self-directed learning teams. Until recently the classroom structure has remained

fundamentally the same with the instructor talking and learners listening (Henchey, 1995). However, as in business, the hierarchical structures within the classroom are beginning to flatten out with instructors becoming the facilitators of the learning process instead of being merely the deliverers of information. Still, it has been found that putting people into a teamwork environment with computer network products will often result in stress and failure (Bate & Travell, 1994), unless there is some training for the participants involved. Often within business, organizations have redesigned their work environments placing their workers in teams, but many of these employees do not have a conceptual understanding of what it is to be an effective team member (Heneman & von Hippel, 1995).

Today's learners, especially within higher education, are taking more control of their own learning and often using on-line computer-mediated communications to facilitate this (Bannon, 1989). If the trend in education is to have learners collaborate on-line in teams, then, like in business, issues of either training, instruction or guidelines on how to structure teamwork need to be addressed. By providing structure and support while learners are engaged in acquiring new knowledge, means there is more opportunity for this learning to become intrinsic (Scardamalia et al. 1989). In addition Tami (1992) suggests that teaching learners strategies, or providing suggestions on how to work in teams, so that learners are able to monitor the quality of their own work, would result in creating future employees who would need less team training and may potentially be more productive.

However, in order to facilitate self-directed learning teams an organization such as an educational institution needs to create the environment for teamwork to exist. It is essential for both learners and the organization to have a conceptual understanding or mental model of how a team needs to be structured and supported in order for team members to accomplish their goals and be more effective. This includes assisting learners in creating a team structure in which they have a means to develop and maintain their collaborative work.

Methodology

This thesis is a literature review designed to introduce aspects of business concepts such as teamwork and self-directed work team's (SDWT), along with additional features of on-line collaboration into education. Literature from other topic areas is also included such as group dynamics and computer-mediated communication technology. Bringing in literature from other areas is intended to expand some of the issues involved in facilitating self-directed learning teams within a computer-mediated communication environment. Throughout this thesis there are suggestions regarding features that may be incorporated into the instructional design of an on-line learning environment. The focus is on the strategies and or suggestions that can be implemented as part of instruction to assist learners in becoming more effective on-line team members. This is expanded further to include how team members can organize themselves and the tasks they are required to do. Also included are suggestions concerning how the institutional environment and the technology can be structured and organized to help facilitate team collaboration.

Summary of the chapters

Chapter 1 - Collaborative Organizations: Facilitating on-line collaboration of learning teams

Chapter one begins by discussing the concept of team collaboration in relation to both business and education. This is followed by sections on self-directed team structure in business, and the development of on-line collaborative learning environments. The portion on learning environments presents various educational institutions and the methods they have used to facilitate collaborative learning.

Chapter 2 - Group structure, development and learning

The second chapter discusses the fundamentals of group structure, and the importance of facilitating a mental model of teamwork for both the institution and learners. This is followed by

sections addressing the development and learning phases of groups, and a discussion of the issues of team learning.

Chapter 3 - Computer technology and teamwork

This part of the thesis brings together the concepts of teamwork and technology. There is a brief history of the forms of computer technology teams have used from the past to the present day. This is followed by descriptions of various synchronous and asynchronous computer technologies available for today's teams.

Chapter 4 - Small group communication

In this section, the importance of facilitating effective communication within an on-line team environment is discussed. The chapter begins with a brief history of communicating through text, which includes the importance of literacy skills. Also discussed are the technical communication and interpersonal problems that can occur when collaboration is through CMC.

Chapter 5 - Developing an on-line team environment

The fifth chapter looks at the issues an instructional institution needs to consider in order to develop a suitable environment for teams to collaborate on-line. Also discussed are issues such as: administrative concerns, team dynamics and the allocation of resources. This is followed by suggestions on the development of on-line instruction for teams, which includes an analysis of team composition and size.

Chapter 6 - Organizing the team: Can education learn from business and other disciplines?

This chapter provides an organizational structure for teams who are collaborating on-line. Compiled from business and education literature the section covers issues on analyzing tasks and information needs, along with suggestions on decision-making and determining goals

and objectives. The intention is to provide a framework of suggestions that a team can use to help facilitate the team collaboration process.

Appendix A - Facilitating text-based electronic communications

This appendix contains suggestions regarding how on-line text-based communication can be facilitated. Issues discussed include time discrepancy problems, lack of non-verbal communication, dealing with information overload, writing for CMC and facilitating progress reports.

Appendix B - Interpersonal issues

Appendix B contains suggestions on how to deal with specific interpersonal issues that occur within a CMC environment. These interpersonal issues include: social skills, dealing with conflict, giving and receiving feedback, trust and commitment, and the importance of proper netiquette on-line.

Appendix C - Facilitating on-line communication between team members

This appendix provides suggestions on how to effectively communicate with others on-line. The first portion of the appendix discusses the beginning phase of group communication, followed by maintaining communication over-time, and concludes with a look at the later phase of group communication.

Appendix D - Organizing the team

Appendix D is designed to serve as a job aid for learners collaborating on-line in teams. This appendix is based on the research summarized from Chapter 6 - 'Organizing the team: Can education learn from business and other disciplines?'. .

Appendix E - Thesis literature sources (Table 1)

This appendix consists of a table that shows the literature sources for specific sections of this thesis.

Chapter 1

Collaborative organizations:

Facilitating on-line collaboration of learning teams

The purpose of this thesis is to bring together literature from other disciplines, (such as business), in order to create an organizational structure for on-line team collaboration within education. This structure is intended to serve as a guide for both the institution and, especially, for learners collaborating on-line. Business literature, for example, has a tremendous amount of data on team building and design. Group dynamics can also provide education with information on issues such as group structure and development. However, due to content and length restrictions only elements of these literature areas will be used within this thesis. For additional information on where various literature was used refer to Table 1 in Appendix E.

Essentially, the structure of this thesis is designed to present components from various literature which can potentially facilitate collaborative team learning. These components include: 'Group structure, development and learning' (Chapter 2); 'Computer technology and teamwork' (Chapter 3); 'Small group communication' (Chapter 4); 'Developing an on-line team environment' (Chapter 5); and most importantly 'Organizing the team' (Chapter 6).

This chapter begins by presenting a discussion to define on-line team collaboration. This is followed by an overview of teamwork design and structure within business. There is also an analysis of team structures and on-line learning within various educational institutions. This analysis can serve as an essential learning opportunity for any organization. Most of the educational institutions discussed here have been using CMC for some time.

What is on-line team collaboration?

Within business, the objective of a self-directed work team is to either develop a project, report, solve a problem or to fulfill a task. A team exists when there is a shared view of goals and

objectives, with an interdependence between members to complete a specific task. This interdependence means each team member's labour is being effected or contingent on the work of others within the team. This could be with one other team member or all (Mankin et al., 1996). The most effective team members have the ability to accomplish tasks independently and collaborate interdependently when it is required (Arnold, 1996). With the addition of technology creates a situation where computer communications can make for more effective work teams, and at the same time the structure of teams can help expand the use of computer technology (Mankin et al., 1996).

But technology in itself cannot create collaborative learning. Certainly, computer tools can have an impact on collaboration (Westera, 1999), but the social skills required for team interaction must also be considered (Bannon, 1989). In fact, it is the learner with the support of the instructional infrastructure who are in the best position to facilitate learning through collaboration. According to Panitz (1996) "the underlying premise of collaborative learning is based upon consensus building through cooperation by group members" (p. 1), and where learning is primarily learner centred.

Perhaps here is the opportunity to clarify the terms cooperation and collaboration. Certainly there are elements of cooperation and collaboration, which do overlap, and there are times when education authors will use the terms almost interchangeably. Nevertheless, a fundamental difference is that cooperative learning is viewed as being predominately teacher centred and collaborative learning, as mentioned earlier, is reflective of learner centred instruction. Collaborative forms of instruction encourage and empower learners to be more independent and less teacher dependent (Panitz, 1996), which is the focus for this thesis. Therefore, in order for collaborative learning to be successful learners need to "have a basic understanding of various collaborative tools as well as principles of teamwork and inter cultural communications" (Marjanovic, 1999, p.136).

However, how the act of collaboration improves learning is still not entirely understood.

There are in fact numerous explanations of how learning may be improved within a collaborative environment, but there lacks an understanding of “how collaboration actually works” (Jeong & Chi, 1997, p.1). Evidence gathered from other literature areas such as anthropology and linguistics reflects the circumstance that when people work together they inevitably will “share common memories, knowledge, or mental models” (Jeong & Chi, 1997, p.1). Jeong and Chi (1997) propose that this same process may be able to explain what is happening within a collaborative learning environment.

It is also possible that collaborative learning is “a process of convergence in which people gradually converge on a meaning and achieve a shared representation” (Roschelle cited in Jeong & Chi, 1997, p.1). The concept of shared representation might be one means to explain how learning occurs when students collaborate together (Dillenbourg & Schneider, 1995). Jeong and Chi (1997) stress that sharing a mental model or a shared representation is important for understanding the collaborative process. A computer system can assist with this shared representation by providing a common interface or medium through which learners will interact (Salomon, 1995). However, as mentioned before on-line technology cannot in itself “create social obligation to interact” (Jeong & Chi, 1997, p.4). Learners can easily end up working more or less independently and only interacting electronically when they choose (Jeong & Chi, 1997).

Therefore, what is often described as collaboration within education is not based on the level of interaction, but instead on the fact that learners are connected via computer technology (Jeong & Chi, 1997). This form of electronic environment does not lend itself to creating a mental model or shared representation among learners. Further proving that connecting people via computers “does not guarantee that any collaborative learning will take place” (Bannon, 1989, p.4). Instead what one finds in much of the educational literature concerning on-line collaboration is a focus on developing the technology infrastructure and instructional course design, but very little in the way of group development and or team building. For example, Marjanovic (1999) presents various collaborative activities in her article ‘Learning and teaching

in a synchronous collaborative environment', but not how learners can organize themselves to accomplish these activities. Authors such as Hsi and Tinker (1997) also discuss technology use for group collaboration, but barely touch on team issues. Structure to the on-line conference environment is discussed, covering the development of electronic areas for learning, posting questions, or to merely socialize on-line (Hsi & Tinker, 1997), but the technology structure seems to be the main focus. Hsi and Tinker however, do site the need for further research, not only on the use of technology, but also on the instructional design models for collaborative learning on-line (Hsi & Tinker, 1997).

However, according to Jeong and Chi (1997), for collaborative learning to be viable there needs to be continuous feedback along with an exchange of ideas and information among learners (Clark & Schaefer cited in Jeong & Chi, 1997). Jeong and Chi (1997) also suggest that the development and design of computer software can assist to facilitate this level of interaction and make team collaboration an even more effective means of learning (Koschmann, Feltovich, Myers & Barrows, 1995). But, even though the technology is important and can aid in collaboration, learners also need the social and organizational tools in order to take full advantage of a team learning situation, especially one where learners are expected to be more self-directed.

Self-directed team structure in business

In business, teamwork did of course, exist in the past, but individuals higher up in the organization such as managers or supervisors made most of the work decisions. Today self-directed teamwork is part of a business' organizational structure enabling workers to manage their own work without the former traditional work hierarchy (Fisher cited in Drinka, 1996). Due to the self-directed nature of these teams, members have more control in deciding on the direction, purpose, and goals their work will take on (Ron et al., cited in Drinka, 1996; Greer, McCalla, Kumar, Collins & Meagher, 1997).

Even with the considerable literature and training designs that are available there are still business organizations that do not address the redesign issues, which are necessary for a team-oriented environment to be successful. One reason is that in large business organizations it can take two to five years to instill a team structure. Within business it has also been found that in the first year team members spend at least 20 percent of their time in teamwork related training (Bate & Travell, 1994).

According to Rocine (1996), developing a team-oriented environment requires an organizational structure that includes:

- Determining team boundaries.
- Establishing the level of power a team will have.
- Deciding who the team members will be.
- Conducting an examination of the work place (within education this would be the learning place which could include the computer network infrastructure for distance collaboration).
- Developing training for members of these teams.
- Dealing with issues of leadership.

Obviously within education it is not possible to have the level of training that exists in business. This partly due to present education structures, where an instructor has learners for one or two semesters (three to six months). However, a more thorough development of team training could occur if an entire degree program incorporated team-training strategies into their instruction. One example of team training being applied to an entire program is at McMaster University, which is discussed later in this chapter.

There are also a number of differences between the organizational culture of a business and that of an educational institution. For example, generally businesses have more authority

over their workers time in regard to what they do and when tasks must be completed (Walther & Burgoon, cited in Vance Wilson et al., 1997-1998). Learners do not have the same restraints as workers, (e.g., learners can drop out of course work and programs) because they are not subject to the same penalties and obligations. Through workers can quit their employment, loss of wages is generally considered more serious than the loss of a grade. Also, the length of time workers are employed with a firm affords them the opportunity to develop relationships over the long term (Walther & Burgoon, cited in Vance Wilson, et al., 1997-1998) This is unlike educational institutions where learners are only together for the duration of a program (three to four years) or only for one course (three to six months).

The business model of teamwork is an evolving process. Nevertheless, there are still elements of business teamwork and collaborative working that can be useful to education, and will be mentioned throughout this thesis.

The development of on-line collaborative learning environments (Team structure within education)

Due to their present organizational design most higher educational institutions do not have the luxury of time, financial resources or, in some cases, the interest that business institutions have when it comes to facilitating a team structured environment. In most institutions the organizational model has been and often still is instructors who view their position as lecturers, placing learners as relatively passive receptors of information (Woods, 1996). This organizational model of delivering instruction in order to encourage learning has existed for centuries and is not easily changed.

There are numerous institutions around the world that have made the effort to challenge the traditional model of learning and instruction. Some of these institutions include Concordia University (Montreal, Quebec, Canada); Federal University of Maranhão (São Luis - MA, Brazil); McMaster University (Hamilton, Ontario, Canada); New York University (New York,

United States); Nova University (Fort Lauderdale, Florida, United States); Open University (Milton Keynes, Great Britain); Simon Fraser University (Burnaby, British Columbia, Canada); OISE Ontario Institute for Studies in Education (Toronto, Ontario, Canada); Universidad de las Americas (Puebla, Mexico); University of California (Berkeley, California, United States); University of Dar Es Salaam (Dar Es Salaam, Tanzania); University of Helsinki (Helsinki, Finland); and University of Twente (Enschede, The Netherlands).

However, only four of these institutions will be discussed here, OISE (the graduate school of education for the University of Toronto), Simon Fraser University, Open University (a distance higher educational institution) and McMaster University. The first three have used CMC to facilitate collaborative learning. McMaster has developed and redesigned their curriculum to accommodate face to face collaborative training, and has more closely resembled the business model of team structured collaborative training.

OISE, Simon Fraser and Open University are presented here to provide a general overview of the development and implementation of on-line instruction during the last ten to fifteen years. All three of these institutions have shared and experienced similar problems and issues in their pursuit of facilitating on-line instruction. Though only a few institutions can be presented here, it is felt that they are reflective of what numerous institutions have faced when attempting to use electronic communications for learning.

OISE and Simon Fraser

Both OISE and Simon Fraser began as on-campus institutions, and still conduct courses this way. In recent years computer conferencing (CC) has been used to deliver instruction for a number of courses at both universities. The information and data presented here is based on Harasim's (1993) research of on-line courses offered at both institutions. This research looked at how collaborative learning was facilitated through CC, with an additional focus on the instructional aspects of group learning (Harasim, 1993).

OISE began using CC in 1985, however, the research here is based on six graduate level courses presented completely on-line, with 112 learners between 1986-89. At Simon Fraser six undergraduate courses were researched, with 295 learners beginning in January 1990, (only a portion of the instruction was provided on-line at Simon Fraser). During the study the computer conferencing software used at OISE was Participate and at Simon Fraser it was Forum. Since the study Simon Fraser began using Participate CC software as well (Harasim, 1993).

Data for the research at both institutions was obtained through various means. The quantitative research compiled information such as the number of messages sent and posted by learners within a conference. Qualitative information was obtained through interviews (via e-mail) with those participating in the on-line courses. Also, an open conference was set up where learners could post their feedback concerning the on-line courses, and their overall experiences (Harasim, 1993).

At both universities there was considerable attention given to creating group activities, designing the computer conferencing sites, and setting up the overall on-line environment. There was also an application of structure by the institutions through imposing a schedule of when assignments and tasks had to be completed. Learners were also expected to contribute a certain number of messages each week, and were assessed on the quality of their electronic contributions based on instructional criteria (Harasim, 1993).

The results of Harasim's data reflected how the design of the on-line environment did facilitate learning interactions. However, though considerable attention was given to setting up the on-line environments, it was evident that there was not enough focus on facilitating team learning. The research revealed that along with technology difficulties (learners unfamiliar with the software etc.), there were also group learning problems such as information management issues and other problems of inadequate instructional support (Harasim, 1993).

Information management difficulties occurred at both universities because of information overload, and learners' inability to organize their collaborative work. It was found

that learners felt overwhelmed with the amount of on-line information they had to deal with. This occurred because students lacked the management skills and experience to handle this problem. Instructors, as well, indicated that information overload was a problem, finding that teaching on-line has demands and difficulties very different from classroom instruction. This showed that instructors also needed tools to manage and organize information (Harasim, 1993).

At Simon Fraser, for example, undergraduate students complained about the number of messages they had to read every week. This was due to the seminar structure of the instructional conference, which could easily generate 100 messages in one week from only 15 to 18 people. This reading was in addition to the course readings, which made the reading load considerable. One suggestion was to have much smaller groups participating in seminar conferences which should result in fewer postings. Learners themselves confirmed this, finding collaboration and decision-making within large groups very difficult (Harasim, 1993).

Because of these difficulties learners found that they wasted time trying to organize their collaborative work, and make group decisions. These problems occurred because of learners' lack of collaborative work experience, and the on-line component of the instruction complicated this issue even further. Learners found what took considerable time was deciding who within the group would accomplish which tasks. This difficulty in deciding and designating roles and/or responsibilities took time away from working on the actual projects. This made it necessary to instigate a means to speed up the decision-making process through "synchronous conferencing, phone calls, or face to face meetings (when possible)" (Harasim, 1993, p. 128). The need for information management tools to deal with these issues calls for the application of a more structured design to the on-line instruction. It was learners themselves who suggested the need for guidelines, structure, and other means of support to deal with these issues (Harasim, 1993).

Another means of instructional support, which could have been utilized more, was the use of moderators. Moderators "introduced new material and formulated issues" (Harasim, 1993, p. 127), but that was the extent of their input. Feedback from learners showed that they preferred

to have moderators who were more actively involved in facilitating discussions and providing other support. The research showed that with less moderator involvement to assist in organizing and, if necessary, stimulating discussions there would be a slow down in learner participation and dialogue on-line. One method used at Simon Fraser was having students within the courses moderate discussions by functioning as seminar leaders. The general consensus among learners at Simon Fraser was that though it was time consuming most found the role rewarding, because it provided them with the opportunity to learn the course material more thoroughly (Harasim, 1993). Whether the other participants learnt more was not discussed.

Conclusions drawn by Harasim's research reflected that it is essential to provide structure and tools to both learners and educational instructors in order to effectively facilitate collaborative learning on-line. This requires the institution and instructors to set-up structured on-line environments and the instructional support to assist learners in decision-making and overall group collaboration. Harasim further suggested using the technology to help bring structure to teamwork by providing "process guidelines, decision support tools and other intellectual resources" (Harasim, 1993, p. 128). This support can be provided electronically, paper-based and through the use of software to develop databases that can assist in organizing work in progress (Harasim, 1993).

More recently Harasim and various colleges have been involved in developing and designing the Virtual University (Virtual U). This project began in 1993 with the intention to "design a system using the internet that would encourage the adoption of a collaborative learning approach" (Harasim, 1999, p. 44). The Virtual-U design group has become part of a national research effort associated with the Telelearning Network of Centres of Excellence (TLNCE). This network is set up to coordinate the design, evaluation and use of computer technology for the purpose of collaborative learning. TLNCE's intention is to design computer network tools specially tailored for the needs of the educational market by providing "a framework for designing, delivering and managing individual courses or entire programs" (Harasim, 1999, p.

45). To date many of TLNCE's projects are still on going with continued financial support through Industry Canada (Harasim, 1999).

Open University

Open University (Open) has always functioned as a distance institution providing education to learners all over the world. Before electronic communications Open used various means of communicating with learners such as "the telephone, letters and some face-to-face tutorials" (Mason & Bacsich, 1998, p. 250). However, with advancements in technology the university has been able to deliver courses through computer conferencing (CC) and other means of electronic support (Mason & Bacsich, 1998).

The information presented here is based on authors Mason and Bacsich's (1998) analysis of CC implementation and use at Open University over the past 10 years. This analysis brings together the assessment studies on various CC courses, as well as how CC has been combined with teaching strategies used at the institution. Both Mason and Bacsich have developed, designed and provided instructional support for on-line instruction at Open.

In the early years of electronic instruction Open used COSY CC software, and by 1990 there were 2000 learners using this system. As software and technology (e.g., hardware, networks) improved the university began using FirstClass CC. By 1996, it was estimated that 13,000 learners were using FirstClass for instructional purposes, with an additional 7000 students using the system for communications (Mason & Bacsich, 1998).

Open found that there were distinct advantages to using CC over other instructional media. Advantages such as the reduction of learners isolation and the ability to provide quick feedback to student inquires made CC very attractive to the institution. However, with the increase use of CC many instructional developers made the assumption that if they provided the on-line environment learning would naturally occur.

Unfortunately, when learners did go on-line to exchange with other learners or contact

the instructor there was very little substantial learning. This revealed that there was a need for some form of structure to the on-line discussions and to learners inquires. It also showed that the institution needed to provide an overall framework to the on-line instructional environment as well (Mason & Bacsich, 1998).

Before the introduction of CC Open generally provided students with structure through “self assessment questions, guided readings and advance organizers” (Mason & Bacsich, 1998, p. 253). However, this portion of the Open’s instructional model was not initially implemented as part of the CC instruction because of the misguided assumptions about what technology can or cannot do. Open realized that with CC as with other forms of media most learners do require structure in order to organize their work. Even the most motivated learners need and often expect some sort of guidance. The university also found that structure must be applied to both the curriculum and the electronic environment. This is true whether or not the on-line component of a course is a small or large part of the instruction. In order to facilitate this form of instructional design the institution had to re-organize their curriculum and the materials to support learners collaborating on-line (Mason & Bacsich, 1998).

Developing effective instructional models for the CC environment has been a continuing, evolving process at Open. Through this experience the university has found that electronic instruction “needs to be structured in the same way as other parts of the course, including pacing of activities, small work groups with set tasks, and pre-prepared materials and exercises for the course-related conference” (Mason & Bacsich, 1998, p. 258). The CC courses that have proved to be most popular at Open are the ones where learners are placed into small groups and assigned specific tasks to complete (Mason & Bacsich, 1998). Once learners are put into groups they are encouraged to regularly participate using the CC on a “week by week pace” (Mason & Bacsich, 1998, p. 254). In some courses learners also had the opportunity to volunteer for specific roles and or tasks. The tutor however, is the one who remains in the position to provide the overall framework for learner discussions and group work (Mason & Bacsich, 1998).

Open still continues to conduct course on-line. With constant new technology innovations and accessibility for learners this trend will continue.

McMaster University

McMaster University radically changed their traditional model of learning and instruction when they realized there was a need to improve their students' ability to problem solve. This resulted in a re-design of their Chemical Engineering program to incorporate more cooperative and collaborative learning methods. The process of reconstructing the curriculum at McMaster began 25 years ago, and has since evolved into the McMaster Problem Solving program (MPS program) (Woods, Hrymak, Marshall, Wood, Crowe, Hoffman, Wright, Taylor, Woodhouse & Bouchard, 1997). This method of instruction is also being used in other programs at McMaster such as the medical school (Woods, 1996).

The MPS program consists of a series of workshops that are divided into four courses. These courses come to 120 hours spread over four years and cover 55 topics (Woods, et al., 1997). Learners take these courses in parallel with regular courses within their program. The workshops are designed to teach learners skills that include stress management, interpersonal skills, decision-making, life long learning, listening and responding, group skills, group evaluation, and team problem-solving (Woods, et al., 1997). The sequence of the workshops are designed so learners will be able to build progressively on these new skills as they are acquired.

McMaster's also realized that learners needed the opportunity to reinforce the new skills within their regular classes (Woods et al., 1997). This required McMaster not only to change its mental model of learning, but also their conceptual understanding of instruction. In this new model the instructor's position changed from being merely someone who lectures to that of a coach who encourages and facilitates learning (Woods et al., 1997).

Adding the workshops meant that there was less time available for regular classes, but this became an opportunity to re-evaluate the overall curriculum (Woods et al., 1997). Through

this re-evaluation McMaster “removed duplication of topics among courses, introduced design across the curriculum, integrated computer skill development and communication skills throughout the program” (Woods, et al., 1997, p. 80).

Though McMaster dealt with these issues on a large scale, Woods (et al., 1997) suggests that instructors can utilize many of the same MBL techniques in their own classroom. These techniques could include teaching learners problem solving and other collaborative skills so they are able to self-direct their own learning (Woods, 1996).

OISE, Simon Fraser, Open and McMaster

With facilitating on-line collaborative instruction it can be seen that institutions share common problems and concerns. By attempting to adapt old models of instruction to this new media institutions have found that it is not always effective. On-line instruction such as computer conferencing is a new form of educational opportunity which, like other forms of instructional delivery, has had to go through growing pains. This makes it essential for institutions to consider how they can better develop and facilitate effective collaborative learning on-line. Success requires institutions to evaluate how technology can be effectively used, and how communication can be better facilitated. This also means that promoting and encouraging learning teams is something, which needs to be incorporated into the instructional design of on-line courses. The exception to this has been McMaster University, with practices reflective of business literature. Of course, the McMaster model was initially developed for face to face team collaborative learning, but there are certainly elements of this model that on-line learning environments could utilize.

Chapter 2

Group structure, development and learning

Understanding how other organizations (education or business) deal with collaborative issues is important and can be beneficial. However, in order to develop and maintain a collaborative team environment it also requires facilitating a shared team mental model for both the institution and learners. The key is to change the traditional mental model of learning and instruction. As mentioned earlier, even within business, implementing a team structured environment requires educating people to be better prepared to work within this new structure. For an institution it is essential to have an understanding of the fundamentals of group structure and how groups develop over time, which includes the phases of group development, along with the stages and processes of team learning. All of the aforementioned issues will be discussed further within this chapter.

Fundamentals of group structure

Group structure is defined by the internal workings, conduct, and processes, which any group adheres to. The issues of structure and related difficulties faced by any group will depend on the level of organization necessary for the group to accomplish its goals. A group will develop its own principles, boundaries, and mechanisms to accommodate the tasks it must accomplish (Hemphill cited in Luft, 1970), but how effective the structure is without outside guidelines or training will depend on the group members' past teamwork experiences and their individual working abilities. For self-directed work teams to be successful it is necessary for there to be:

- A certain level of work interdependence between members.
- A goal and or mission which is shared.
- Communication which is truthful and forthright.

- A feeling of being part of something.
- Decision-making where there is consensus.
- A leadership structure which is shared.

It is also important that the differences between team members are valued, and that opinions and taking chances are looked upon positively. These same team members also need to have the ability to assess and correct their own problems by individually and collectively having the interpersonal tools to analyze their own work (Orsburn et al., cited in Drinka 1996). All of this is reminiscent of team building (development and design) within the business environment. The features required for a successful self-directed work team can also be applied to a self-directed learning team (students) since many of the necessary group interactions will be similar, due to how any team must collaborate in order to accomplish their goals.

Facilitating a shared team mental model

The structure of a team is reflective of the work or tasks the team is expected to carry out. Understanding the type of structure a team is supposed to take on can also assist team members and an institution in developing a mental model on how a team will have to be organized in order to accomplish its goals (Heneman & von Hippel, 1995).

An educational institution can help facilitate this mental model by providing learners with information, suggestions, or guidelines on how to structure teamwork, and on how to collaborate as a team. (These issues will be discussed in further detail in chapter 5 'Developing an on-line team environment' and chapter 6 'Organizing the team: Can education learn from business and other disciplines')

For learners a 'team mental model' can be described as a situation where members of a team will share an understanding of how their group functions and operates (Heneman & von

Hippel, 1995). This understanding will help team members develop a mental model of how information and data will flow between team members, and will assist the group in breaking down and structuring tasks in order to determine roles and responsibilities. All of this is essential in order for a team to establish deadlines for completing their work.

- It also has been found that when team members share a conceptual understanding or mental model of teamwork possible conflicts and confusion within a team, may be minimized. According to Rouse, Cannon-Bowers, and Salas (1992) when members of a team have a shared mental model they:
- Generally do not require as much time to plan and organize themselves in order to finish tasks.
- Will be able to accomplish tasks with less communication needed between team members.
- Are in a better position to anticipate each other's information needs. (This will reduce the need for information requests between team members).
- Will be in a better position to deal with stress. (This is because with an understanding of teamwork members do not need to spend as much time organizing themselves and coordinating tasks).
- Are in a better position to plan what they have to do and when without having to have lengthy discussions.

Development and learning phases of groups

Issues of group structure and mental modeling can be facilitated further with an understanding of the development and learning phases of groups. All groups, whether they are composed of learners or workers, will pass through specific developmental phases (McDonald & Campbell Gibson, 1998), as the team goes through its 'life cycle'. A team's 'life cycle' refers to

the time that team members will be working together in order to achieve their collaborative goals (McGrath, 1990; Jacques, 1991).

Understanding how teams develop over time is essential in order for an organization to assist team members in reaching their targeted objectives. The time element requires each team member to attain a position within their working together where they can operate as a cohesive group. Generally, this occurs at the halfway point of whatever time a team is given to complete the assigned work (McGrath, 1990). This seems to hold whether assigned work is required to be completed within days, months or more (Gersick cited in Kasl et al., 1997). This makes it important, when developing a team training (e.g., guidelines) component to accompany self-directed team instruction, to ensure that the strategies incorporated are adaptable so that they may evolve as the team progresses through different phases or stages of development (Benson, Bruil, Coghill, Cleator, Keller & Wolf, 1994).

Three phases of group development, 'beginning', 'middle' and 'later' have been determined by Jacques (1991) through analyzing the research of a number of group dynamic theorists. Jacques found that though different theorists focused on various aspects of group development all seem to have similarities in their acceptance that groups pass through specific phases during their life cycle. Another common similarity found was the view that actual teamwork begins to take place after the beginning phase, and during the middle and later phases (Jacques, 1991).

However, collaboration over time is a dynamic process; one phase does not end before another begins (McDonald & Campbell Gibson, 1998). It is possible that different areas of group work will be at different phases (Schutz cited in McDonald & Campbell Gibson, 1998). For example, research that is half-completed would be at the middle phase, but graphic design for the project could be just starting, making this task at the beginning phase. Group phases can also be effected by the addition of a new team member joining a group after the teamwork has already begun. This can require the social group dynamics of the team to start again at the beginning

phase.

These group phases are also reminiscent of the phases or stages of learning described by Kasl et al., (1997) as 'fragmented', 'pooled' and 'synergistic'. The fragmented learning stage reflects the beginning phase, pooled follows the middle phase, and synergistic is similar to the later developmental phase of group development. There is a fourth learning stage referred to as 'continuous', which reflects the situation wherein a team's synergistic learning behaviour becomes habit. However, this fourth stage will not be discussed further within this thesis. Kasl, Marsick and Dechant (1997) developed their team learning model from analyzing two companies, one a petro chemical plant and the other a manufacturing firm. The case studies done at these firms analyzed how employees within these organizations functioned and worked within a team structured environment.

Beginning phase of group development

Generally, in the beginning of any teamwork, group members are getting to know each other (abilities, interests) and the team at this stage is merely a group of people. During this beginning stage team members will be uncertain of the direction of the team and their role within it (Rocine, 1996).

An important area of concern at this beginning phase for new team members is how the tasks or work will be divided. To reduce this concern it is effective if all members of a team are involved in deciding how their work will be organized and distributed (Cleland, 1996). Other issues, which create uncertainty for team members include what the team's goals will be, and how will the team attain its performance objectives (e.g., learning the material, obtaining a good grade).

As mentioned previously, this beginning phase can also be viewed as the fragmented stage of learning where cohesion within the group has not begun (Kasl et al., 1997). In the fragmented stage, learning for team members is separate because the team does not learn as a

group. At this stage each team member maintains their opinions and perceptions as separate, having not reached a sense of cohesiveness as a working team.

Middle phase of group development

The middle phase (Jacques, 1991) is where team members develop a means to work together. It is at this phase where teams are in a better position to make decisions, deal with conflict issues and decide on team members' roles and responsibilities. However, if problems (conflicts) occur at this phase team members can become unsatisfied with the team collaborative process (Rocine, 1996).

This phase reflects the pooled stage of learning where cohesion within the group begins through collaborative teamwork (Kasl et al., 1997). Within the pooled stage, members of a team start to exchange data, share information and views for the purpose of the group's objectives. Still, at the pooled stage the team does not yet learn as a collective entity (Kasl et al., 1997).

Later phase of group development

At the later phase (Jacques, 1991) team members become more committed to the collaborative process and to one another. At this phase group work gathers momentum. Often conflicts will be put aside as the team becomes more focused on completing their work. At this stage of development teams that have been provided with direction and instruction on collaboration will be able to move forward into 'self-management'. This self-management means that team members are in a better position to evolve into a cohesive group where members support one another, and everyone within the team is viewed as being essential for successful completion of the work (Rocine, 1996).

This final or later group phase is similar to the synergistic stage of learning where knowledge is developed, and learning occurs that is unique to the group. The learning and developed knowledge is then shared among all team members. This is where cognitive schemes

of individual team members are integrated as the group learns as a unit (Kasl et al., 1997). A learner's cognitive schemes refers to the mental model or conceptual understanding of a learning situation. As new information is obtained by an individual their mental model changes and adapts.

Learning stages of technology

There are also stages for learning the technology in order to collaborate effectively online. At the first stage learners must master the technology at a sufficient level in order to perform basic tasks; for example, uploading, downloading, accessing mail, and using search engines for obtaining data. This can be viewed as the beginning phase of group development and/or the fragmented stage of learning which is needed in order for learners to learn computer-mediated communications, and must be achieved individually before moving on to the next levels. The next levels, which are interacting and learning the instructional content with other learners, reflect the middle to later phases of group development and/or pooling to synergistic stages of learning.

Learning as a team

Whether in business or education, each person as team member contributes to the collective knowledge of the team. However, within a learning environment learners not only have to develop a project or report; they are often also learning course material, communication technology (Martin, Moskal, Foshee & Morse, 1997), and how to work in groups at same time. This can create a very complex learning situation which makes it more essential for the group dynamics within a team to be positive and sound in order for team learning to have the opportunity to develop (Kasl et al., 1997).

Generally, early stages of learning any material tend to require a more instruction centred approach. According to Choi and Hannafin (1995), a learning activity is guided by the

context in which it is learnt. This context assists the learners to understand new knowledge through providing such things as 'advanced organizers' and suggestions on available related resource aids (Choi & Hannafin, 1995). Other means of assistance for learners can include guidelines and or instruction on how to collaborate with others.

Learning approaches which focus on collaboration can help students to improve their understanding of basic interpersonal skills (Murphy, 1995). These interpersonal skills reflect a team member's ability to understand how their group functions (Drinka, 1996) and their capacity to interact effectively with other members of the team. Inevitably, individuals who collaborate will share and combine their skills which will lead to learning collectively (Murphy, 1995). Murphy suggests looking at this form of learning as a 'mutual tutorial', where there is peer teaching with the support of a 'mentor and/or coach' (instructor/tutor). Learning is expanded further when a situation evolves where knowledge is created for members of the team and for others outside of the team as well (Kasl et al., 1997). Other people outside of the team can be other students, faculty, the instructor or anyone outside of the team who may benefit from the collaborative work the team is producing.

Chapter 3

Computer technology and teamwork

It is obvious that creating a self-directed learning team environment requires an understanding of a multitude of issues. Learners cannot be expected to automatically have effective collaborative skills. This means that both learners and the institution have a learning curve to overcome, in order create a successful team learning atmosphere. This learning curve not only involves the understanding of group structure, but also the phases of group development and the issues of team learning. However, with the combination of computer technology and teamwork, group dynamics becomes even more complicated, requiring additional attention by an institution and the participating learners to ensure a team's success (Salomon, 1995).

With today's technology the micro computer, through on-line networked communication, has the ability to combine the medium of writing with some of the flexible elements of speaking conversation; this makes computer technology a powerful tool for effective group communication, and support for cooperative (Schrum, 1991) and collaborative learning. The choice of instructional delivery ranges from synchronous to asynchronous computer system design and each form of collaborative technology has unique features, which make it adaptable to specific types of teamwork situations (Bate & Travell, 1994). Synchronous delivery systems encompass face to face instruction via satellite teleconferencing, compressed video, audio teleconferencing or telephone, which all mimic the face to face 'real time' of instruction. Systems which are asynchronous such as mail correspondence, and computer network communication relieve learners of the constraints of time and place. These various technologies and their relationship to education are discussed further within this chapter.

Collaboration technology of today

Computer technology has developed from mailing data on stored disks to e-mail to where today individuals can edit the same document on-line at the same time. Within the present work environment faster reactions are essential in order to keep pace with global market changes. This need has resulted in the increase use of computer technologies which are 'group oriented' pushing older technologies such as stand alone computer systems out of today's organizations (Mankin et al., 1996). The collaboration technology that is available today is designed to assist teams to communicate more effectively, help facilitate decision-making, improve the ability to keep track of information, and enable reports and/or documents to be developed as a team effort (Opper & Fersko-Weiss, 1992).

However, even with the push for collaborative technologies, Briggs and Nunamaker (1994) suggest that team members are still being supported technically at three levels within an organization. The first is the 'individual level' where members of a team use 'stand alone' technology (e.g., word processing software, spreadsheets, and electronic schedulers). The second is the 'coordination level' where teams utilize networked technology in order to organize information and to coordinate team members' work (e.g., databases, e-mail, and team schedulers). The first and second levels are then combined to create a third 'group dynamics level' where teams utilize computer technology to resolve situations or problems that can occur through collaboration with others. It is at the third level where technology is used to assist team members to focus towards the same goals and objectives in order to keep pace with each other's work.

As within business the use of computer network systems (e.g., computer conferencing) has increased in many educational institutions as well, especially over the past ten years. This increase is reflected by the number of educational institutions around the world offering instruction on-line (Bellman et al., Harasim et al., Harasim & Winkelmanns, Mason & Kaye, cited in Harasim, 1993; Hiltz, Fjermestad & Lewis, 1999). With the constant increase in technological

advancements it is becoming more and more likely that in the future every learner will need basic training in information/computer technology (Eraut, 1991). This training would not be to make every learner a specialist, but would be required in order to learn other things.

Forms of collaborative technology

In order for a CMC collaborative environment to exist there must be some form of software technology, and computer network infrastructure, which will enable a team to share data and information (Bate & Travell, 1994). The technology choice is even more important if a team is required to handle a large amount of data which must be stored electronically over an extended period of time (Bate & Travell, 1994). Software that enables users to share information ranges from simple software with the ability to organize data so that it can be easily retrieved to complex systems where users are able to access information (e.g., documents, or files) simultaneously. One problem with computer conferencing, as with other software, is that it usually requires users to have attained a certain level of computer literacy skills (Bate & Travell, 1994). The level of computer skills needed will depend on how easy the software is to learn and use, and whether or not there is adequate instruction available on how to use the software. Irregardless of how simple or complex the software technology is all should enable users who are geographically separated to share information and data (Bate & Travell, 1994).

As mentioned earlier, the software that facilitates on-line collaboration will be either synchronous or asynchronous, and will require a computer network infrastructure to facilitate the electronic communication (Smith, 1994). A computer network infrastructure is composed of:

- **Personal computer(s), a principal component which a learner interacts with and uses to electronically communicate with the network (e.g., other computer users) (Hawryszkiewicz, 1997).**
- **Software to facilitate electronic communications. This generally requires enough computer memory and a computer processing unit (CPU) with sufficient data processing speed**

so that electronic information can be received and sent quickly (Hawryszkiewicz, 1997).

- **Communication lines, either telephone lines or television cable which connect the personal computer with other computers (e.g., mainframe (file server), other personal computers) (Hawryszkiewicz, 1997).**
- **Technical configurations which are needed so the personal computer can interact with the network. This requires a personal computer to have a modem (connected to a communication line) and a network card (which will configure the computer to communicate (transfer data) within the network (Hawryszkiewicz, 1997).**
- **A host computer (main frame) that is the network's file server which people have access to through their computer, and modem (Harasim cited in Lauzon, 1991). The host computer or file server is where information, data and or file documents can be saved and stored for the group's needs (Hawryszkiewicz, 1997).**

Synchronous software technology

Synchronous technology allows two or more individuals who are in different locations to communicate and work together simultaneously (Smith, 1994). The problem with this software is that it requires extensive hardware (e.g., large memory capacity, fast modems, video cameras, and speakers) in order to use these applications. The variety of synchronous software available today are quite numerous, making it impossible to discuss all of them. Therefore, the technology discussed below, computer conferencing and joint authoring products, are provided to furnish information on some of the forms that are available for today's teams.

Computer conferencing: Text-based, audio, and video

The variety of software which facilitates computer conferencing ranges from enabling users to 'chat', (which is text-based), to audio and video conferencing (Bate & Travell, 1994).

All synchronous computer conferencing facilitates communication in 'real time' between people who are geographically separated. This technology simulates the face to face meeting making it an effective means of collaboration (Bate & Travell, 1994).

With text-based desktop computer conferencing (chat) the computer screen is portioned off or split into sections. These sections portray each individual who is participating in the discussion. When an individual types, their words instantaneously appear on the computer screen of everyone who is involved in the dialogue (Dutta-Roy, 1998). However, because communication is through text a certain level of keyboard skills is required, or the dialogue could become quite cumbersome with the time required to type in comments.

Audio-conferencing enables people to simultaneously speak to each other, and electronically transmit digital audio files through a computer network. Sound can also be digitally recorded and then saved as files before being sent out to others electronically. In order for audio conferencing to be utilized hardware components such as a sound board and speakers must be installed (Eager, 1994).

With video conferencing not only are people at different locations able to speak to each other, they are also able to see each other simultaneously (Hawryszkiewicz, 1997). Most software that facilitates this technology enables people to share images, files and other data as well. Video images and other information can be displayed on a computer monitor or television. The video transmission is in digital format and is sent to desktop computers, which are outfitted with small video cameras.

Video conferencing, like audio conferencing needs a sound board, and speakers, and in addition a video capture board, video cameras, compression software, and a modem speed of at least 56K Bits Per Second (BPS) (Eager ,1994).

Joint authoring productions and systems

With this form of software technology (also referred to as shared application/editors) a group of individuals are able to access text information simultaneously to develop, discuss, and edit reports and/or documents on-line (Hawryszkiewicz, 1997). Swerdlow (1995) describes this as a 'shared work space' where changes made on the same document enable learners to discuss work in progress, and to see how their contributions effective the overall collaborative work (Moeller, 1995). The advantage of this is that changes appear on screen as they happen in 'real-time'. This 'real-time' aspect means that other members of a group do not have to wait for data to be completed before seeing it. Software of this nature is very complex and many on-line systems cannot provide this level of working due to the hardware (e.g., memory, modem speeds) needed for such a system. An alternative is to distribute portions of a file or document to members of the teams, but only the original author is able make changes (Bate & Travell, 1994).

Asynchronous software technology

With asynchronous technology the work of team members is not simultaneous, but it allows users to share data and information with one another at their convenience (Smith, 1994; Hawryszkiewicz, 1997). Collaboration is facilitated by helping members of a group work independently on the same tangible product, such as a document or the source code for a computer system (Smith, 1994). Also, unlike synchronous technology, asynchronous software does not need the extensive hardware and the costs that go along with it. Because of this and other logistic factors asynchronous technology is often more commonly used within educational environments (Harasim, 1999). Two of the most predominately used technologies are computer conferencing and e-mail, which are discussed below.

Computer conferencing

Though video and audio conferencing enables synchronous discussion, text-based asynchronous computer conferencing (CC) tends to be used more within higher education (Rekkedal & Paulsen, 1989). This is probably because audio and especially video are still an expensive means for a team to communicate, and generally the forms of collaboration needed by most self-directed distance learning teams are better facilitated through the sharing of text, information and graphics (Dutta-Roy, 1998).

Asynchronous CC enables people to communicate with each other according to their availability (Hasted, 1994; Bate & Travell, 1994, Hawryszkiewicz, 1997) provided the appropriate software and internet access is in place. The success of CC is due to its design structure where users can participate in a vast assortment of discussion groups on a wide range of topics with anyone in the world (Bate & Travell, 1994). For instructional purposes (or business) a conference can be set up where only members of a specific team have access. Within the conference team members can exchange comments and other information in order to accomplish their collaborative goals. CC can be an effective medium for sending electronically anything from brief messages to extensive and lengthy documents (Bate & Travell, 1994). Most CC software will have an e-mail feature for personal messages as well as a means for messages (e.g., letters, files, documents etc.) to be sent to all members of a team simultaneously.

E-mail

Electronic mail or e-mail software enables users to send and receive text and, depending on the system, audio and video as well. An added feature of most e-mail systems is the ability to also attach documents and/or graphics, to forward and reply to messages, and retain address lists. Generally all software that enables users to collaborate via CMC will have an electronic mail feature so that teams can communicate asynchronously (Bate & Travell, 1994).

Provided the technical facilities (appropriate software, and computer network with internet access) are in place individuals can send and receive e-mail from anywhere in the world (Bannon, 1989; Bate & Travell, 1994). The mechanism for using e-mail requires both sender and receiver to have an e-mail address and access to some type of mail application program (Smith, 1994). It is through a mail application program and an internet server (e.g., CompuServe) that e-mail users gain access to the global internet.

Chapter 4

Small group communication

The combination of teams and technology will continue to have profound impact on the organizations in which they exist (Mankin et al., 1996). When learners use computer-mediated communications, not only will they need training on using the software, they also need to understand issues of group management when using the new technology. This will necessitate learning a different set of work conventions so that everyone will be working in a similar way (Opper & Fersko-Weiss, 1992), and will also entail the ability to organize communication and effectively interact with others on-line. How this is carried out will depend on the technology, and also on how group communication is understood, organized and maintained by a team collaborating on-line.

As mentioned earlier, at present, learning institutions tend to predominately use asynchronous text-based computer-mediated communication. This use of asynchronous communication means that there has to be a change in how people (learners, instructors) learn, and organize their collaborative work. Learners need to understand the difficulties of on-line communication and be provided with the skills to deal with possible problems. This means having the opportunity to learn about group dynamic and communication issues which can effect the collaborative process (McDonald & Campbell Gibson, 1998).

The issues discussed in this chapter include; the limitations of communication predominately through electronic text, the importance of interpersonal skills, and facilitating team communication. There are also appendices, which are designed to provide additional information and suggestions on how to deal with on-line communication issues. These appendices will be referred to through out this chapter.

Communication through text

In recent years the development of computer-mediated communications has resulted in an explosion of information accessibility and has been the forefront of transforming our society from an industrial age to an information one. A society whose economy is based on information needs for its citizens to be able to communicate and process information. This means achievement in today's information age requires people to have effective literacy skills. These literacy skills not only encompass reading and writing, but also the ability to process and understand information (Moeller, 1995).

Working electronically as opposed to face to face has required both workers and learners to shift from speaking to writing (Opper & Fersko-Weiss, 1992). This reliance on electronic text-based information means that written communication needs to be 'clear and concise' (Gast, Ounsworth, Lewis & Davey, 1992). However, even with our long history with print-based information verbal discourse has always had a more prominent place in human communication. Being able to speak convincingly and write convincingly are very different skills (Opper & Fersko-Weiss, 1992; Rimmershaw, 1999) and, for many, putting one's verbal ideas into writing is an uncomfortable shift.

One suggestion to alleviate this problem is to provide instruction or guidance on how to write and communicate on-line effectively (discussed in Appendices A and C). This is essential if discourse between team members is needed in order for goals and tasks to be accomplished. Naturally, this would be less important if the situation only required the participants to send documents, spread sheets (Opper & Fersko-Weiss, 1992) or databases to each other.

Facilitating text-based electronic communication

According to Ruberg and Sherman (1992) the process of working and communicating electronically via computers will reflect the same social structures of situations where members of a group are dealing with each other face to face (Harasim, 1993; McDonald & Campbell

Gibson, 1998). However, face to face communication has a tendency to be linear where conversations are formed and exchanges are built one on top of another (Ruberg & Sherman, 1992; Koschmann et al., 1995). With much of the present computer-mediated communication being asynchronous discussions can become non-linear by acquiring what is described as 'multiple threads' (Ruberg & Sherman, 1992). With 'multiple threads' a number of unrelated electronic discussions can occur at the same time, which can make it difficult to keep track of what has been said and how it relates to other comments (Burge, 1994). Added to this are other issues with CMC which include time discrepancy problems, lack of nonverbal communication and information overload, which are discussed below.

Time discrepancy

One problem that can arise when using asynchronous communication is the time discrepancy between messages, which are sent and received. This time lag makes it important for a group to have some means of structuring their electronic communications (Ahern & Repman, 1994). An advantage to the discrepancy of time is that it can enable group members to have the opportunity to contemplate before sending a response (Harasim, 1993). But when the time lag of the responding messages is too long often the discussion becomes choppy and less smooth, making it difficult to keep track of the conversation (Ruberg & Sherman, 1992). Because of this added complexity, the structures of discussions using asynchronous computer-mediated communication tend to be far more complicated than 'face to face' dialogue (Ruberg & Sherman, 1992). Suggestions for teams about how to deal with time discrepancy problems are in Appendix A, "Facilitating text-base electronic communications".

Non-verbal communication

In face to face situations there is generally a great deal of communication taking place through non-verbal language (e.g., body language, tone of voice, facial expressions) even though

the dominant mode of communication is speaking (Opper & Fersko-Weiss, 1992). This non-verbal communication is taken for granted in face to face conversations, but communicating is more than speaking and listening (Opper & Fersko-Weiss, 1992). It is these non-verbal elements of communication which can provide a great deal of information (Freenberg cited in Rojo, 1991) and can be an important means of learning (Velayo, 1994). Without these non-verbal or 'auditory cues' many users can feel detached from the communications (Ruberg & Sherman, 1992). Non-verbal communication is discussed further in Appendix A, "Facilitating text-based electronic communications".

Information overload

Information overload is a frequent problem with electronic communications because of the ease that this medium enables information to be generated (James, 1998). Burge (1994) stresses the importance of focused messaging which can reduce some problems such as 'information overload' and 'fragmented thinking'. It is also helpful in reducing information overload if the number of people within a group is kept small (Hiltz & Wellman, 1997). This should reduce the number of messages that the group will have to exchange and read (Mason & Bacsich, 1998). Suggestions for teams on how to better deal with issues of information overload are in Appendix A, "Facilitating text-based electronic communications".

Interpersonal skills

It is important for both learners and the educational institutions to understand the interpersonal issues that can occur when people are communicating and collaborating on-line. In face to face situations the basis of interpersonal communication is the ability to listen, assist each other, and for there to be congenial interactions between team members. It has been found that ideas and topics are facilitated more readily when discussions are as concise and specific as possible. This can be achieved through 'checking understanding' or what is also described as

'active listening' whereby when someone has finished what he or she is saying the individual listening then condenses the information and reiterates the important points back to the speaker (Romig, 1996). Achieving this necessitates being able to focus in on what is being said by mentally reformatting the speaker's words in order to understand the specific points of the discussion (Romig, 1996). Interpersonal strategies can be used in an on-line situation by applying some of these principles to text. Through text dialogue exchange individuals can, by 'active' reading and writing, condense and use the important points of a discussion in the messages that they exchange.

For a self-directed learning team interpersonal communication may also include learning techniques for organizing and negotiating the tasks and roles different members of a team will take on (Orsburn et al. cited in Drinka, 1996). These interpersonal issues also encompass social skills, effectively dealing with conflict, being able to give and receive feedback, establishing trust and commitment, and netiquette issues specific to CMC, all of which are discussed below.

Social skills

One aspect that can socially affect a team is the kind of organizational atmosphere in which the group is operating in. Cleland (1996) suggests that this atmosphere or culture can have an impact on the performance, views, and learning practices of a team. Though in this context Cleland is describing a business organization, these same issues can be applied to an instructional institution, or an electronic classroom. What is important is that the administrators (moderators, instructor, tutors) of the electronic communication create a positive atmosphere where learners feel comfortable expressing opinions and ideas. Creating a positive atmosphere for collaboration can occur if an organization is open to the variety of ideas and opinions learners may have, and by encouraging diversity of thought. However, when learners are told to be creative and express themselves, but then are curtailed by an organization's inability to deal with such diversity, the result is confusion and frustration among learners.

Enabling users ease in exchanging messages and in dealing with other on-line issues will depend on how effective the working relationship is between team members (Burge, 1994). One problem that can occur especially with text-based electronic communication is the decreased 'awareness of audience' (Ruberg & Sherman, 1992). This situation happens because users of CMC can easily become detached from those with whom they are communicating. Open University dealt with this problem by increasing the 'telepresence' of those participating on-line through the FirstClass computer conferencing technology that the institution used (Mason & Bacsich, 1998). This technology enabled learners to exchange digitized photos of themselves with their personal resumes which helped learners to feel more connected with each other. Open University also incorporated 'synchronous chat sessions' as part of the instruction. These sessions generally occurred to signal the end of a course, assist team members to coordinate collaborative tasks, and/or arrange meetings with tutor(s), instructor(s) or with other team members (Mason & Bacsich, 1998).

Social issues that can effect learners communicating and collaborating on-line are discussed further in Appendix B, "Interpersonal issues".

Conflict issues

In order to help learners to deal with conflict an organization needs to understand the various issues that can create conflict. Anyone entering into a teamwork situation needs to realize that it will be doubtful other team members will think in similar ways as they do (Carliner, 1995). Conflict within a group is normal and inevitable to a certain degree (Cowger, 1979), and generally occurs between people over issues which are important to them (Romig, 1996).

- In the workplace the restructuring of an organization to use teams has increased the degree of conflict between people. The view that collaborative teamwork results in better productivity is well-founded, but such collaboration can create conflicts that have not been seen

before (Caudron, 1998).

- Issues of conflict within a group can change as a team moves from determining what goals to accomplish, to how the team will attain its objectives (Romig, 1996). Because of this, a common problem for many teams is maintaining focus as they are working towards their goals (Mankin et al., 1996).
- Difficulties can arise when team members have needs which are not compatible such as conflicting decisions over leadership, or disagreements concerning the goals of the team (Cowger, 1979). Other examples are differences in working styles, opinions, and priorities.
- Conflict can happen within a team when members, in order to gain a different point of view, 'cross boundaries' into another team member's area of work (Kasl et al., 1997).
- Differences in work values can create conflict (within education this can be the difference in learning values). Obviously if everyone had the same values (e.g., priorities, views, concerns) collaboration with others would be simple. Therefore, it is important for team members to realize that differences in perspectives and values can effect decisions. This diversity makes it essential for team members to accept differences when deciding what is important to the team and what is not (Jaffe & Scott, 1998).
- One mistake often made is assuming that conflict occurs because of poor communication. People with extremely effective communication skills can have serious conflicts due to holding opposing points of view on issues which they perceive as important (Stiebel cited in Caudron, 1998).
- The past culture of an organization (educational institution or business) may be one where speaking one's mind, and creativity were not encouraged. This lack of encouragement occurs when an organization views conflict as negative. In this situation, an organization needs to change its view and realize that conflict can be constructive with positive outcomes. Differences of opinion can enable team members to see a situation from various sides and give

them the opportunity to make better decisions (Caudron, 1998).

- An area of conflict for many people arises when they are asked to perform tasks, which are new and unfamiliar to them. Caudron (1998) describes this situation as being positioned outside one's 'comfort zone'. The comfort zone is the environment people are comfortable working and learning in because that is where their knowledge is. Outside one's comfort zone is where new knowledge and experience has to be learnt (Caudron, 1998). To alleviate this problem an organization should develop mechanisms to help guide and provide a means for people to learn the necessary skills in order to expand their comfort zone to include new knowledge (Emerson cited in Caudron, 1998). Though Caudron (1998) is speaking from a business perspective, this situation occurs within education where learners are taking more responsibility for their own learning. This is compounded even further when learners are also expected to learn course content, communication technology and how to function within a group as well.

- Another source of conflict in teamwork is what Heneman and von Hippel (1995) describe as 'social loafing' or 'free riders' (Bettenhausen cited in Heneman & von Hippel, 1995). Social loafing happens in situations where a member of a team will not contribute to their full capacity, while expecting that others will fill the gap. In this situation other members of a team who are contributing more than their share may become resentful and begin reducing their work contribution. This reduction of contribution from good workers can occur if team members feel that their individual efforts are not going to be recognized and rewarded. This can become more of a problem when team members do not see how their individual work or lack of work affects how the group will accomplish its goals (Heneman & von Hippel, 1995).

Being able to effectively deal with conflict is essential if a group is to overcome difficulties and successfully reach its objectives. Suggestions for teams on dealing with conflict are in Appendix B, "Interpersonal issues".

Giving and receiving feedback

When collaborating with others many of us are reluctant to accept feedback, which we may perceive as negative. However, before deciding to accept or discard feedback it is important to inquire as to why the feedback is being given before making a decision (Carliner, 1995).

Learners need feedback from the instructor (or other support person) to help resolve their concerns over the course content, and on how their group work is progressing. If learners do not receive some sort of feedback they sometimes will doubt the quality of their work and can become anxious about fulfilling the criteria of the instruction (Woods, 1996).

Suggestions for teams on giving and receiving feedback are in Appendix B, “Interpersonal issues”.

Trust and commitment

Trust and commitment between team members is essential if a group is going to function as a cohesive unit. An organization also needs to practice and encourage trust and commitment when dealing with teams. This creates a positive working atmosphere for both learners and the instructional organization. Suggestions for teams on facilitating trust and commitment are in Appendix B, “Interpersonal issues”.

Netiquette issues

Netiquette refers to the electronic social standards people are expected to conduct themselves when communicating through CMC. An organization can facilitate proper netiquette by providing information and guidance to learners on how to behave and communicate when on-line (Mason & Bacsich, 1998). For learners, netiquette issues are discussed further in Appendix B, “Interpersonal issues”.

Facilitating team communication

An institution may find it necessary to speed up a group activity through various methods in order to push a group's work forward. These methods can include:

- Information and or instruction on issues which occur with electronic communication, including suggestions on writing for CMC. This information can be electronic or print-based. These issues are discussed further in Appendix A, "Facilitating text-based electronic communications".
- Furnishing information on social and interpersonal problems, which can happen when CMC is used for collaboration. Suggestions on dealing with some of these problems are provided in Appendix B, "Interpersonal issues".
- Providing suggestions to learners on how they can best facilitate dialogue within their team. More information on communication issues are in Appendix C, "Facilitating on-line communication between team members".
- Using a moderator.

Moderating CMC teamwork

Another means to facilitate group work is by using a moderator to make suggestions or provide information to teams collaborating on-line (Freenberg cited in Rojo, 1991). A moderator can be one or more than one person within an instructional environment, such as an instructor, tutor(s), team leader or other staff member.

Within a self-directed learning environment a moderator can be seen as a 'wandering tutor' who becomes part of a team by observing and sometimes participating to help move a team's work forward (Woods, 1996). It is important that learners understand that a moderator is there to assist and help the team's collaborative process. The moderator is in the position to provide:

- Information on course content, instructional expectations, and evaluation criteria.
- Feedback on how well the group work is progressing.
- Help in keeping on-line discussions on track (Freenberg cited in Rojo, 1991).
- Support and guidance with the possible communication problems which may arise between participants (Freenberg cited in Rojo, 1991).
- Assistance so team members are more able to help themselves with obtaining resources, dividing tasks, dealing with conflicts, and/or decision-making.
- Help to learners while they are learning new tasks (Brandt, Farmer, & Buckmaster cited in Choi & Hannafin 1995).
- Guidance by focusing team members' attention to important instructional and collaboration issues (Choi & Hannafin, 1995).
- Information on the various ways to learn and accomplish tasks (Choi & Hannafin, 1995). This can include providing information and/or instruction which is appropriate for learners level of knowledge, understanding, and abilities (Choi & Hannafin, 1995).

Depending on the number of learners in a team, and the amount of teams, the position of moderator can be overwhelming. An institution might consider designating one or more than one individual to deal specifically with issues such as learners' technical difficulties and/or social conflicts (Mason & Bacsich, 1998). An instructor and/or tutor is then more available to deal with course content and other instructional issues.

One suggestion is to have a moderator deal with all aspects of the on-line collaboration, but for only a specific number of teams. However, it should be noted that having a moderator can have an impact on the kind of communication patterns that may develop between members of a team (Kiesler, Siegl, Quinn, & Tombaugh cited in Ruberg & Sherman, 1992). Some team members may feel more self-conscious about exchanging ideas and information if they know

someone outside of their team can read them.

Another organizational model, suggested by Scardamalia et al. (1989), places a member of the learning team as the monitor. Placing a learner in this position means that they must be provided with the technological support to fulfill this task (Scardamalia et al., 1989)

Chapter 5

Developing an on-line team environment

On-line communications creates group dynamic problems which are unique compared to face to face dialogue. How effectively a team communicates on-line works hand in hand with the structure of the team. This requires an organization to develop and design an instructional environment, which will assist and facilitate team collaboration.

The more front-end planning an organization can do, to promote a team environment, the easier it will be for teams to focus on the collaborative process. It has been found that on-line learning requires even more structure than face to face instruction (Harasim, 1993; Marjanovic, 1999). This is because even though CMC enables interaction between learners and the instructor there are limitations, such as lack of instructional resources and study guides, which makes the organization of the learning and collaborative activities even more important and more time consuming (Harasim, 1993; Marjanovic, 1999).

In order to develop an on-line collaborative environment an instructional institution has to create and maintain an infrastructure, which supports teamwork both administratively and technically. The administration level reflects the instructional institution itself and includes the instructors, faculty, curriculum development and other administrative needs. The technology includes the technological infrastructure of computers, modems, software and other technology needed for on-line communication and collaboration (discussed in Chapter 3, 'Computer technology and teamwork').

Self-directed teams and the instructional environment

In the beginning phase when organizing a self-directed team environment an institution (or instructor) should look at the past and present implementation of collaborative learning teams within the organization. If implementation occurred in the past then this could provide a

framework for implementation. However, if team collaboration is new to the organization then development will have to be organized from the beginning.

The creation of a self-directed learning environment and the on-line technology to support it can be developed at the same time. This of course will be relative to an organization's financial situation, available personal (to develop the on-line instruction) and time frame (to implement structural change). These areas can be seen as the front end of development and planning that an institution needs to do before actual on-line teamwork can begin.

The issues discussed in this chapter can easily be scaled down to accommodate an instructor who is incorporating a self-directed learning team structure within an electronic classroom. Naturally, an instructor would still have to deal with the larger institution for support technically and administratively. Whether developing an on-line instructional environment for a program or for only one class the issues discussed below will be relevant. The difference of course will be the scale and the levels of organization needed.

The suggestions below are not exhaustive, but are here to provide an overview of what an institution needs to consider when developing an on-line collaborative learning environment. Some of the suggestions have come from business literature, as indicated, and have been adapted to an instructional institution's needs and concerns.

Time frame

A problem that occurs for many organizations is underestimating the amount of time needed for the development of an on-line learning team environment (Mason & Bacsich, 1998). Martin et al. (1997) suggest that the time needed for development can range from three to six months, if not more, and will be relative to the amount of preparation an institution will need to do. Development and preparation issues can include:

- Creating the organizational infrastructure to support teams collaborating on-line. This can involve developing, organizing and maintaining the administrative aspects of the on-line

instruction.

- The amount of modifications and changes that will have to be made to the curriculum in order to make it adaptable to an on-line format (Martin et al., 1997).
- Developing and printing manuals (Mason & Bacsich, 1998), job aids and/or other text-based information (electronic or print-based).
- The time needed to train and/or hire staff or faculty to work within an electronic environment and with the self-direct learning teams (Martin et al., 1997). For an instructor developing an electronic classroom alone, time is still needed to learn and organize this new form of instruction.
- Organizing and providing learners with the technology they will need. This can include obtaining the technology (hardware and/or software) (Martin et al., 1997) and developing the electronic conference(s), preparing discs etc...(Mason & Bacsich, 1998) in order to deliver the instruction (Martin et al., 1997).

Funding

Another important issue an organization needs to consider is whether or not there is enough funding to create an on-line collaborative environment for learners (Martin et al., 1997). This funding could include the financial resources for:

- The number of personal that may have to be trained or hired to deal with the technology and the self-directed learning teams (Martin et al., 1997).
- Restructuring and redesigning the curriculum including the personal to do this (Martin et al., 1997). Even if there are personal within the organization to work on the on-line instruction, their time will have to be accounted for.
- The cost of instructional materials that may have to be designed and/or developed (electronic and/or print-based).

- **Technology to conduct the on-line collaborative instruction. Both the software and hardware along with the technological infrastructure can be costly to set up and maintain.**

Personnel

In order to develop and facilitate a team environment personal will be needed to restructure, redesign, implement, and moderate the on-line collaborative instruction.

- **Within the organization who is available to assist in developing an on-line environment for self-directed learning teams (e.g., instructors, tutors, instructional designers, graphic designers, computer technicians/programmers) (Martin et al., 1997)?**
- **Does the faculty (e.g., staff, instructor, tutor(s)) understand the issues of group dynamics in regard to what a group can do and can not do? If this understanding is lacking it may be necessary to develop instruction and/or training for faculty (Woods, 1996).**
- **Will someone (e.g., instructor, faculty member, technician, peer learner, research assistant(s)) be moderating the team's work (Rocine, 1996)? This can include moderating learners' work in progress, assisting when team conflict occurs or facilitating communication between team members. What training will monitors(s) need to help facilitate the teams collaborating on-line (Woods, 1996)?**

Resources and Facilities

An organization needs to determine how resources and facilities will be used and distributed within the institution and among the learning teams. It is imperative that the organization provide easy access to information, resources and facilities that are essential for teams to complete their work objectives (Mankin et al., 1996). This can involve creating specific plans and strategies to deal with the allocation of both resources and facilities (Cleland, 1996). Both Mankin et al. and Cleland are speaking from a business point of view, but these same issues

are relevant within an instructional environment.

- What resources and facilities will be available for teams (Cleland, 1996)? Some examples are; learning materials (text-based or electronic), access to electronic and/or traditional libraries, computers and software.
- How will resources and facilities be distributed to team members (Cleland, 1996) such as printed material, software, computers etc..? Will informational materials (e.g., manuals, job aids or other instructional materials) be mailed out or sent electronically? Will the organization have software it can easily distribute to learners or will learners have to buy it themselves?

The self-directed team environment

The creation of a self-directed team environment is also an area that will take time for an institution to organize. Rocine (1996), speaking from a business point of view, makes a number of suggestions, which are listed below. Due to the similarity of group dynamic issues, these suggestions can be applied to an instructional environment as well.

- Does the organization have established standards for dealing with self-directed teams? If self-directed teams have been implemented before, how was it done (pros cons), and how was the organization set up to accommodate the self-directed team structure? Was this self-directed team structure developed for face to face, on-line or both types of environments (Rocine, 1996)?
- Does the organization have a means or strategy to help self-directed teams stay focused towards their final objective(s) (Rocine, 1996)? This can entail utilizing a moderator, providing job aids on structuring teamwork and other strategies to help facilitate team collaboration. If an organization does not have assistance for teams then something will have to be developed.

Learners

When ever possible an instructor (or institution) should assess learners attitudes about on-line collaborative learning (Velayo, 1994). This could be determined by a survey, interviews or other means of contact with learners. The information obtained can be helpful by enabling an instructor the opportunity to be in a better position to deal with possible problems. There are also a number of issues when dealing with self-directed learning teams collaborating on-line that an institution should consider such as:

- Do learners have sufficient understanding of what is required to complete an electronic distance course (Martin et al., 1997)? If learning on-line is a new experience for learners there will be a high degree of apprehension and anxiety concerning the instruction, which can interfere with the learning process.
- What experience do learners have with electronic instruction? Knowing learners' levels of experience with technology and electronic communication is essential in order to develop and provide the technical support learners will need.
- Do learners have teamwork related experience (Martin et al., 1997)? If yes, what level of teamwork experience do team members have? If no, then an institution will have to assist learners in building new knowledge (mental models) of teamwork structures. Knowing the level of teamwork experience will help determine the extent of the training and/or support team members may need (Rocine, 1996).
- When it comes to learning the instruction are learners able to be independent and self-directed (Martin et al., 1997)? A course offered at a distance means learners need to be more self sufficient and independent than within a face to face course. This can create a problem for learners unaccustomed to this form of instruction and who may need or expect more instructor lead structure to their learning environments.
- Have team members been provided with a general outline or synopsis of the project or

task(s) they are required to do (Makulowich, 1994)?

- Do team members have concerns about the way members of the team are supposed to work together? If yes, how will this be addressed?
- Is there a means to deal with team members concerns over what is expected of the team's collaborative work?
- Do all team members understand the way their work outcome and compensations (e.g., grade) will be shared? Issues concerning evaluation are discussed later in this chapter.

Team dynamics and structure

Team or group dynamics, along with group structure, are also issues an instructional institution needs to understand in order to help facilitate positive team collaboration. Changing from a traditional lecture environment to an electronic learner centred one can be a considerable shift for many instructors. This shift requires a change in both the instructor(s) and learners mental model of learning and instruction (mental modeling is discussed in Chapter 2, Group structure, development and learning). The issues discussed here by authors Rocine, Arnold and Cleland are taken from business literature, but adapted to an educational environment.

- What will the teams be responsible for (Rocine, 1996)? This may include the quality of work, organization of tasks and other issues that directly effect a team's objectives.
- How much authority will self-directed teams have over their own work (Rocine, 1996)? This can include what decisions team members will be able to make without consulting an outside source. In addition, having a means to structure tasks by providing a team with methods to organize their work can help a team deal with authority issues (Arnold 1996) which may occur within the group.
- What will the team structure be which will enable it to communicate with the larger organization and if need be other organizations (Cleland, 1996)? This might be a decision an

organization (or instructor) might leave to the teams themselves.

- Have team members been given suggestions and or information on how to work as a team? Is there information on how to structure teamwork available (e.g., examples, guidelines)?

Technology

Facilitating the technology is a crucial part of creating the on-line learning environment. Essentially the technology infrastructure is the cornerstone of electronic collaboration. If the technology is not in place and well-organized, it can create confusion and anxiety for learners. In addition, this lack of front end planning can in the long run create more work for the organization. An organization can either require learners to have their own equipment or provide a means for learners to borrow, lease or rent the technology they will need (e.g., modems, software, computers). According to Mason and Bacsich (1998), there is a direct connection between learners receiving equipment and/or support and how successful the instruction will be.

Generally, choosing and implementing technology is the responsibility of the organization. If an organization does not have a CMC network infrastructure in place then time and money will be needed to develop and implement one. It is best to analyze what the organization's present technology situation is in order to determine what needs to be added, changed and/or up-graded (Martin et al., 1997).

Developing on-line instruction

A distance course, especially an electronic one, should be designed to be self-directed (Martin et al., 1997) and learner centred. This means that it is essential for information to be clear and specific concerning the objectives and requirements of both the instruction and the group work (Mager; Kibler et al.; & Popham & Baker, cited in Woods, 1996).

Developing instruction for on-line implementation requires attention to a number of issues which includes curriculum issues, structuring communications, instructional

administration and other issues relative to the organization of the instruction.

Curriculum issues

There are various curriculum issues that need to be considered such as:

- Within the institution are there courses or curriculum structures that have to be redesigned in order to accommodate using CMC (Martin et al., 1997)?
- Will some portions of existing courses have to be left out in order for the instruction to fit into a specific time frame (Martin et al., 1997)? When fitting instruction into a certain time frame, the time learners need to complete their tasks must also be accounted for (Martin et al., 1997).
- Within the present instruction will assignments or other learning tasks be easily shown and illustrated on-line? The more changes needed to make a course adaptable to an on-line format the more costly the instructional redesign will be (Martin et al., 1997).
- Will on-line course material need to be developed? One example could be a study guide designed to assist learners in their course work. Such a guide would help focus learners and teams to specific information and encourage interest in the course material (Martin et al., 1997).
- How will academic credit be determined? This will be relative to how learner knowledge is assessed. For example, will learners be given academic credit for learning team skills?

Structuring communications

Incorporating a communication structure as part of the instruction is essential in order to create an organized atmosphere for learners. This communication structure includes establishing how and when the instructor (tutor, moderator) and learners will communicate with each other (Martin et al., 1997). Generally with electronic communications learners and instructors can post messages and communicate 24 hours a day and seven days a week. However, it can still benefit

learners to have a schedule to know when an instructor is available if quick feedback is essential or if it is necessary to communicate by phone.

- One means to provide learners organization is for the institution (or instructor) to impose a time structure which can include establishing a specific beginning and ending to the assigned work or task (Harasim ,1993). This can be done by implementing a schedule (e.g., weekly, daily, monthly) which can assist both learners and the instructor to organize and arrange learning tasks (Harasim, 1993).

Technology can also assist with structuring and organizing communication.

- Many on-line technologies enable users to chat synchronously. Such synchronous discussions could be facilitated in the beginning and end of a collaborative project, thus providing a specific start and finish to a team's collaboration (Mason & Bacsich, 1998). This can also give team members a sense that they are communicating with people and not just technology.
- Providing a frequently asked questions (FAQ) on-line database can help reduce the amount of questions and communications a moderator or instructor will receive from learning teams. Such a database can be designed to anticipate learner questions by providing as much information as possible on topics such as; the technology, curriculum, and other team collaboration issues. This list of questions can be built on and added to with each new group of learners, creating a continuous resource for learners in the future. Such a list will also reduce the time wasted by instructors having to answer the same questions again and again (Martin et al., 1997).

Instructional administration issues

In order to administer the instruction decisions will need to be made such as:

- Developing an action plan for possible problems that may occur between group members. For example, how will the organization (e.g., instructor, monitor) handle learners who are uncooperative and are failing to effectively collaborate with others (Woods, 1996).
- Determining what will happen if a team can not complete their work within the designated time frame (Arnold, 1996). If this occurs how will the work be evaluated? Will time automatically be extended or will there be penalties for late work? This can be determined on a team by team basis.

Evaluation

The most essential feature, which will determine a group's success, is how well they are attaining their objectives (Romig, 1996). Learners will often measure their success according to how well they are evaluated on course content knowledge. However, implementing a self-directed on-line learning environment often requires students to learn things outside of the course content. Past evaluation methods were based on traditional instruction where learners were responsible to learn only specific subject knowledge and of course were evaluated only on that knowledge. The measurement of only subject knowledge with no consideration for the other skills learners must acquire is an inaccurate evaluation of what students are actually learning (Woods, 1996). Woods (1996) suggests that instructional evaluation needs to consider the other non-course content knowledge since it is this non-course understanding which enables learners to accomplish their on-line learning tasks.

Whatever the evaluation strategies, it is imperative that the organization specifically inform learners what is expected of them and incorporate this information into the course objectives (Woods, 1996).

Team composition and size

Establishing what tasks a team must accomplish will help in deciding who should be on the team (Mankin et al., 1996). This can include the number of team members and the skills they will need (Dillenbourg & Schneider, 1995). A team should include members who have the various abilities and skills (Mankin et al., 1996) needed to accomplish the team's work. It is also important for there to be compatibility between team members with working styles, sense of commitment, time availability, along with goals and objectives for the tasks (Murphy, 1995).

One means of ensuring team diversity and compatibility is by having learners exchange resumes on their interests and experiences (e.g., work, education). This exchange can enable skills and interests of potential team members to be matched and can also help ensure diversity of work skills within the groups.

Determining team size

Whenever possible a team's size should be limited to the number of people needed to accomplish the goals of the team. When groups are too large, decision-making and other group collaboration issues can become more complicated (Dillenbourg & Schneider, 1995; Mankin et al., 1996). According to Harasim's (1993) research at OISE and Simon Fraser most learners at those institutions seemed to prefer to be in teams of two to four people. Since the number of team members can effect a group's success it is an important issue that has to be recognized.

Chapter 6

Organizing the team:

Can education learn from business and other disciplines?

No matter how much time and energy an institution puts into developing and designing an on-line collaborative learning environment, it cannot be successful without the cooperation of learners. Essentially, in order for the 'team concept' to work team members need to be open to the idea of working as a team (Arnold, 1996).

As mentioned earlier, within a work or learning team very seldom do all the members have the needed skills to complete the tasks required of them. In order to fill this gap in knowledge some kind of training or instruction on how to effectively work in teams is generally needed (Mankin et al., 1996). This makes it necessary when implementing a team structure to provide learners with suggestions and tools regarding how to be effective team members. This chapter includes suggestions on; structuring teamwork, analyzing teamwork objectives, organizing a team and other team related issues.

The information presented here comes predominately from business literature with the exception of Gay, and Brown et al. from education, and Jacques, Kasl et al. and Weber from group dynamics/behavioural science. In addition, research reported in this chapter has also been condensed and formatted as a job aid in Appendix D, "Organizing the team".

Structuring teamwork for learners

Ideally any team structure should include; mechanisms for a team to make decisions, methods to determine goals and objectives, and the means to decide on the respective responsibilities and roles each team member is to take on (Elsnear cited in Romig, 1996). These are some of the issues a team should deal with in the beginning phase of their collaboration.

The team will continue to evolve throughout the group's life cycle passing through

different phases of group development (beginning, middle, and later, (Jacques, 1991)), and stages of learning (fragmented, pooled, and synergistic (Kasl et al., 1997)). This evolving life cycle will have an effect on the decisions and direction the team's collaboration will take.

Analyzing teamwork objectives

To analyze work objectives a team should break down the tasks or assignment in order to determine goals, objectives, roles, responsibilities, and work schedules. This beginning phase of group work is where teams are in the best position to determine how tasks will have to be structured in order for work to be accomplished. As tasks and projects will vary depending on the requirements of the work it can be helpful for a team to create a list of what needs or issues have to be attended to in order for the collaborative teamwork to reach a successful completion. What can be suggested for any team is to discuss issues about the project, such as the criteria, parameters, and objectives. It is likewise imperative for teams to consider the information and materials they will need.

Collaborative brainstorming

A team can benefit from collaborative brainstorming during the beginning phase and throughout the group's life cycle. Brainstorming may seem chaotic and random at first with everyone contributing ideas, and suggestions, but this can be an important means to generate creative solutions. This process can enable all team members the opportunity to prioritize important decisions when it comes to determining what needs to be done and when (Carliner, 1995). This does not have to be a linear process, many issues overlap and can be developed and discussed concurrently.

- 1- Determine the projects scope (Carliner, 1995). What is the overall project about?
- 2- Discuss tasks to be accomplished (Rocine, 1996) (e.g., criteria, parameters, objectives).
What is the team expected to do and/or produce?

- 3- Determine what is needed to get the job done (e.g., information, resources, materials).
- 4- Decide and prioritize goals and objectives. What needs to be dealt with first, second, etc..? What things will take more time?
- 5- Finalize a timeline (deadlines) (Carliner, 1995). Decide when things need to be done.
- 6- Formulate how task(s) will have to be structured in order for work to be accomplished.

Organizing the team

In order to organize their group work a team needs to discuss and make decisions on a number of organizational issues. Everything discussed below can be done concurrently or in various order depending on the work objectives and the composition of the group.

It may not be necessary for a team to make decisions on all of these issues when they just begin working together, but it is important for a team to keep such issues in mind. The extent that a team will need to deal with and discuss some of these organizational issues will depend on the nature of the tasks and the composition of the group itself. These structural issues include; defining task structure, setting team goals and final objective, scheduling time effectively, defining team roles and responsibilities, setting authority and leadership issues, dealing with information processing, determining team decision-making processes, and establishing team boundaries.

Defining task structure

To define task structure requires an analysis of the tasks the team needs to do in order to reach its goals (Mankin et al., 1996). A task that is considered independent can be accomplished by a single individual, without involvement or contribution from someone else. When a task requires collaboration of two or more individuals then the work becomes the domain of a group (Thompson cited in Watson, Bostrom & Dennis, 1994). Discussed here are four task structures a team can be engaged in according to the level of dependency which are described as: 'pooled

interdependency', 'sequential', 'reciprocal' (Thompson cited in Watson et al., 1994) and 'matrix' (Watson et al., 1994). Teamwork can be accomplished using one of the aforementioned task structures, or a combination, depending on the nature of the work that must be accomplished.

Pooled interdependency

Will each individual team member have his or her own task(s) to do, which will only be brought together towards the end of the project?

This task structure is referred to as pooled interdependency (Figure 1) and is defined as a group situation where each member contributes work to the larger task. However, the work of each individual is not brought together until the task is finished or near to completion. In this scenario each task completed must be done well or it can have an adverse effect on the entire task or project (Thompson cited in Watson et al., 1994). For example, two areas of work, writing (research-writing-editing) and graphic design (research-design), are not combined until the end of the project.

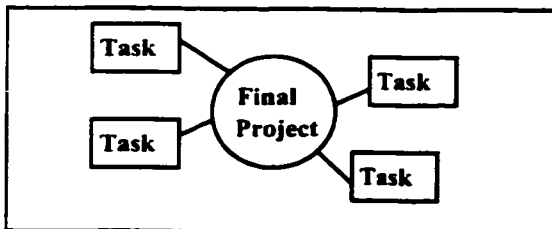


Figure 1 - Pooled interdependency task structure

Sequential

Will certain work have to be compiled and completed before other stages of the work can begin?

This design is referred to as a sequential task structure (Figure 2) where one task feeds into the next task and so on. A sequential task structure is one in which work must be finished before the next step or task can be addressed. Essentially the product of one task is used as part

of the next task and so on towards the final completion of the work (Thompson cited in Watson et al., 1994). An example is creating a text-based document, where research-writing-editing-final draft result in the completion of the task. Research would have to be finished (or mostly finished) in order for the writing to begin, the writing then has to be edited etc.

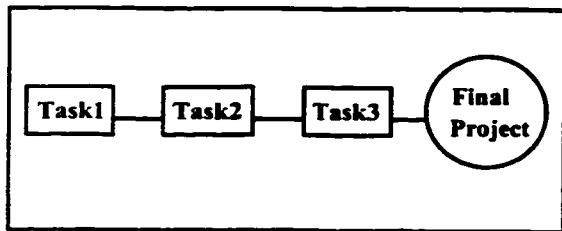


Figure 2 - Sequential task structure

Reciprocal

Will the work of one (or more than one) team member be needed by another member of the team in order for them to complete their task?

With reciprocal task structure (Figure 3) the contribution of each team member goes into the work of the another team member and so on (Thompson cited in Watson et al., 1994). For example, statistical analysis by one team member is used to create graphs by another team member. Another example would be a conversation where the information provided by one individual becomes part of the knowledge or understanding of another individual.

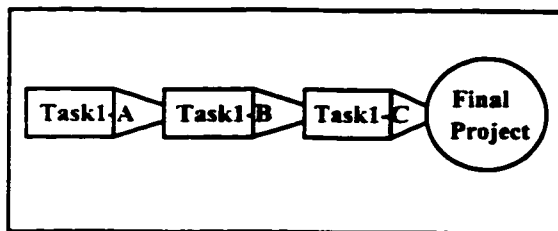


Figure 3 - Reciprocal task structure

Matrix

Will the task structure require some of the work to be linear, one task feeding into the next, while the work of other team member's is only incorporated into the project near the end?

This task structure is described as matrix (Figure 4) and is a combination of the pooled interdependency and sequential structures. Within this task structure, people work independently and are also provided information and feedback from other team members who are working on similar and/or other related tasks. According to Watson et al. (1994) the principle difference between pooled and matrix structures is that within pooled team members generally work independently and only combine their work near the end of the project. With the matrix, work sharing occurs near the beginning and throughout the collaborative process (Watson et al., 1994).

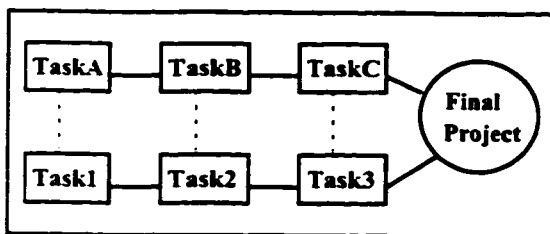


Figure 4 - Matrix task structure

Often within group work members will accomplish tasks on their own with team members coming together to organize and discuss work in progress (Romig, 1996; Mankin et al., 1996). In this type of situation work is accomplished as each member of the team completes his or her individual responsibilities (Romig, 1996). For example, there could be elements of the team's work, which could be accomplished in parallel, such as graphics and written material. Both will require linear processes (e.g., research for written material, writing, editing, formatting and research for graphics, designing graphics) before the two are brought together and combined. Throughout this entire process team members will communicate and provide feedback to each other.

Setting team goals and final objective

Teams that are successful have goals, which are specific and viewed as important by each team member (Bate and Travell, 1994). To achieve this a team needs to develop and establish methods, procedures and/or strategies to reach their objectives (Cleland, 1996). This process requires defining, setting, and maintaining both goals and sub-goals. Sub-goals are smaller tasks, which need to be accomplished in order for a team to complete their work. Once goals (and sub-goals) are defined and set a team can then decide on; the direction their work will take, the outcome on major decisions, how resources will be used, and the most appropriate timeline for work to be completed (Cleland, 1996).

Defining goals

Every team member should be included in developing and defining team goals (Romig, 1996).

- In order to define what goals will need to be reached a team must breakdown the work or tasks (Cleland 1996). It is especially important to define sub-goals so a team will have a general structure of the tasks they must complete.
- The type of goal to be defined will be relative to the task(s) a team is required to do. The method to decide and define goals will depend on the structure of the group (refer to 'Team decision-making processes' within this chapter).
- A goal (or goals) must be compatible with the expectations and criteria of the institution and/or instructor (Romig, 1996).

Setting team goals

The type of goals and the way they are set can effect the overall collaborative process between team members (Romig, 1996).

- Setting a goal reflects how a specific goal will be reached and when.
- In order to set a goal team members must agree that the specific goal will enable the group to reach their final objective (Romig, 1996).
- All members of the team should be part of organizing the process to reach the decided goal(s) (Romig, 1996).

Maintaining goals

Teams should periodically review their goals to ensure that the goals originally set will still enable the group to achieve their objectives (Romig, 1996).

- It should be kept in mind that, as a project evolves, goals and the means to reach certain goals may change. This happens when new information is addressed or changes to the parameters of the project occur.
- Each part of the project is important for the team to reach its final goal. This means that no job or task is too small or mediocre.

Scheduling Time Effectively

An important factor for any team is the ability to complete their work by specific deadlines. To schedule time, teams need to prioritize what needs to be done, and when, for everything to be completed on time. Gay (1992) suggests that developing a time schedule requires a team to:

- Make a list of what needs to be done and prioritize tasks and goals.
- Determine the phases that task(s) will have to go through in order to establish pre-deadlines, sub-goals along with goals and objectives.
- Once goals and sub-goals are determined decide when things will have to be completed.

Organizing a timeline

The work timeline is essential in order for learners to organize themselves.

- One key to success is to start work early. This will provide a team with leeway time in the event problems and/or other delays occur (Gay, 1992).
- When scheduling deadlines a team should always take into account that things generally take longer than expected (Gay, 1992).
- Both the team collectively and team members individually need to set target dates (sub-goals) for when specific tasks have to be completed (Gay, 1992). Once decided, team members should submit a time-line plan indicating who will do what and when.
- Set pre-deadline target dates so the team can touch base with the member doing a specific task and find out how things are going, how much more needs to be done, and to see if extra help is needed (Gay, 1992).
- It can also be helpful to set the final completion date earlier than the actual date to hand in work. The reason to do this is to provide additional time to change things and/or deal with any problems (Gay, 1992).

Maintaining a timeline

Once established, it is essential that learners keep to the timeline, but still allow flexibility for any variations or changes that may occur.

- Members need to keep to the deadlines established by the team, with a focus on completing work before the deadlines (Carliner, 1995). This is especially important if the work is needed by other team members to complete their tasks.
- Team members can send each other progress reports to inform fellow group members how tasks are going and if there are problems that may create delays. This is so the team can be forewarned and therefore be able to deal with the issues that are causing the delay.

- Members should inform each other when a specific task is completed.

Scheduling tools - Gantt chart.

The organization of the team schedule can be informal, where team members discuss what they are going to do, divide the work, and begin; or a more formal structure may be created by developing a Gantt chart (Carlisle cited in Gay, 1992). Often used in business, a Gantt Chart is set up so team members can visually see when tasks have to be completed by, and who is performing the tasks. The chart is designed with the activities or tasks listed down the left side, and the time needed for the project across the top (refer to Figure 5). This enables a team to see how tasks link or relate to other tasks, and shows where a task begins and ends (Gay, 1992). Schedules can be broken down by week, day, or month depending on the time line and the extent of the project. Such a chart can be paper-based or electronic (there are a number of project management programs that will facilitate making a Gantt Chart). How detailed a chart will have to be will depend on the complexity of the project.

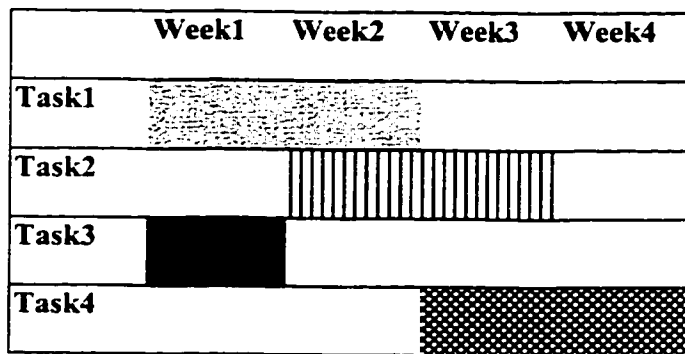


Figure 5 - Gantt Chart - The bar graph format of the Gantt Chart creates an easy visual means to organize and schedule group work.

Team roles and responsibilities

The purpose of establishing team roles and responsibilities is to facilitate a team towards accomplishing its goals (Romig, 1996). This makes determining roles and responsibilities crucial for a team's development. Dealing with this at the beginning phase of group work can help

alleviate conflict and misunderstandings later in the project. Of course decisions concerning roles and responsibilities made at this beginning phase can change as the project evolves from beginning to the middle and then later phases of the group's work.

When roles and responsibilities for team members are clearly defined it makes it easier for the entire team to function and organize their work (Cleland, 1996). Within this framework every team member should know their place within the group and what is expected of them (Arnold, 1996; Cleland, 1996).

Organizing team roles and responsibilities

In order to accomplish a collaborative task it is generally necessary for team members to take on a variety roles and responsibilities (Brown et al. 1989). Team roles and responsibilities can include research, statistical analysis, developing materials, interviewing subjects, and/or designing graphics etc. Some issues a team should consider include:

- What roles and responsibilities will team members have to take on in order for the team to attain its objectives (Rocine, 1996)?
- Will team members have to fulfill more than one role and/or will some roles have to be split because of the workload involved?
- Will the team need to decide on one person to make contact with outside organizations or will different team members contact other organizations depending on their roles and responsibilities?

Team members should also keep in mind:

- Not all roles have to be decided at once. Roles can change over time depending on how the tasks change.

- With issues of responsibility it is crucial that team members establish who is responsible for what and when (Murphy, 1995).

It is generally impossible for each team members to participate in every aspect of the project. If there is insufficient time for team members to learn the roles and responsibilities of other team members, it is important to at least understand the roles and responsibilities of their fellow members. This is essential in order to see how each role fits and contributes to the team's goals and objectives (Arnold, 1996; Romig, 1996).

Deciding roles and responsibilities

The best situation is where team members can choose roles and responsibilities that they are most comfortable with (Carliner, 1995). However, there will be some situations where members of a team will have to take on roles or responsibilities they are not familiar with or would prefer not to do. This makes it important for individual team members to have a good understanding of their own abilities, strengths and weaknesses (Carliner, 1995). This can help team members when they are discussing and deciding which roles and responsibilities they will take on (Arnold, 1996). Carliner (1995) suggests a number of questions that team members can ask themselves and each other to facilitate this process such as:

- What roles and responsibilities would you prefer to do?
- Within a group do you prefer to be a leader or a follower?
- Are you interested in working on only one feature of the project or do you prefer to contribute to various tasks through out the project?
- Are you open to ideas and suggestions from others?
- How do you respond to negative feedback, do you get defensive or are you willing to talk things out?

When roles are not defined

Problems can occur when roles and responsibilities for team members are not established. When this happens team members without specific roles and responsibilities may feel unsure of what they should do within the team. This can get in the way of a team accomplishing their goals. However, if such a situation does happen it is important for these members to show an interest in contributing to the group work even if specific work is not assigned to them (Carliner, 1995).

Authority and leadership issues

It should be realized that even though we now live in an integrative information age culture the hierarchical structures of the industrial age have been part of society for centuries and are not likely to shift quickly (Seaman, 1995). Individuals bring their history of education and working experiences to a group situation which in turn effects how they interact with the group (Weber, 1982).

Within a self-directed team, authority and leadership are supposed to be shared, but for many people this is a new experience. Often people feel insecure within a self-directed team environment because the familiar hierarchical structures are lacking making the issue of authority even more critical (Arnold, 1996). According to Arnold (1996), "meeting the human need for clear leadership and followership roles presents one of the biggest challenges to effective teamwork" (p.12).

Authority within a team

At the beginning phase, when a team structure is first implemented, there is often a fair amount of confusion concerning authority within a team (Seaman, 1995). When this confusion occurs it can create stress among team members resulting in what Seaman (1995) describes as 'management chaos'. Though taken from a business point of view, management chaos can occur

in any organization in which the behavior of learning teams becomes exaggerated due to the lack of boundaries and structures.

Team leadership structure

In order for a team to organize and reach their final objectives there must be some form of leadership structure (Arnold, 1996). Determining a leadership structure will help a team to have a mental model of how the team's direction will be facilitated, and how the leader/follower ship issues will be dealt with (Arnold, 1996). This requires team members to discuss and determine the kind of leadership structure they will need to fulfill the assigned tasks (Rocine, 1996). Whatever the leadership structure chosen team members need to be aware that the needs and demands of leadership can change as the team moves through its life cycle (e.g., the group development phases beginning, middle, later (Jacques, 1991)).

Team leadership is a complex issue and can not be dealt with extensively in this thesis. However, a brief overview of three leadership model structures (choosing a team leader, shared leadership model, and combination of leadership structures) are discussed below.

Choosing a team leader

The concept of leader today is not the same as it was within the industrial age organization. Within the industrial model a leader was in control and often made most of the decisions, (a top down decision structure). Though aspects of this model still exist the flattening out of organizational structures has effected the nature of the leadership position. A leader or team leader today is often the one who coordinates, assists, facilitates, and helps organize a team to ensure that work flows forward by making certain deadlines and goals are met (Mankin et al., 1996). This same information age model of leadership can also be applied to self-directed learning teams within the organizational structure of institutions. Choosing a team leader can be done in a variety of ways such as:

- An organization (or instructor) can decide if there will be a team leader and who it should be. This does impose structure, but this can be helpful to learners new to the team collaborative experience.
- Team members are also in a position to choose a leader among themselves. Choosing a team leader can be done in a variety of ways, such as by voting or unanimous decision; or when a natural leader emerges through interactions among team members (Carliner, 1995).

Shared leadership model

Within the shared leadership model the role of leader is shared among the team, with each member taking turns being leader in respect to their roles and responsibilities (Arnold, 1996). This means that the leadership within the group will change relative to the task or 'stage' the work is at (Mankin et al., 1996). During the different stages of the group's collaboration team members can help coordinate each other's work. This facilitates a shared responsibility for learning and accomplishing tasks (Arnold, 1996).

However, for the shared leadership model to be effective team members need to agree to this structure. Once accepted the team is then in a position to decide on the authority and leadership issues within the group (Arnold, 1996). This requires a team to consider a number of issues such as:

- What do team member's individually and collectively have to accomplish (Arnold, 1996)?
- How will the team's collective work, and the work of individual team members be accomplished (Arnold, 1996)? This can include determining the strategies and procedures team members will follow in order to complete their tasks.
- Within the team when will team members be followers, and when will they lead (Arnold, 1996)? This will be in relation to the roles and responsibilities each team member has taken on.

- When and how will the team know when their work is successfully completed (Arnold, 1996)? This will be relative to the team's shared collaborative decisions on their goals and objectives.

Combination of leadership structures

It is also possible to have a combination leadership structure that includes choosing a team leader while still utilizing some of the aspects of the shared leadership model. In this situation the team leader coordinates and helps organize the group, but individual team members are still in charge or leader within their specific roles or responsibilities.

Information Processing

A team's structure can have an impact on a group's communication patterns, which in turn will have an effect on the flow of information. The understanding of information processes will give team members a mental model of how information and data will flow within the group. This makes it essential to determine the necessary information or data that must be shared in order for the team to attain its objectives (Romig, 1996). In addition this will also assist the team in breaking down tasks in order to determine roles and responsibilities.

Any team, in order to accomplish its goals, needs data and information on the tasks or project they are required to do, and throughout the collaborative process (Mankin et al., 1996). This means that all teams have to determine the forms or types of information the group will need to accomplish their goals (e.g., literature, computer code, calculations, statistics, and/or data research) (Bate and Travell, 1994; Rocine, 1996). Task information needs can also include data on resources, facilities, technology, course content, evaluation processes and other procedures (Mankin et al., 1996). As a team, learners need to determine:

- How will information needed by the team be obtained (Rocine 1996) (e.g., will it be

through other individuals, literature (libraries), the internet, or other means of research methods)?

- Will information the team needs come from one or many different sources (Bate & Travell, 1994)?
- Will the form of information be consistent (only literature) or will it vary depending on the various tasks the team is required to do (Bate & Travell, 1994) (e.g., statistics, literature research, interviews)?
- How much information will have to be utilized by the team? Will there be a large amount of information that the team will have to deal with or a small amount (Bate & Travell, 1994)?
- How will the needed information be distributed within the team (Bate & Travell, 1994)? Will one member distribute information or will all team members distribute information depending on their role and responsibilities (Romig, 1996)?

Team decision-making processes

All team members should have the opportunity to approve of the project before it is finally submitted to an instructor/tutor. However, the types of decisions, which require the input of all team members, should be thoughtfully considered. This is because there is generally insufficient time for all members of a team to be involved in each decision. Because of this there needs to be an understanding within a team concerning the decisions that an individual team member can make and ones that require input from the entire team (Romig, 1996). For a more effective use of time some decisions will have to be decided by specific members of a team in respect to their responsibilities or role. Depending on the size of a team it is also possible for members to break off into smaller groups in order to decide certain issues (Romig, 1996).

Collective decision-making

Effective collective decision-making requires team members to:

- Know and understand how decision-making will be made within their team. Decisions can be determined by:
 - 1 - each member voting, (Carliner, 1995),
 - 2 - general agreement (Carliner, 1995) all members must agree,
 - 3 - or by deferring the decisions to a specific individual or individuals (Carliner, 1995) depending on the role and responsibilities they have taken on.

- Know how the implementation of the decisions will be facilitated. Essentially once a decision is made how will the decision be carried out (Carliner, 1995). This of course will be relative to the task and the respective responsibilities of team members.

Determining the importance of a decision

Ideally decisions which effect the overall work should have input from all team members. Romig (1996) suggests such decisions be brainstormed, then placed in order of their importance. To determine a decision's importance it can be helpful for a team to consider if the decision is essential for the team to attain its goals (Romig, 1996). Such decisions should include the following:

- Input from all (or the majority of) team members will be needed to accomplish the specific task or job (Romig, 1996).
- Most (or all) of the team members are needed to share information in order for a decision to be made (Romig, 1996).
- All members of the team are interested in having input into the decision (Romig, 1996).

Establishing Team Boundaries

Decision-making within a team will depend on the nature of the task and work the team is required to do. This will also help to determine what a team's decision boundaries will be (Mankin et al., 1996). Team decision boundaries are what a team can or can not make a decision about without requesting permission, and this will be dependent on the type of task and the nature of the organization itself (Mankin et al., 1996).

The overall purpose of boundaries is to help teams to be in a better position to organize themselves, coordinate their activities, and assist them in establishing divisions of labour (Rocine, 1996). Within an educational environment, team members often will consult with the instructor or faculty in order to establish that they are on the right track for meeting the requirements of the instruction. This is an external boundary. However, there are also internal boundaries within a team which are in relation to the roles and responsibilities individual team members take on. With internal boundaries it is important for team members to respect boundaries in relation to the role and responsibilities they are assigned. Conflict can occur when team members cross boundaries into another member's area of responsibilities (Kasl et al., 1997). This can happen even if team members have the best intentions. Internal task boundaries within a team are determined by:

- The role of an individual team member. This would encompass the tasks and responsibilities specifically related to that role (Rocine, 1996)
- The necessary procedures, and criteria which must be followed in order to successfully complete the work (Rocine, 1996).
- The type of resources and facilities that may be needed in order for the team to complete its work (Rocine, 1996).

Other issues a team needs to consider

Resources and materials

A team needs to decide what resources and materials will be needed to accomplish their goals (Arnold, 1996). Once decided, a group can then determine where and how the resources and materials will be obtained. Resources and materials can be anything a team may need to accomplish their collaborative tasks (e.g., libraries (electronic and traditional), equipment, print-based materials, software etc...).

Technology and communications

Technology - Learners need to have a certain level of computer literacy skills and feel comfortable using the technology in order for on-line collaboration to take place. To ensure this learners should assess the level of technical support that is available to them. This support can range from the institution supplying communications software to the instruction some learners may need in order to use the technology (e.g., job aids, workshops or other means of support).

Facilitating text-based electronic communications - To collaborate effectively using CMC learners need to be aware of, and understand, the issues and complexities that can occur with on-line team collaboration. These issues include not only dealing with the technology, but communicating electronically as well. Aspects of text-base electronic communications are discussed further in Appendix A.

Interpersonal issues - Other factors learners need to be aware of are the interpersonal issues that a team will have to deal with throughout their collaborative process. This can include the level of commitment and dedication team members expect from each other (Cleland, 1996). Suggestions for learners on how to deal with specific interpersonal issues are in Appendix B.

Facilitating on-line communication between team members - Being able to effectively communicate with others is essential within a team environment. This requires an understanding of how communication is developed and maintained over time. Appendix C provides guidance and suggestions for learners on facilitating on-line communication between team members.

Conclusion

Concerning the question posed in this thesis, namely, with regard to facilitating on-line collaboration of learning teams: can education learn from business and other disciplines, at certain levels the answer is “yes”, from a theoretical standpoint. Whether from business or other sources there are certain conditions and patterns that will repeat within collaborative situations. This is due to the nature of collaborative interaction which generally includes issues such as group structure (e.g. phases of group development), team communication (e.g. interpersonal issues), and other issues of team organization (e.g. analyzing teamwork objectives). Certainly, business literature (or group dynamics) does not have all the answers especially since business objectives are different from education in many ways, but there are, as mentioned earlier, teamwork tools and strategies within business which can be transferable to an educational environment.

With collaborative teamwork, activities such as dividing tasks, decision sharing, and the ability to positively resolve problems, are skills which are becoming more and more essential in today’s world (Moeller, 1995). For on-line teamwork to be successful there needs to be a focus towards a common goal or purpose, an accountability that is mutual, as well as respect and support between team members. There also needs to be the ability to solve problems collaboratively, to effectively organize team tasks, and for team members to have attained a certain level of computer literacy skills (Heneman & von Hippel, 1995). In a collaborative learning environment acquiring these skills empowers learners to be more independent and responsible for their own learning (Seaman, 1995). If learning teams are not empowered or provided with guidance to organize their own teamwork they may end up maturing slowly as a group, and might possibly not be able to attain a working level which is productive. The result can be habits which are counter productive, leaving members of a team unsatisfied with the collaborative process (Rocine, 1996).

Nevertheless, creating a learning team environment within an on-line course or

educational program requires considerable pre-planning by an organization. It also necessitates changing the mental model of how learning and instruction occurs. The bonus, however, are learners who are more independent, self-directed and prepared to enter the global information age world.

Facilitating team collaboration

Promoting team learning has become a focus for many organizations both business and educational. The issues involved in creating and maintaining an on-line learning environment are very complex and can not be dealt with extensively within the confines of this thesis. But the intention has been to at least begin to build a structure for understanding how to facilitate team collaboration. This has been done by bringing in literature from other disciplines such as business, group dynamics and technology.

An understanding of teamwork and group dynamics can assist the collaborative learning process by facilitating a shared team mental model for both the institution and learners on how groups are structured and developed. This can include group organizational issues such as the phases of group development and how groups evolve over time.

When group learning is combined with technology the complexity of the learning environment increases. However the kind of group learning that this thesis addresses could not be possible without today's computer technologies. The vast assortment of technologies which are available have the potential to facilitate learning like never before.

Besides the issues of group dynamics and technology, an additional feature is facilitating communication. Essentially group collaboration can not exist, and technology is useless, unless there is effective communication between team members. For communication and other interpersonal issues to be viable there needs to be a conceptual understanding of how these processes occur. This is essential for both the institution and especially for learners.

However, in order for an on-line collaborative learning environment to exist there must

be an infrastructure to support it. This infrastructure is essential to support learning teams in their collaborative efforts through; developing and maintaining the technology, facilitating communication, and developing group oriented on-line instruction.

Finally, all aspects of team learning; group dynamics, technology, communication and the infrastructure to support it, all need to come together in order for team collaboration to be sustained. Learning teams need a model on how to facilitate themselves as a team. This is something team members often need to learn and it should be part of the overall instructional design of a learning team environment.

As previously mentioned, within this thesis there is a guide for learners on how to organize themselves as a team is included in Appendix D. Other appendices are designed to provide additional support on dealing with communication through technology (Appendix A), interpersonal issues (Appendix B) and facilitating communication between team members (Appendix C).

Developing support for learning teams - Recommendations

Instructional support can be self-guided (electronic, paper based) and/or traditional (classroom structured) depending on the needs and educational situation. The support provided can include; job aids, guidelines, checklists, workshops, seminars, and/or courses on team development and collaboration relative to learners needs. The purpose of these forms of support is to assist learners in addressing specific areas of collaboration in order to help promote and facilitate the teamwork process.

Learners could be provided with on-line descriptions of group work structures which might include suggestions on how to divide up work and tasks, make decisions, deal with conflict, and/or how to facilitate on-line communication between team members. The institution (or instructor) could also set up guidelines, which require learners to address certain questions in relation to collaboration. For example, learning teams can use a questionnaire checklist so they

can keep track of their work in progress (e.g., procedure/suggestions on how to divide and decide on roles and responsibilities within the group).

In business it has been shown that traditional instruction (seminars and classes) are useful in team training, but it has been found that having team members learn directly from the experience of being part of a team can be even more effective (Cleland, 1996). Bate and Travell (1994) suggest that training/instruction can also be more successful if it is provided over a period of time instead of all at once. Providing team instruction over time enables team members to incorporate more of the team learning strategies as part of their work processes (Bate and Travell, 1994). Given the generally short time-frame for learners participating in teamwork the over-time strategy can include reminders to learners as to how teamwork should be conducted and organized, such as providing on-line job aids or guides at different stages of the team's collaboration.

Suggestions for future development and research

The use of CMC within instructional environments creates new learning opportunities with a multitude of possibilities. The collaborative potential of this medium "facilitates individualized feedback and contact with peers and faculty; promotes reflective and critical thinking due to its asynchronous nature; and permits students to work at a time and pace that is convenient to them" (Boyd, Harasim, cited in Dehler & Porras-Hernandez, 1998, p.52). However, any organization, be it a business or instructional institution, needs to conceptually understand the team environment, in order to facilitate teamwork (Cleland, 1996). Learners also need to understand the challenges of on-line collaboration, and be provided with the means to learn skills on how to be effective team members. This means having the opportunity to learn about group dynamic and team building issues that can effect the collaborative process (McDonald & Campbell Gibson, 1998). By providing learners with a model and suggestions on how to facilitate teamwork the result can be a more organized and successful atmosphere for

collaboration (Mankin et al., 1996). An important issue is providing learners with the instructional aids and/or support which best suits the situation (Walsh, 1987). It is often found that due to the complexities of on-line collaboration various instructional methods and support need to be used.

However, with CMC instruction we are really just at the beginning of developing and expanding the learning potential of this new medium. Within this thesis there has been the opportunity to provide suggestions for both the educational institution and learning teams on how to better facilitate team collaboration.

Nevertheless, even with the research presented here the issues discussed in this thesis have only touched on this very complex topic. There is a wealth of information in other disciplines which has yet to be fully explored by educators. Business literature, as mentioned before, and discussed within this thesis, has extensive research on issues such as team building and organization. Group dynamics, as well, can provide education with insight into the fundamentals of group structure and design. Many of these issues are often not dealt with extensively within education. By considering the research of other disciplines, education, especially higher institutions, can develop different perspectives, create new knowledge, and expand educational boundaries.

There has been the tendency among various disciplines, education is no exception, to segregate themselves from each other, with their own terminology, practices and points of view. With the creation of the global village through networked computer-mediated communications, borders and organizational boundaries are breaking down and sometimes disappearing. This creates an opportunity for divisions between disciplines to change by becoming less rigid and defined. With today's technologies no discipline can exist in isolation. The global village has seen to that.

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Appendix A

Facilitating text-based electronic communication

Text-based electronic communication has numerous obstacles to overcome due to the nature of the technology. Facilitating communication requires an understanding of the problems that can occur. It is also essential to have the tools and information to deal with any possible problems. This appendix is designed to provide a guide to deal with issues specific to electronic dialogue, with suggestions on how to better facilitate text-based communication. Areas of discussion include:

- Time discrepancy problems
- Lack of non-verbal communication
- Dealing with information overload
- Writing for CMC
- Exchanging a progress report

Time discrepancy problems

Time discrepancy can be a problem for teams collaborating using CMC. This discrepancy reflects the amount of time between messages that are received and sent (Ahern & Repman, 1994). If the time lag is too long team members can lose track of electronic discussions.

- One means of dealing with this problem is by developing the habit of communicating on-line on a regular basis. This regular basis can be weekly or daily depending on what tasks are being worked on (Mason & Bacsich, 1998).

Software technology can also assist with this problem

- Computer conferencing software has the ability to electronically keep track and link all related comments together through a 'thread' feature. This thread feature enables people participating in an electronic discussion to see all comments connected to one topic in a linear fashion.
- The e-mail reply feature can also assist with time discrepancy by enabling a user to send their new message along with the message they are replying to. This serves to remind the reader what the message is about, but this can become cumbersome if it is used again and again. Solution is to only include a brief note in the beginning of each e-mail to remind the reader what the message is in reference to. This is similar to business letters where there is a line or two at the top of a letter to indicate what the letter is referring to.

Lack of non-verbal communication

Teams need to remember when using CMC that elements of communication will be missing. These elements are the non-verbal aspects of communication, which are often taken for granted in face to face situations (Opper & Fersko-Weiss, 1992).

- Because text-based communication lacks non-verbal information it requires users of this media to pay more attention to details by providing specific information and sometimes increase (within reason) the amount of information they provide to each other.

- One means to compensate for the lack of visual cues is by using various forms of punctuation or 'lexical symbols' (e.g., :>(sad face or ;>) winking happy face) in order to suggest gestures or feelings to others reading the CMC messages (Ruberg & Sherman, 1992).

Dealing with information overload

Information overload is a common problem with electronic communications. This situation occurs when too much information (data) is provided than what is actually needed. To alleviate this people communicating by CMC should:

- Focus on providing specific information. This requires editing down data, making it concise and well organized. It is always best to determine what the receiver of the information needs to know. If the information people are receiving is considered needless, messages will not be read. Therefore it is important to only send messages when crucial information needs to be provided (James, 1996).
- Within the subject heading or header of the electronic communication message always include a title which describes the message briefly to the reader. This makes it easier for the receiver to quickly know what the message is about (James, 1996).
- Always try to create correspondence, which is short and concise. James (1996) suggests creating messages that are only screen length. If the information is longer than one screen it is best to condense the data on the first screen and if necessary provide more detailed information on the following screen(s) (James, 1996). Condensing information on the first screen enables the reader to get an overall sense of what the message is about before having to read through a lengthy file. A sender can also (if the communication software has this feature), send a file (document) as an attachment to the message being sent.

Writing for CMC

Writing for CMC requires special attention and organization in order to effectively get the proper message across. Team members should remember to:

- Always write clearly and concisely. Remember when using CMC contact is often limited to text.
- Always ask for clarification if communication difficulties arise.

It is also essential that work done by a team seem cohesive as if one individual produced it, even though many probably contributed (Carliner, 1995). According to Carliner (1995) features that a team should pay attention to are:

- consistency of the data,
- how the data is organized,
- the use of language (terminology),
- and general appearance.

The above features are all things, which various individuals will of course deal with differently. Anyone who has worked on a document realizes that it is essential to go over the work to make sure there is consistency within the project or document (Carliner, 1995). In some teamwork situations it can be helpful if one person keeps track of document changes maintaining

different versions for the team's reference. However, in other situations it is more effective if each team member is responsible to make back ups and keep track of their own work in progress.

Exchanging a progress report

Another suggestion to facilitate communication is for a team to exchange a progress report between team members, and if necessary for others outside of the team (Carliner, 1995). This concept is borrowed from business, but it can also be a useful tool for learning teams within education. Such a report would not necessarily have to be anything formal, but is a means for team members to maintain a record on how tasks and the entire project is progressing (Carliner, 1995). This form of communication would help team members to stay on top of deadlines and be able to keep tabs on possible problems (e.g., work being delayed due to unforeseen circumstance or needed information taking longer to compile than expected). A progress report could also include:

- How data was obtained (problems if any).
- Data and or information the team needs to make decisions on.
- The time needed for a task to be completed and/or how far a task is from completion.
- Information on the status of a task (or job) such as how the task is progressing, and what materials or information are needed.
- And anything that needs to be shared in order for the team to complete its work successfully (e.g., graphics, software, data, statistics, text, research).

Depending on the nature and length of the project team members could decide to make progress reports daily, weekly, or only when specific tasks are completed. Of course the amount of communication needed will depend on the length of time a team will be working together and the complexity of the tasks they must complete.

Appendix B

Interpersonal issues

Interpersonal skills reflect our ability or inability to interact and communicate with others in constructive ways. How effective our interpersonal skills are will determine the success of our social and work interactions. This appendix discusses a number of interpersonal issues, with suggestions on how to improve communication with others. The issues covered here are:

- Social skills
- Dealing with conflict
- Giving and receiving feedback
- Trust and commitment
- Netiquette issues

Social skills

It is essential for users of CMC to always be aware that they are communicating with people not computers. Collaborating using CMC is more complex than face to face situations requiring more attention to social interactions. Social problems often occur because many people when using electronic communications will expect it to be the same as if they were communicating face to face (Goode cited in Black, 1995).

- One problem found with text-based CMC is that participants seemed less aware of how their interactions can effect others on-line (Ruberg & Sherman, 1992). Ruberg and Sherman (1992) describe this as a 'decreased awareness of audience'. This makes it important for teams to always be aware of how they are communicating and interacting with others on-line.
- In other situations learners (users) will believe that the message they sent is perfectly clear and it will result in an expected response (Black, 1995). However, difficulties arise when users of electronic communication make incorrect assumptions about what they believe is being said (Westera, 1999). This can occur irregardless if the user is experienced or inexperienced with e-mail or other forms of CMC (Willis cited in Black, 1995).

Dealing with conflict

In order for a team to learn they must be able to work through problems which may arise through collaboration. Team members should realize that the various opinions, which may create conflict, can also be a source of learning (Kasl et al., 1997). Serious problems can occur when team members avoid dealing with conflict issues. Therefore, determining how conflict will be dealt with can help a group cope with possible difficulties (Carliner, 1995; Cleland, 1996). It has been found that teams who collaborate effectively have developed methods to both deal with conflict directly and avoid conflict when necessary (Forsyth cited in Kasl et al., 1997).

According to Kasl et al. (1997) in order for members of a team to learn how to effectively deal with conflict issues they need to:

1. directly deal with the issue,
2. openly discuss the issue by listening,
3. reflect on each other's opinions,

4. and allow all members of the team the chance to offer suggestions on how to resolve the situation or problem.

Ideally all teams should productively consider ways to deal with issues and difficulties. This means creating a collaborative working relationship which enables each member of the team to feel that their contribution is part of solving the collaboration problems which may occur (Cleland, 1996). The most successful team utilizes the opinions, ideas and objectives of all its members through negotiation and making concessions (Mankin et al., 1996). Members of a team need to understand that any successful group work requires compromise where “no one gets everything he or she wants and that everyone has to give up something he or she values” (Mankin et al., 1996, p.12).

- One means of dealing with conflict is for team members to consider how they wish to handle decision-making within the group (e.g., by each member voting, general agreement or deferring the decisions to a specific individual or individuals depending on their role and responsibilities) (Carliner, 1995). However, voting on an issue is not always a solution. Caudron (1998) points out that though the majority of team members might vote yes on something it is still not a consensus. Those team members not in agreement might resent the decision (Caudron, 1998).
- In some situations it has been found that meeting face to face (if possible) can be an effective way to deal with specific conflicts such as, attaining a consensus or with problems which are considered delicate (Smith, 199), such as personal issues. Having a group meet face to face in order to deal with conflict issues should only be done when other means of resolution have been futile. If meeting face to face is not possible and the conflict is not able to be resolved electronically communicating by telephone may help deal with the situation.
- Another problem is when a team member is not contributing toward the team’s goals. These non contributing team members are described by Heneman and von Hippel (1995) as ‘social loafers’. One way to deal with this problem can be through peer pressure from other members of the team. Depending on the individual having pressure from his or her peers to better their performance may be effective, but it can also create conflict. The objective is to improve a member’s contribution so that the team can effectively attain its goals, but if resentment occurs it can upset a groups ability to function successfully (Heneman & von Hippel, 1995). If a group can not deal with a social loafer through diplomatic dialogue and the individual’s lack of contribution is adversely effecting a group reaching its goals an outside authority (e.g., instructor, tutor) may have to be consulted.

Giving and receiving feedback

Being able to give and receive feedback is essential for effective communication. How feedback dialogue is understood and accepted will depend on how it is given.

- Instead of responding to problems with ‘that’s wrong’ or ‘fix it’ team members should express specifically what the difficulty is and describe how to deal with it (Carliner, 1995).
- It is also advisable for group members to speak in a ‘passive voice’ by saying things such as ‘perhaps this could be expanded’ and ‘might it be possible to’. Using what is called a passive voice removes putting blame on another individual and instead focuses in on the work itself (Carliner, 1995).

- If negative feedback must be given try when every possible to do it person (or if not in person over the phone). Giving what might be perceived as negative feedback is not an easy situation to deal with. Therefore to ensure something will not be taken personally it is essential to always try to focus and stress that the feedback being given is only to create improvement for the project (James, 1998).
- Try not to take each other for granted by finding reasons to appreciate contributions instead of chastising each other for problems (Carliner, 1995; Rimmershaw, 1999). The more team members value what they are doing the more likely they will be willing to deal with team related difficulties (Arnold, 1996).

Trust and commitment

Issues of trust and commitment between team members are essential for effective teamwork to be accomplished.

- Each team member should participate in the kind of commitment they expect from each other and themselves (Carliner, 1995).
- Team members must trust other members to keep their commitments. If a team member does not for fill their responsibilities others within the group will lose trust in that individual (Carliner, 1995).
- It may be helpful if team members view the agreement to work together as a contract of commitment. This view can assist members in understanding the importance of commitment within collaboration.

Netiquette issues

Netiquette is a form of on-line etiquette that users of CMC are expected to conduct themselves. For a positive collaborative environment to occur it is essential that team members maintain awareness on how they are communicating on-line. This means paying more attention to the way things are said, especially when feedback is being given.

- One breach of netiquette occurs when people begin arguing, accusing, and insulting each other on-line. Referred to as flaming some situations can unfortunately get quite nasty. Flaming can often start with a simple misunderstanding in communication which gets blown out of proportion or when an individual deliberately insights a problem which results in conflict.
- Another netiquette issue that is important to be aware of is the use of upper and lower case text. Generally upper case text is viewed as shouting as if someone is angry or annoyed.

Appendix C

Facilitating on-line communication between team members

Effective communication is essential for team collaboration to be productive. Nothing can begin without communication between team members, and with the larger instructional organization (e.g., instructor, faculty). It is also essential for both the team and the organization that communication be maintained and open throughout the collaborative process. This appendix includes information on the phases of group communications as well as suggestions on how to facilitate team dialogue.

- Beginning phase of group communication
- Maintaining communication over-time
- Later phase of group communication

Beginning phase of group communication

In the beginning of any project it is important for team members to establish effective communication with each other from the start of their collaboration (Carliner, 1995). If meeting face to face is impossible due to time restraints and distance team members will have to get to know each other electronically. The level of communication needed will depend on an individual's experience working in a team, and the type of tasks they are required to do.

- In the beginning team members should talk about the overall project focusing on what is required, (e.g., when the project must be completed, the type of project they are suppose to develop) (Carliner, 1995). Doing this enables team members to get an overall picture of the work and an additional opportunity to get to know one another. This early dialogue can also enable learners to discover about each others skills, abilities, and interests which can be helpful when deciding who will do what tasks (Carliner, 1995).
- Team members should also introduce themselves by providing fellow team members information on:
 - Personnel interests in relation to the assigned teamwork.
 - Skills they have which will be needed to accomplish the assigned work.
 - Their past teamwork experiences (e.g., type of work assignments, what roles and responsibilities they had). This can be teamwork that was either face to face or on-line.
 - What they expect to get from this team project (Murphy, 1995) (e.g., Good grade, opportunity to learn).
 - And other concerns if any.

These introductions could be as simple as brief notes on interests and thoughts on the project to an exchange of more formal resumes. Depending on the software this introductory exchange could also include a scanned photo along with the personal information (Mason & Bacsich, 1998).

- After this initial beginning team members can then begin to decide on the different roles and the required responsibilities each will take on for the project (Carliner, 1995). How much time a team can spend in the beginning getting to know one another will depend on the length of the project and the type of social atmosphere that the institution has encouraged.

- Besides using electronic text it can be helpful for team members to be able to contact people through other forms of communication media such as the telephone (Carliner, 1995; James, 1998). The telephone can be an ideal substitute when face to face dialogue is not possible especially if there are problems (James, 1998). This of course will depend on team members time availability and the complexity of the tasks the team has to do in order to complete their work (Velayo, 1994).

Maintaining communication over-time

Throughout out the teamwork life cycle it is essential for group members to maintain communication with each other, and if necessary with others outside their team (e.g., instructor, faculty). This middle phase of the group's development requires a team to consistently have an open dialogue with each other on how things should be dealt with and accomplished. Teamwork is an evolving process where requirements and tasks can change as a team moves towards its final goal.

- Ideally each team member should be responsible for his or her own individual communications. This can mean initiating communication if clarity of information is needed or to keep pace with what is going on within their team. Members should always contact someone and find out information instead of waiting for someone to contact them (Carliner, 1995).
- During the teams life cycle each member should maintain their commitments by performing their agree tasks in a timely manor (Murphy, 1995). As a team obtains new information some commitments and responsibilities will change according to the needs of the team. If a team member cannot for fill an agreed commitment it is a duty to communicate this problem with other members of the team.
- It is essential that all members of a team are consistently clear about what they need and/or want (Murphy, 1995) in the way of information, data or other necessary group work materials.

Later phase of group communication

Teamwork can sometimes become more stressful as a team's work reaches near its completion. This later phase of group development is where the stress of wanting to complete the work on time, and issues or problems not dealt with when they occurred may come to a head adding delays for completion. This is why maintaining communication and attempting to keep to agreed goals is essential.

Appendix D Organizing the team

This appendix is designed to be used as a guide and checklist for learning teams collaborating on-line. The intention is to provide teams with an organizational structure so they can better organize themselves and their collaborative tasks.

All the issues discussed below can be done concurrently or in various order depending on the work objectives and the composition of the group. It may not be necessary for a team to make decisions on everything discussed here, when they just begin working together. Though it is important for a team to keep such issues in mind when they undertake a group task.

(The information presented here is based on the research from Chapter 6 'Organizing the team: Can education learn from business and other disciplines?').

1) Analyzing teamwork objectives

To analyze work objectives a team should break down the tasks or assignment in order to determine goals, objectives, roles, responsibilities, and work schedules.

Collaborative brainstorming: A team can benefit from collaborative brainstorming during the beginning phase and periodically throughout the group's life cycle. This process can enable all team members the opportunity to prioritize important decisions when it comes to determining what needs to be done and when (Carliner, 1995). This does not have to be a linear process, many issues overlap and can be developed and discussed concurrently.

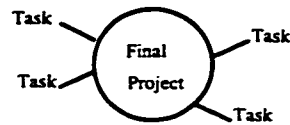
- 1- Determine the project's scope (Carliner, 1995). What is the overall project about?
- 2- Discuss tasks to be accomplished (Rocine, 1996) (e.g., criteria, parameters, objectives). What is the team expected to do and/or produce?
- 3- Determine what is needed to get the job done (e.g., information, resources, materials).
- 4- Decide and prioritize goals and objectives. What needs to be dealt with first, second, etc...? What things will take more time?
- 5- Finalize a timeline (deadlines) (Carliner, 1995). Decide when things need to be done.
- 6- Formulate how task(s) will have to be structured in order for work to be accomplished.

2) Defining task structure

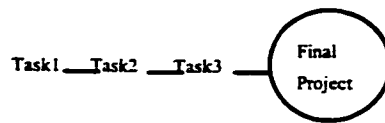
Determining how tasks will have to be structured can help team members develop a conceptual understanding or mental model on how their team must be organized. To define task structure it requires an analysis of the tasks the team needs to do in order to

reach its goals (Mankin et al., 1996). Task structure can be one of the following or combination of two or more, and will depend on what the team is required to do.

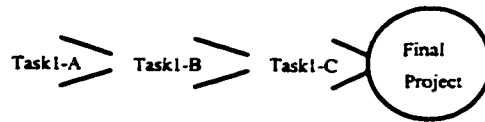
- **Pooled interdependency** - Defined as a group situation where each member contributes work to the larger task. However, the work of each individual is not brought together until the task is finished or near to completion.
For example, two areas of work writing (research-writing-editing) and graphic design (research-design) are not combined until the end of the project.



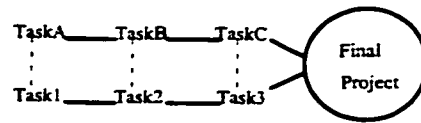
- **Sequential** - A sequential task structure is where work must be finished before the next step or task can be addressed. Essentially the product of one task is used as part of the next task and so on towards the final completion of the work (Thompson cited in Watson et al., 1994).
For example, creating a text-based document where research-writing-editing-final draft result in the completion of the task. Research would have to be finished (or mostly finished) in order for the writing to begin, the writing then has to be edited etc.



- **Reciprocal** - With reciprocal the contribution of each team member goes into the work of the another team member and so on (Thompson cited in Watson et al., 1994).
For example, statistical analysis by one team member is used to create a graph by another team member.



- **Matrix** - This task structure is described as matrix and is a combination of pooled interdependency and sequential. Within this task structure people work independently and are also provided information and feedback from other team members who are working on similar and/or other related tasks.
For example, there could be elements of the team's work, which could be accomplished in parallel such as graphics and written material. Both will require linear processes (e.g., research for written material, writing, editing, formatting and research for graphics, designing graphics) before the two are brought together and combined.



3) Setting team goals and final objective

To decide on the direction a team's work will take requires making decisions on the goals and objectives the group wants to achieve (Arnold, 1996). To achieve this a team needs to develop and establish methods, procedures and/or strategies to reach their objectives (Cleland, 1996). This process requires defining, setting, and maintaining both goals and sub-goals. Sub-goals are smaller tasks, which need to be accomplished in order for a team to complete their work.

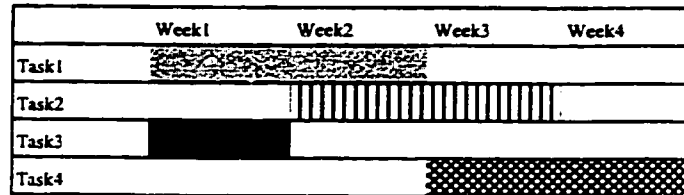
- **Defining goals** - In order to define what goals will need to be reached a team must breakdown the work or tasks (Cleland 1996). It is especially important to define sub-goals so a team will have a general structure of the tasks they must complete.
- **Setting team goals** - To set a goal team members must agree that the specific goal will enable the group to reach their final objective (Romig, 1996). Setting a goal (or goals) will reflect how a specific goal will be reached and when.
- **Maintaining goals** - Teams should periodically review their goals to ensure that the goals originally set will still enable the group to achieve their objectives (Romig, 1996).

4) Scheduling time effectively

By scheduling a timeline a team is in a better position to direct and focus towards their goals and objectives. To schedule time teams need to prioritize what needs to be done and when for everything to be completed on time. One suggestion is to determine the phases that task(s) will have to go through in order to establish pre-deadlines, sub-goals along with goals and objectives (Gay, 1992).

- **Organizing a timeline** - Both the team collectively and team members individually need to set target dates (sub-goals) for when specific tasks have to be completed (Gay, 1992). Once decided team members should submit a timeline plan of who will do what and when. Setting pre-deadline target dates enables a team to touch base with the member doing a specific task and find out how things are going, how much more needs to be done, and to see if extra help is needed (Gay, 1992).
- **Maintaining a timeline** - Members need to keep to the deadlines established by the team, with a focus on completing work before the deadlines (Carliner, 1995). This is especially important if the work is needed by other team members to complete their tasks.

- **Scheduling tools (e.g., Gantt chart)** - The organization of the team schedule can be informal, where team members discuss what they are going to do, divide the work, and begin; to a more formal structure by developing a Gantt chart (Carlisle cited in Gay, 1992). A Gantt chart is designed with the activities or tasks listed down the left side, and the time needed for the project across the top. This enables a team to see how tasks link or relate to other tasks, and shows where a task begins and ends (Gay, 1992).



Gantt Chart

5) Team roles and responsibilities

This requires deciding what roles and responsibilities will be needed to accomplish the goals of the team. When roles and responsibilities for team members are clearly defined it makes it easier for the entire team to function and organize their work (Cleland, 1996). Within this framework every team member should know their place within the group and what is expected of them (Arnold, 1996; Cleland, 1996).

- **Organizing team roles and responsibilities** - In order to accomplish a collaborative task it generally requires team members to take on a variety of roles and responsibilities (Brown et al. 1989). Roles can change over time depending on how the tasks change. Also, with issues of responsibility it is crucial that team members establish who is responsible for what and when (Murphy, 1995).
- **Deciding roles and responsibilities** - The best situation is where team members can choose roles and responsibilities that they are most comfortable with (Carliner, 1995). However, there will be some situations where members of a team will have to take on roles or responsibilities they are not familiar with or would prefer not to do. It is important for individual team members to have a good understanding of their own abilities, strengths and weaknesses (Carliner, 1995). This can help team members when they are discussing and deciding which roles and responsibilities they will take on (Arnold, 1996).
- **When roles are not defined** - Problems can occur when roles and responsibilities for team members are not established. If such a situation does happen it is important for these members to show an interest in contributing to the group work even if specific work is not assigned to them (Carliner, 1995).

6) Authority and leadership issues

A team needs to understand the issues of authority within a collaborative situation. This also includes making decisions on the type of leadership structure that will be needed to facilitate the group work.

Team leadership structure: In order for a team to organize and reach their final objectives there must be some form of leadership structure (Arnold, 1996). A team can either:

- **Choose one individual in the group to be the team leader** - A leader or team leader today is often the one who coordinates, assists, facilitates, and helps organize a team to ensure that work flows forward by making certain deadlines and goals are met (Mankin et al., 1996).
- **Adapt a shared leadership model** - Within the shared leadership model the role of leader is shared among the team, with each member taking turns being leader in respect to their roles and responsibilities (Arnold, 1996). This means that the leadership within the group will change relative to the task or 'stage' the work is at (Mankin et al., 1996).
- **Or a combination of the two** - In this situation the team leader coordinates and helps organize the group, but individual team members are still in charge or leader within their specific roles or responsibilities.

7) Information processing

Understanding how information will be processed and distributed within a team can assist with organizing the responsibilities each team member will have to take on. This means that all teams have to determine the forms or types of information the group will need to accomplish their goals (e.g., literature, computer code, calculations, statistics, and/or data research) (Bate and Travell, 1994; Rocine, 1996). Task information needs can also include data on; resources, facilities, technology, course content, evaluation processes and other procedures (Mankin et al., 1996).

8) Team decision-making processes

Establishing how decisions will be made and carried out can help a team to better organize themselves. Decisions can be determined by:

- **each member voting**, (Carliner, 1995),
- **general agreement** (Carliner, 1995) all members must agree,
- **or by deferring the decisions to a specific individual or individuals** (Carliner, 1995) depending on the role and responsibilities they have taken on.

A team must then decide how their decisions will be implemented. Essentially once a decision is made how will the decision be carried out (Carliner, 1995). This will depend

on the roles and responsibilities team members have taken on, and the goals for the team's work.

Determining the importance of a decision: Ideally decisions which effect the overall work should have input from all team members. Romig (1996) suggests such decisions be brainstormed then placed in order of their importance.

9) Establishing team boundaries

Understanding the issues of boundaries both within and outside of the team will also assist in reducing conflict between team members. The overall purpose of boundaries is to help teams to be in a better position to organize themselves, coordinate their activities, and assist them in establishing divisions of labour (Rocine, 1996). However, there are also internal boundaries within a team which are in relation to the roles and responsibilities individual team members take on. With internal boundaries it is important for team members to respect boundaries in relation to the role and responsibilities they are assigned.

10) Other issues a team needs to consider

Resources and materials - A team needs to decide what resources and materials will be needed to accomplish their goals (Arnold, 1996). Resources and materials can be anything from access to libraries (electronic and traditional), equipment, print-based materials, and/or software etc...

Technology - All team members need to have a certain level of computer literacy skills and feel comfortable using the technology in order for on-line collaboration to take place.

Facilitating text-based electronic communications - To effectively collaborate using CMC learners need to be aware and understand the issues and complexities that can occur with on-line team collaboration. These issues and suggestions for dealing with these complexities are in Appendix A, which includes: time discrepancy problems; lack of non-verbal communication; dealing with information overload; writing for CMC and exchanging a progress report.

Interpersonal issues - Other factors learners need to be aware of are the interpersonal issues that a team will have to deal with throughout their collaborative process. For more information on interpersonal issues and skills refer to Appendix B, which includes: social skills, dealing with conflict, giving and receiving feedback, trust and commitment and netiquette issues

Facilitating on-line communication between team members - Being able to effectively communicate with others is essential within a team environment. This requires an understanding of how communication is developed and maintained over time. For more information on communications refer to Appendix C.

Appendix E
Thesis literature sources
 Table 1

This table shows the literature source for specific sections of this thesis. Literature areas are placed in order of use within the chapters.

THESIS SECTIONS	LITERATURE AREAS
Ch 1 - Collaborative organizations: Facilitating on-line collaboration of learning teams	Education (computer technology, collaborative learning, CSCL) Business (teamwork, technology cooperative work, self-directed work teams, education)
Ch. 2 - Group structure, development and learning	Group dynamics (team learning, computer technology, education) Business (teamwork, self-directed work teams, collaboration, education) Education (computer technology, self-directed learning)
Ch. 3 - Computer technology and teamwork	Technology (group collaboration, distance) Education (technology, distance, collaboration) Business (technology, cooperative work, teamwork)
Ch. 4 - Small group communication	Education (computer technology, collaboration, social, communication, distance) Business (teamwork, computer technology, self-directed work teams, education) Group dynamics (learning, teamwork, education, conflict, computer technology) Technology (collaboration, group dynamics)
Ch. 5 - Developing an on-line team environment	Education (technology, collaboration, distance) Business (teamwork, computer technology, collaboration, self-directed work teams)

Table 1 continued

Ch. 6 - Organizing the team Analyzing teamwork objectives	Business (teamwork, self-directed work teams, computer technology) Group dynamics (teamwork, learning)
1. Defining task structure	Business (teamwork, computer technology) Group dynamics (cooperative work, computer technology)
2. Setting team goals and final objectives	Business (teamwork, cooperative work, computer technology)
3. Scheduling time effectively	Education (research, evaluation) Business (teamwork)
4. Team roles and responsibilities	Business (teamwork, self-directed work teams, collaboration)
5. Authority and leadership issues	Business (self-directed work teams, teamwork, computer technology) Group dynamics (research)
6. Information processing	Business (teamwork, computer technology cooperative work, self-directed work teams)
7. Team decision-making processes	Business (teamwork)
8. Establishing team boundaries	Business (teamwork, self-directed work teams, computer technology) Group dynamics (learning)
