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**Learner Perceived Productivity
Within an On-site and an On-line Collaborative Learning Environment:
A Case Study**

Jennifer Sclater

A Thesis

In

The Department

Of Education

**Presented in Partial Fulfillment of the requirements
For the Degree of Master of Arts (Educational Technology)
Concordia University
Montreal, Quebec, Canada**

April 2003

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ABSTRACT

Learner Perceived Productivity Within an On-Site and an On-Line Collaborative Learning Environment: A Case Study

Jennifer Sclater

Is collaborating on-line more productive than collaborating face-to-face? This case study is an exploration of the effectiveness of face-to-face and computer supported collaboration. More specifically learner attitudes towards the use of on-line and on-site collaborative learning within an undergraduate course on integrating technology into the classroom at Concordia University are explored. Learner reflections kept throughout the semester is analyzed to determine whether certain elements of collaboration, namely (a) efficiency, (b) group management, and (c) task process, are more productive within an on-line or on-site collaborative learning environment. Findings suggest that learners do perceive that some elements of collaboration are best suited to an on-line learning environment while other elements are best suited to an on-site learning environment.

Acknowledgements

So many people to thank! First to my parents, for making the choices and sacrifices they made. I am the person I am today because they decided that my brother and I come first. To Jay and Jeff for the support and confidence that I could do this. Thanks to the four of you for putting up with me through this process and helping me in everyway possible. To the rest of my family and friends who contributed the little things that kept me going throughout my studies (the rewards - mushrooms and cones; the distractions - 'children'; a trip to Toronto; the encouragement that no matter how long this thesis was, anything over twenty pages was quite an accomplishment; and most of all the expressions of pride, confidence and support).

Thanks to my committee members. Allyson for her guidance early in the process, Steve for making me think and questioning my practice, Phil, for always challenging my beliefs about teaching and learning, and Bob, for recruiting me, helping me understand whatever it was I was trying to do here and encouraging me that I could complete it.

To my other committee - Gretchen, Vivek and Mariam, for the laughter, "debriefing", understanding, support and encouragement, which made me appreciate that I truly was not alone in this process. I have never felt as though I have really belonged anywhere as I did in Ed Tech. I would like to thank all of the friends that I have made along the way, my profs for making this such a wonderful learning experience, to Stef for giving me the *carte-blanche* when it came to FirstClass and supporting all the cocamany ideas I had for integrating technology into my class, and to Anne Brown, the heart and soul of Ed Tech, for always being there.

To our learners in EDUC 305 over the last three years, who have allowed me to grow as an educator and truly experience theory into practice. I thank them for their patience, commitment and enthusiasm.

Finally, and most importantly, to my teacher, mentor, guide and most of all my friend, Laura, who saw something in this sarcastic undergraduate, who assured me that Ed Tech was where I should be and took me under her wing. Words cannot express the gratitude, respect and admiration I have for you and how much I appreciate the time and energy you not only invested in helping me with this thesis, but through every step of the way. Thanks to Laura and Bob I was given the opportunity to teach this wonderful course and further explore and understand my calling in life.

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OVERVIEW

This case study is an exploration of the effectiveness of face-to-face and computer supported collaboration. The presentation of this project reflects Miles' (1990) outline for a pre-structured case. According to Miles, this method begins with the researcher developing a conceptual framework for the study, along with a set of research questions. The requirements for this stage of the process were satisfied in the proposal document for this thesis research. Miles (1990) recommends that the researcher then (a) develop instruments to reflect the research questions, (b) select a sample, and finally, (c) create a case outline.

This study took place within the context of *Technology for Educational Change*, an undergraduate course, offered on-site as well as on-line, designed to introduce students to the theory, research and practice of integrating alternative instructional methods and supporting the integration of technology into the classroom. Data collection instruments used in this study were part of the instructional design of *Technology for Educational Change*. Although these learning activities were created prior to the development of my research questions, I was confident that, with minor adjustments, they would capture the data of interest for this study. This belief was due to the fact that effectiveness of collaboration had been an area of interest of mine upon entering the Masters program. This focus had influenced adjustments I had made to the learning activities over a three-year period as instructor of the course.

Miles (1990) suggests that considerations about sampling should go beyond "sites and actors, in terms of the range of site specific events, settings, times and processes that need to be included" (p.43). All of these factors were easily addressed, since I assumed

the dual role of instructor and researcher, and therefore could undertake full control of when, where and how sampling and data collection were conducted. Finally, Miles (1990) suggests that the case outline be created prior to the collection of data. However, given time constraints and the availability of data this was not possible. Instead, the case outline was drawn up only once the course was in progress and while learners were completing the tasks that would provide as the data for this study. According to Miles, the case outline should include (a) the context, (b) an overview of what is being planned, (c) why this is being explored, (d) planning, (e) implementation, (f) results, (g) why these results, and (h) lessons for improving.

This document will mirror Miles' (1990) case outline. Chapter 1 establishes the context for the study and describes the design of *Technology for Educational Change*, which is the course used for data collection. Literature supporting the course design is also included.

Although Miles (1990) separates the overview of what is being studied and the justification for the study, I felt that this was too constricting and interrupted the flow of the material presented. Therefore, Chapter 2 includes a description of the study as well as a justification for undertaking it. Reference to literature supporting the study is interwoven throughout the chapter.

Chapter 3 describes the planning stage of the study. The research design, description of data collection instruments and method of analysis are discussed. The chapter also includes a description of the participants in the study and the method used for obtaining consent.

Chapter 4 describes how the actual study was carried out. The process undertaken to complete the study is described in detail, including the handling of consenting participants, reasons for including and excluding data, and the method of analysis for qualitative and quantitative data.

Chapter 5 presents the results of the quantitative data analysis as well as the qualitative analysis that supports the findings. Seven hypotheses were explored in answering the research questions posed. The statistical analyses in the form of chi-square tests are presented for each hypothesis. Chapter 6 presents the discussion of these results. This is followed by a discussion of the implications for future research and practice.

CHAPTER 1

Introduction

The Context

EDUC 305: *Technology for Educational Change* is a three-credit undergraduate course intended for pre-service teachers enrolled in Early Childhood Education (ECE), Child studies, Art Education and/or Teaching English as a Second Language (TESL), at Concordia University. However, the course frequently attracts students from faculties other than education given the topical subject matter emphasizing the use of technology in education. The course is designed to introduce students to the theory, research and practice of integrating alternative instructional methods and supporting the integration of technology into the classroom. The topics covered in the course range from philosophies of learning and teaching, collaborative/cooperative learning, distance education, assessment practices, learning and teaching using visual representations, and the use of instructional video.

Technology for Educational Change is offered both at a distance (DE) and on-campus (on-site). The on-site section tends to attract students from the Department of Education. Alternatively, the DE section is more diverse in its composition, frequently including students from all four faculties (John Molson School of Business, Faculty of Arts and Science, Faculty of Engineering and Computer Science and Faculty of Fine Arts). Although the learner population is quite diverse across the sections of the course, the pedagogical approach and course design of both sections is parallel. All assignments, assessment practices, readings and supporting materials are the same for both sections. Truly the only difference between the two is that learners in the DE section never meet

face-to-face (aside from an optional orientation session during the first week of the semester).

Instructional Design

Learning Environment

Both the distance and on-site sections of *Technology for Educational Change* make extensive use of FirstClass®, a computer conferencing application. While all course material, discussions and interaction is conducted exclusively through FirstClass® for the DE section, the learners in the on-site section use the courseware to retrieve required readings, interact with the course instructor and peers between class sessions, and submit assignments. Using an on-line learning environment to the extent to which it is used in *Technology for Educational Change* requires substantial consideration in choice of courseware and in designing the interface for the learning environment.

The Department of Education at Concordia University adopted FirstClass® as its primary courseware and Intranet client in 1995. From a technical support standpoint, FirstClass® was a natural choice for the purposes of course delivery, since the infrastructure had been well established. Although WebCT® was also available for use at the university at that time, it did not possess the same functionality in terms of the organization and monitoring capabilities in regard to communication. Whereas FirstClass® was designed as a computer conferencing tool, WebCT® was designed as a course management tool to which communication functionality was added. This reality represents a distinct difference between these two applications. These differences in functionality were underlined in an evaluation of WebCT® conducted by The Centre for Teaching and Learning Services (CTLS) at Concordia University in 2001. At that time

WebCT® communication functionality was examined to determine whether it contained the communication tools necessary to optimally support an on-line forum for faculty. The results of the CTLS comparative analysis of WebCT® and FirstClass® communication capabilities are presented in Table 1.1 (modified from CTLS, 2001, p. 40). Software functionalities are identified in the first column of the table. A description of the expression of each functionality across both WebCT® and FirstClass® applications appear in the second and third column, respectively.

The literature (Turoff, 1999; Lowell & Perschitte, 2000; Kaye, 1995) suggests that when selecting courseware to support computer supported collaborative learning (CSCL), it is important that the tool offer learners as many options as possible for communication, such as email, conferences, synchronous chat and bulletin boards. FirstClass® incorporates both synchronous (chat function) and asynchronous (private email and conferences) capabilities for communication. Since the purpose of the course is to provide pre-service teachers with the experience and knowledge of a variety of media and techniques for learning and teaching, learners are encouraged to experiment with the synchronous and asynchronous tools built into FirstClass®. This being said, students are cautioned to limit their reliance on synchronous communication for reasons of both flexibility and software functionality. Learners in the past have commented that it can be more difficult to orchestrate synchronous group meetings. This is an important consideration, especially for DE learners, as many decide to take the course at a distance due to the flexibility of this format offers. Flexibility aside, functionality is another consideration. The ‘chat’ function in FirstClass® is less sophisticated than the

Table 1.1 WebCT versus FirstClass

Software Functionality		WebCT	FirstClass
Administrative Issues	Creation of sub-folders	Yes - in the form of discussion threads. A maximum of 4 sub-folders can be created.	Yes – in the form of unlimited creation of conferences/sub-conferences, folders/sub-folders.
	Security and access control system	Designer/Instructor: Customize environment, post assignments, reading material, and create quizzes assignment of co-designer privileges. Read all postings remove any posting, access and contribute to "grade book". Co-designer: Read all postings, access and contribute to "grade book". Student: Access and post to areas within the environment for which student has been given access to. Access to personal grades and quizzes.	Disallowed: No access to a given conference. Summary: Can only open the conference to view contents, but cannot open items. Browser: Open conference and open items. Reader: Open conference, search items, open items, save attachments, and view message history. Contributor: Open conference, search items, send items, open items, save attachments, view permissions, and view message history. Approver: Approve items, open conference, search, send, and open items, save attachments, view permissions, and message history. Moderator: Delete, edit, and approve items, open conference, search, send, and open items, save attachments, view permissions, and message history. Creator: Create sub-conferences, delete, edit, and approve items, open conference, search, send, and open items, save attachments, view permissions, and message history. Controller: Edit permissions and read only items. Create sub-conferences, delete, edit, and approve items, open conference, search, send and open items, save attachments, view permissions and message history. Custom: All permissions can easily be customized for any user.
	Calendar function	Available	Available
	Creation of customized forms/templates	Available	Available but also flexibility in terms of characteristics included in the design of the conference.
	Easily editable text	Users must "code" in HTML any changes in font that could allow the reader of their messages to easily distinguish added comments.	Changes to font colour, style and size is done very similarly to word processing applications, such as Word.
Messaging	Send and save attachments	Available	Available
	Integrated email capacity	Available	Available
	Message history function	Not available	Available

other synchronous tools that learners are used to (such as MSN Messenger and ICQ). For example, many of the synchronous chat applications learners often use in their private lives offer the user the ability to see when the person they are chatting with is typing. FirstClass® does not offer this type of functionality, which can make using the chat function with four people very confusing, and difficult to follow.

For many learners, the use of courseware is a new phenomenon. For this reason, it is imperative that the design of the CSCL interface be intuitive. In short, the on-line learning environment must be designed in such a way as to facilitate the learning processes not hinder it. Something as simple as labeling the different areas of the learning environment to relate to its purpose can make it easier for learners to navigate within the environment and to decide what goes where (Kaye, 1995; Turoff, 1999). For example, all course readings and resources are located in the conference labeled 'Course Library,' the area where learners can ask questions or post responses to questions is the 'Help' conference, the 'Drop-box' is where learners submit their assignments, and learner grades and assigned groups, are in the 'Admin' conference.

Instructional Method

Teach as you expect them to teach. I believe that a major downfall of many courses intended for pre-service teachers is that the approach to delivery is contrary to what is being taught. Prospective teachers usually bring preconceived ideas and attitudes about how to teach, which often influence their decisions regarding how content should be taught, typically being teacher-centered (Barnett, et al., 2002). I believe this could be attributed to our experiences as learners. We resort to teaching as we were taught. We

expect teachers to adopt a learner-centred philosophy, with a focus on open discourse, collaboration and the integration of technology; however, few faculty members do practice what they preach. Many of us continue to lecture to students, and engage them in decontextualized activities, which we expect them to complete individually.

Constructivism

This move away from teacher-centeredness is characteristic of the adoption of a constructivist philosophy to teaching and learning. A constructivist approach to learning is centered on the notion of high student participation in the learning process, which consequently is a shift away from a highly teacher structured environment (Sotillo, 2000). Constructivism engages learners in collaborative construction of knowledge, rather than the transfer or reproduction of knowledge, which is typical of a traditional learning context (Duffy & Cunningham, 1996; Jonassen, 1991; Sotillo, 2000; Tam, 2000; Weasenforth, et al., 2002). This contradicts the traditional philosophy of the instructor as the sole receptacle of knowledge. “From a learning perspective, we do not assume that the learners will ‘acquire’ the expert’s meaning, and hence we do not seek a transmission approach to instruction” (Duffy & Cunningham, 1996, p. 172).

By encouraging individual construction of knowledge, learners may maintain very different ideas about truth and meaning. These different interpretations are conceived based on learner experiences with the world and their beliefs about these experiences (Jonassen, 1991; Tam, 2000). This, however, does not mean that constructivism encourages an ‘anything goes’ attitude. Rather, learners must learn to justify their positions and interpretations (Duffy & Cunningham, 1996; Tam, 2000). Learners are

engaged in group discussions that provide them with the opportunity to share and adapt their meanings through discussion (Tam, 2000). This being said, learners are not expected to assume a shared meaning, “within the constructivist framework there is a seeking of compatibility, a lack of contradiction between views” (Duffy & Cunningham, 1996, p. 171). I often explain this to my learners, as we are not looking for groupthink, we are looking for a way of incorporating the different meanings and understandings in a way that does not lose individual perspectives or interpretations.

Establishing a learning environment and learning tasks that exploit opportunity for discussion is essential. Collaboration is central to this process. Through collaboration, learners are provided with the opportunity to put their understanding to the test and refine their understanding in an ongoing process (Tam, 2000). Knowledge is then used to solve problems that are personally meaningful and appropriate to the levels of complexity (Tam, 2000; Jonassen, 1991) as well as allow learners to select appropriate levels of difficulty or involvement (Jonassen, 1991). Learning activities within a constructivist philosophy must, therefore, (a) engage learners in contextualized authentic tasks (Weasenforth, et al., 2002) that are rooted in real-world relevance, and that are integrated across the curriculum (Jonassen, 1991), (b) provide learners with the opportunity to assume ownership of knowledge (Weasenforth, et al., 2002), and (c) stimulate exploration and thoughtful reflection, which is necessary for knowledge construction (Tam, 2000; Weasenforth, et al., 2002). The learning climate must therefore, “create a social context in which collaboration creates a sense of community, and that teachers and students are active participants in the learning process” (Tam, 2000, p.51). Jonassen (1991) further suggests that the learning environment should support multiple

perspectives through context-rich experience-based activities to reflect the various interpretations of reality and knowledge construction that learners may possess.

The term constructivism is often defined and characterized similarly to above, however there are two types of constructivism that are generally outlined; social constructivism, which draws from the works of Vygotsky and Leont'ev, and psychological or cognitive constructivism, which draws from the works of Piaget and von Glaserfeld (Duffy & Cunningham, 1996). My approach to course design and delivery can be characterized as one of social constructivism. Social and psychological constructivist approach to learning can be differentiated across a variety of characteristics (Duffy & Cunningham, 1996; Haddal-Haqq, 1998). A comparison between these two constructivist approaches is provided in Table 1.2. The characteristics that differentiate these two approaches are identified in the first column of the table. How these characteristics are expressed in psychological and social constructivist approaches is detailed in the second and third column respectively.

According to Abdal-Haqq (1998),

Programs influenced by social reconstructionist tradition attempts to help teacher education students deconstruct their prior knowledge and attitudes, comprehend how these understandings evolved, explore the effects they have on actions and behavior, and consider alternate conceptions and premises that may be more serviceable in teaching.

Since the course is designed to model “best practices” for integrating technology into the classroom, I believe that it is important for my students to understand why I have made the pedagogical design decisions I have. In my opinion, to become great educators who will successfully integrate different media and teaching approaches into their practice,

Table 1.2. Psychological Constructivism versus Social Constructivism

Characteristics	Psychological Constructivism	Social Constructivism
Purpose	Educating the individual learner in such a way that it supports the learner's interests and needs	Education for social transformation
Subject	The learner	Dialectical relationship between the individual and the social and cultural milieu
Emphasis	Individual cognitive development	Individual development derived from social interaction
Assumption	Learners come to a learning context with ideas, beliefs & opinions that require altering or modification by the instructor	Theory and practice are shaped by dominant cultural assumptions
Tasks	Discovery learning and hands-on activities	Exposing, critiquing and altering the cultural assumptions, power relationships and historical influences

students need to do more than just read about theory, they need opportunities to engage in the expression of theory in practice. According to Schon (1987), becoming a “professional” or part of a community of practitioners involves (a) taking our “intelligent action” (our know-how) that we have acquired, (b) exploring it through “spontaneous, skillful execution of the performance” and finally (c) reflecting on these actions to make them explicit (p. 25). Schon suggests that it is only through the reflection phase of the process that we are able to make the implicit explicit, which in turn may help in creating ones’ own “theory” of action. A Theory of Action is created through interacting with

other people, adopting certain behaviours as a result of these interactions and holding a theory for behaving/interacting in this way (Argyris & Schon, 1974). “These theories of action, as we have called them, include the values, strategies and underlying assumptions that inform individuals’ patterns of interpersonal behavior” (Schon, 1987).

In the instructional design of EDUC: 305 *Technology for Educational Change*, I adopt a cyclical educational approach. This approach is consistent with Black and McClintock’s (1994) seven principles of study design within a constructivist framework. An overview of this framework is provided in Table 1.3. Black and McClintock’s principles appear in the first column of the table. A description of activities associated with each principle appears in the second column of the table. Finally, the third column of the table includes parallels between each principle and the course design. Within this context, learners in *Technology for Educational Change* are first introduced to concepts through recent meaningful literature. This is followed by group discussion and modeling of these concepts, including practical examples and activities. Finally, learners are required to engage in personal reflection about how they might incorporate these concepts into their own teaching practices. These activities, as well as supporting evidence for their significance are further described in the following sections.

Table 1.3 Black & McClintock's (1994) Seven Principles of Study Design

Principles	Description of Activity within each principle	Technology for Educational Change
1) Text	Learners are presented with various materials.	Learners are provided with a course library of recent journal articles, from a variety of disciplines.
2) Context	Learners are provided with open-ended access to contextual resources that will help them interpret the material.	Learners are encouraged to find and share their own resources with their classmates. Learners are provided with many different resources (journal articles, application user manuals, job aids, etc.)
3) Engagement	Material presented is situated in such a way that is becomes personally meaningful, which in turn helps with interpretation.	Learners are encouraged to share experiences from their own learning and make connections between the material covered and these learning and professional experiences.
4) Cooperation	Learners "collaborate" with peers.	Learners are engaged in two collaborative activities.
5) Inclusivity	Instructor models best practice, but coaches and supports learners in their own efforts.	The course design and delivery models a constructivist philosophy, which is at the core of the course.
6) Abstraction	Learners are encouraged to share prior experiences to the learning task to prepare them to transfer their interpretive skills.	<p>The first collaborative activity begins by having learners reflect on a prior learning experience as the basis for the transformation from a directed learning context to a constructivist one.</p> <p>Learners are required to maintain a Learning Log, whereby they reflect on their learning experiences (prior and current), reflect on how the course content relates to their learning experiences and how this will inform their future practice.</p>
7) Diversity	Complex problems are situated within different contexts so that learners develop the ability of understanding things from many points of view.	Learners are encouraged to think critically about the course material and subject matter, whether it is in in-class discussions or in answering questions posed as part of the weekly learning logs.

Learning Activities

Technology for Educational Change, as I teach it, involves learners in two types of instructional activities: (a) collaborative learning, and (b) personal reflection. Over the course of the thirteen-week semester, learners are engaged in two collaborative activities and maintain a personal learning log. A description of and rationale for each learning activity is provided in Table 1.4. Learning activities are identified in the first column of the table. A description of each task appears in the second column. The type of activity is designated in column three and a rationale for each is presented in the final column.

Collaboration

In my opinion, constructivist and learner-centred philosophical approaches include the use of collaboration. Much recent literature supports the integration of collaborative activities as essential components of this pedagogical orientation (e.g. Abrami & Bures, 1996; Bernard, et al, 2000; Brandon & Hollingshead, 1999 Chui, 2000; Clark, 2000; Cockrell, et al, 2000; 1999; Feather, 1999; Hiltz, 1998; Towns, et al, 2000). However, there appears to be little consensus as to how it might be labeled and defined. Terms such as group work (Huxam & Land, 2000; Turoff, 1999), small-group learning (Towns, et al, 2000), teamwork (Goby & Lewis, 2000) and most commonly, cooperative learning, are used to refer to the act of working with at least one other person to accomplish a task.

Table 1.4 Descriptions of and rationale for learning activities

Learning Activity	Description of task	Type of Activity	Rationale
Initial log-in and introduction	Each learner posts biographical “welcome” message to Welcome conference in FirstClass.	Individual activity, posted within FirstClass and included in learning log.	a) encourages development of a sense of community b) means for grouping students for the collaborative activities.
Benchmark	Description of the prior knowledge, experience and expertise with course content.	Individual activity, learning log entry.	Benchmark prior knowledge to facilitate the reflection process.
Learning Log entries (semi-weekly)	Document challenges encountered during the week and resolutions arrived at. Respond to guiding questions posted by instructor based on course readings/discussions.	Individual activity, learning log entry.	a) support reflective process b) Instructor’s diagnostic tool used to identify areas of confusion or need for further explanation of course material c) space for learners to identify challenges and concerns with the course.
Collaborative Activity 1:	Comparative analysis between directed instructional approaches and a constructivist framework. Individual and collaborative activity	Document individual experience of directed instruction, collaboratively convert one to a more constructivist approach, and compete self and peer assessment.	Associate prior experience with new theory. “Through participation in collaborative discussions, pre-service teachers are able to articulate and reflect upon their beliefs and evolving classroom practice.” (Barnett, et al., 2002)
Collaborative Activity 2	Design a learning activity involving computers.	Collaboratively design phase and self and peer assessment.	Provide learners with an activity that allows them to put everything that they have learned into a product that they may actually be able to use.
Self and Peer Assessment	Learners assess themselves and each peer in their group based on a set of criterion. The average of peer and self assessed contribution scores are factored into calculating each learner’s final grade.	Individual assessment of self and peers	a) A means of giving each learner a grade based on what he/she actually contributed to the group effort. b) promote responsibility for their own learning as well as that of their peers. c) Provide pre-service teachers with authentic assessment experiences.
Reflection Paper	Learners review Benchmark and Learning Log entries in order to answer a series of guiding questions about their learning experience.	Individual activity	Guided self-reflection of individual learning outcomes and experiences.

Many authors use the terms cooperative and collaborative learning interchangeably (e.g. Abrami & Bures, 1996; Towns, et al, 1998; Chui, 2000), where others have defined a clear distinction between the two terms (e.g. Abrami, et al., 1995; Bernard, et al, 2000; Bruffee, 1995; Matthews, et al, 1995; Panitz 1997; Roshelle & Teasley 1995). While both cooperative and collaborative learning involve learners being engaged in working with other learners in the completion of a task, they can be distinguished in the following two ways; (a) the structure of the learning activity, and (b) the power structure between learners and the course instructor.

Within a cooperative learning environment, learning tasks are highly structured by the teacher and students complete the task simply by dividing the workload, and bringing individual parts together to create the whole (Abrami, et al., 1995; Bernard, et al., 2000; Brandon & Hollingshead, 1999; Cockrell, et al., 2000; Matthews, et al., 1995). In contrast, collaborative learning activities rely more on the learners to initiate and orchestrate their joint efforts. Furthermore, students continually work together to solve a problem or complete an assignment. (Abrami, et al., 1995; Bernard, et al., 2000; Brandon & Hollingshead, 1999; Cockrell, et al., 2000; Matthews, et al., 1995). This does not mean learners do not have some sort of division of labour within the context of a collaborative learning activity. Learners do assume roles, however, their contributions are not restricted to these roles. All group members are expected or required to continuously contribute and work towards the common group goal. For example, individual learners may assume the role of researcher, editor, and writer/compiler, yet all members should be involved in the on going researching, writing and editing of a group paper.

These differences between cooperation and collaboration lead to a restructuring of the power relationship between learners and educators. While the teacher remains the ‘boss’ within a cooperative environment, in a collaborative orientation the learner assumes more responsibility for decision-making. Establishing a collaborative learning climate also emphasizes “purposeful talk” and requires openness and shared responsibility between learners and teachers (Abrami, et al., 1995). Therefore, for collaboration to work effectively it is necessary to provide learners with an environment that encourages open dialogue and where learners feel comfortable expressing themselves.

Within the context of *Technology for Educational Change*, I have established an environment that is more collaborative than cooperative in nature. However, I recognize the way in which my learners engage in ‘group work’ does not completely conform to pure collaboration as characterized above. The learning activities are not highly structured, in that learners have the freedom to decide how they will approach the task at hand, which is very characteristic of collaborative learning. Learners are, however, assigned to groups as opposed to assignment through self-selection. Although much of the literature I reviewed on collaborative learning seemed to support instructor formed groups (Bernard & Lundgren-Cayrol, 2001; Chui, 2000; Cockrell, et al., 2000; Feather, 1999; Towns, 1998; Towns, et al., 2000; Turoff, 1999), it has been my personal experience that self-selected grouping is the most common approach used by instructors. This often results in problems within the group dynamic and could account for the pessimistic feelings many learners have about working collaboratively for grades. Huxam and Land (2000) suggest that this phenomenon may be due to the lack of skills needed to

work in groups. According to them, “Without explicit instruction in and practice of these skills, many groups will not operate well” (p. 17). A possible solution could be found in the engineering of groups. If instructors can form collaborative groups of compatible or complementary individuals this conflicting group dynamic might be avoided.

The power structure in *Technology for Educational Change* is characteristic of a collaborative learning environment, where open-dialogue among learners and between learners and the course instructor is central to the success of the course. Opportunities for discussion and the sharing of opinions are built into the course design. Moore (1998) identifies three types of interaction in a DE learning environment (a) learner- learner, (b) learner-content, and (c) learner- instructor. These types of interaction are facilitated in the course design through the creation of course conferences to serve these specific needs. For example, learner-learner interaction is promoted by providing learners with (a) the ‘Help’ conference where learners can post questions and respond to each other’s queries. and (b) the ‘Groups’ conferences, created specifically for each collaborative group but open to all learners enrolled in the course. The learner-instructor interaction is promoted through the use of personal learning logs where learners are encouraged to share their feelings about the course and course content on an on-going basis. The public course conference areas provide a space where interaction among all participants is encouraged, including students, instructor and the teaching assistant. Finally, the ‘Course Library’ conference contains all course readings and supplementary resources (e.g. user manuals, study guides), which would constitute the learner-content interaction, especially since learners are encouraged to share resources by placing them in the ‘Course Library.’

Bruffee (1995) suggests that within a collaborative learning context, learners should assume the role of assessing individual group members' process. This sentiment is echoed by Winnie Cheng and Martin Warren (2000) through their recognition of using peer assessment as a means of reducing 'free-loading' or 'social-loafing' in group work through the "individualizing of students' grades in a collaborative context." This element was researched and integrated into *Technology for Educational Change* by the previous course instructor (McEwen, 2002). Learners are not only provided with a grade on their group product, but their process and individual contributions are factored into the calculation of their final grade for each of the collaborative assignments. Learners are given a percentage of the group product score based on the quality of their contributions toward the final product. The individual grades are calculated by weighting the group product scores by the average of each learner's self and peer assessment scores. Self and peer assessment scores are based on a rubric negotiated by each forum. An example of the assessment criteria used for their self and peer assessment is provided in Table 1.5. The first column presents the criteria the Forum 4 negotiated and agreed upon. In the second column, the group's definition or description of each criterion is presented. The formula used to calculate learner grades, as well as an example of how the self and peer review scores factor into the final product score to determine the individual grade is provided in Table 1.6. The first column of the assessment rubric table contains Forum 4's assessment criteria. The second column contains the learner's self-assessment for each criterion. Finally, the third and fourth columns contain the peer review scores from each peer. The formula table shows exactly the result of factoring the self and peer review scores into the calculation of the individual grade.

Table 1.5 Forum 4 rubric for self and peer assessment.

Criterion	Definition/Description
Quality of work	- More than minimum - Usefulness of expressed ideas - accuracy and clearness of information
Participation	- Amount of feedback/input - Amount of devotion
Positive reinforcements	(Group did not define)
Respecting goals	- Punctuality!!! (deadlines-posting, attendance)
Roles	- Duty fulfillment - Initiative

Table 1.6
Calculating individual contribution score for collaborative activities.

Assessment Rubric			
Assessment Criteria	Self	Peer 1	Peer 2
Quality of work	H	M	M
Participation	M	M	M
Positive reinforcement	M	M	M
Respecting goals	H	M	L
Roles	H	M	M
Global Ratings	4/5	3/5	3/5

Formula for calculating individual grade				
Average of Self and Peer Review Score	X	Group product score	=	Individual grade
3.33/5		18/20		12/20

Promoting Collaborative Learning

It is essential for collaborative and cooperative learning activities be well designed for learners to capitalize on the benefits of this type of learning. Johnson et al. (1991) outlined five elements that promote cooperative work in face-to-face groups, which Brandon and Hollingshead (1999) believe can be applied to on-line collaborative groups. These elements include (a) individual accountability, (b) face-to-face promotive interaction, (c) social skills, (d) group processing discussions and (e) positive interdependence.

Great care was taken in the design of the collaborative activities and learner interaction to ensure that these elements were adequately addressed. The incorporation of the semi-weekly Learning Logs, and the self and peer assessment component ensures allows learners to reflect on (a) who is contributing what to the group effort (individual accountability), (b) the quality of each group member's contributions (promotive interaction), (c) the "smoothness" of interaction among group members (social skills), and (d) group functioning on an on-going basis (group processing). Being aware that learners do not always possess the necessary social skills for working with others, the learners build up to the two collaborative activities that constitute about 45% of their final grade. During the second week of the semester, learners meet face-to-face during class time to discuss their personal learning goals for the course and agree on a list of group goals for the collaborative activities. The class prior to the beginning of the first collaborative activity, learners meet with their group to negotiate the assessment criteria that they will use for the self and peer assessment. Brandon and Hollingshead (1999) suggest four types of interdependence, (a) goal, (b) reward, (c) resource and (d) role. To

incorporate positive interdependence in the course design, learners are asked to include their prior experiences with collaborative learning or working in groups, and with learning with technology in the Benchmark activity. Throughout the semester, learners are asked to reflect on their experiences with learning within the context of collaborative learning, a learner-centered environment and the use of technology. These exercises are incorporated in an attempt to foster a sense of value for using these techniques, both as future educators and as learners.

Reflective Practices

As teacher educators we prepare future teachers to become educational leaders who are open to different perspectives, whose instructional decisions draw on multiple sources of information that is responsive to the capabilities and needs of diverse learners. (Risko, et al., 2002)

This description of our role as teacher educators is parallel to the beliefs concerning the need to teach future practitioners to be reflective learners, which is most notably outlined in *Educating the Reflective Practitioner* (Schon, 1987). Schon suggests that successfully bridging the gap between theory and practice requires engagement in reflective practice.

Reflection can be defined as the process of reviewing, reconstructing, revisiting and critically analyzing one's own performance (Shulman, 1987). Evidence that emerges from this process is used to ground explanations, beliefs, or knowledge, which leads to consequences (Shulman, 1987; Zeichner & Lipston, 1987). Dewey (1987) suggests the process and outcome of reflection are interrelated and "involves not simply a sequence of ideas, but a *con*-sequence – a consecutive ordering in such a way that each determines the next as its proper outcome, while each outcome in turn leans back on, or refers to, its

predecessors” (p. 4). Dewey further distinguishes reflective thought from other types of thinking in that it requires two phases; “(1) a state of doubt, hesitation, perplexity, mental difficult, in which thinking originates, and (2) an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity” (p. 12).

Why use reflective practices?

While Argyris and Schon (1974) believe that “all human beings need to become competent in taking action and simultaneously reflecting on this action and learn from it” (p. 4), this appears to be especially true in teacher education (Ferguson, 1989; Newman, 1996; Risko et al., 2002; Zeichner & Liston, 1987). Why might it be so important to include reflective practices in teacher education? If we consider the current reform to the Quebec Education system, we have seen that changes such as these have been met with resistance from in-service teachers. This could be attributed to what Ferguson (1989) refers to as being the problem with teacher education programs that focus on technical competence rather than on reflective practices. It produces individuals who only see one possible way of teaching, the way in which they were taught. This, in turn, restricts “their capacity to reflect upon a range of possible decisions and activities available in teaching” (Ferguson, 1989, p. 36). Therefore, providing pre-service teachers with the opportunity to confront their own beliefs about teaching and previous experiences, while adopting new perspectives, can lead to a deeper understanding of teaching (Barnett, et al., 2002; Risko, et al., 2002). By adopting reflective practices, pre-service teachers enhance their ability to think flexibly and objectively about problems, which enables them to learn from their own practices, enhance their ability to make connections between theory and practice, allowing them to learn from and about their own teaching (Risko, et al., 2002).

CHAPTER 2

This Study and Its Purpose

With the changing demands in industry and academia, partly due to the infiltration of accessible electronic media, learning is moving away from a solitary act, characterized by memorization and exams, to a social arena where learners dictate how and when they learn. While experts insist that a learner-centered education, driven by collaboration, is essential, learners do not seem that easily convinced. Why do so many learners shudder at the mere suggestion of group work? Past experiences riddled with freeloaders, wasted time and the feeling of ‘doing it all myself’ are leaving learners weary of such approaches. Could the use of computer conferencing systems change this view, by bringing collaboration out into the open where freeloaders are easily identified and all contributors are made accountable for their contributions? My purpose in conducting this research was to determine whether certain components or aspects of the collaborative process are more conducive to an on-line learning environment while others are more suited to a face-to-face learning environment.

Why use collaborative learning?

The tendency towards the increased incorporation of collaborative learning can be attributed to several studies demonstrating the benefits of this type of learning over more traditional methods (Hiltz, 1998). Collaborative learning benefits learners on an academic, cognitive and social level. It is believed that the use of collaboration can (a) promote student learning and achievement (Brandon & Hollingshead, 1999; Cockrell, et al., 2000; Hiltz, 1998), (b) nurture the development of critical reasoning skills (Brandon & Hollingshead, 1999; Cockrell, et al., 2000), (c) encourage more frequent generation of

ideas (Brandon & Hollingshead, 1999; Cheng & Warren, 2000; Chui, 2000), and (d) foster greater transfer of learning (Brandon & Hollingshead, 1999) and engagement of cognitive experiences (Cockrell, et al., 2000). According to Cheng & Warren (2000) the social benefits of exposing learners to collaborative activities include the development of interpersonal relationships and individual responsibilities as well as the development of the personal transferable skills' of communication, presentation, problem solving, leadership delegation and organization. All of these skills could be considered vital for successful future educators.

Computer Supported Collaborative Learning

Could pre-service teachers engaging in the collaborative process benefit from the use of computer-mediated communication? Computer supported collaborative learning (CSCL) can be defined as the use of computer technology to facilitate group learning. Brandon and Hollingshead (1999) further characterize CSCL as the amalgamation of "classroom-based collaborative learning theory with theory and research on computer mediated communication (CMC) in order to provide a foundation for understanding how CMC-based group projects can enhance learning."

The literature supports numerous benefits in using CSCL, most of which capitalize on the asynchronous nature of computer conferencing systems used for computer mediated communication (CMC). These benefits can be summarized by addressing four major issues of collaboration: a) time and space; b) efficiency; c) individual accountability; and d) creation of a social context for learning.

Time and space. Collaboration within an asynchronous conferencing system allows learners to contribute to a group effort when it is convenient for them to do so

(Turoff, 1999; Weasenforth, et al., 2002). Since active engagement in the collaborative process is not restricted by time or space, asynchronous communication encourages reflection rather than spontaneous thinking (Abrami & Bures, 1996; Edelson, 2000; Turoff, 1999; Weasenforth, et al., 2002). This is beneficial not only for learners who maintain unusual or busy schedules (e.g., job and/or family) but to those students for whom the language of instruction is not their first language. This is especially true when technology is integrated over an extended time frame, students learn to “interpret and produce contextually appropriate language by recognizing, deconstructing, and analyzing texts they encounter” (Weasenforth, et al., 2002). Furthermore, this promotion of learner reflection on course content encourages learners to take responsibility for their learning, promotes careful deliberation, which in turn, encourages critical thinking (Weasenforth, et al., 2002). This extension of course content outside of the classroom in terms of time and space also provides more learners with the opportunity to share their ideas and opinions or ask questions. During a face-to-face encounter, only one learner can speak or be heard at a time. With the use of asynchronous communication learners do not have to wait for their turn to be heard, or even wait for class time for that matter. It engages learners in discourse “without fear of overt intimidation by bullies or egotists who often interrupt the most and speak the loudest in face-to-face discussions and traditional classroom settings” (Sotillo, 2000, p.84).

Efficiency. In the description of my experience with collaborative learning above, I commented on the struggle to stay on task during face-to-face group meetings, which tended to make this process unproductive. This challenge is not a product of collaborating face-to-face; rather it is the result of communicating within any synchronous, or real-

time, environment. In my capacity as teaching assistant and instructor of the DE section of *Technology for Educational Change* I observed the same frustrations and complaints by learners who used the FirstClass® ‘chat’ function. However, learners who collaborated solely by posting messages (asynchronous) to their group conferences seemed to feel more productive. According to Turoff (1999), this is related to the volume of communication. “Anything that reduces the need for comments or messages that have nothing to do with the meaningful discussions underway allows greater productivity of the resulting discussions without information overload setting in” (Turoff, 1999). Sotillo (2000) further speculates that even synchronous CMC is more efficient in terms of time on task than ordinary classroom discourse.

Accountability. The increased use of written communication associated with the use of asynchronous CMC (Abrami & Bures, 1996; Edelson, 2000) provides learners and facilitators with a record of communication, which provides evidence of the collaborative process as well as individual contributions (Abrami & Bures, 1996; Turoff, 1999). In such a social context, being aware of and giving credit for the process learners are engaged in while completing an assignment is invaluable. The recognition of individual contributions can increase students’ sense of accountability, responsibility, initiative, participation and interaction (Brandon & Hollingshead, 1999; Edelson, 2000; Feather, 1999; Turoff, 1999). Increases in learners’ rates of interaction can foster greater communication with peers and discussion of course concepts (Brandon & Hollingshead, 1999), which in turn, fosters greater learning and higher levels of performance (Brandon & Hollingshead, 1999; Hiltz, 1998).

Social context for learning. Finally the greatest benefit in using CSCL is the social context it provides for learning. In CSCL, the social creation of knowledge is emphasized as the bases of learning. “The interactive and collaborative nature of asynchronous technology allows students to share perspectives and experiences, to establish relationships, to seek assistance.” (Weasenforth, et al., 2002, p. 59) Within such a context, meaning is negotiated and developed among group members. Brandon & Hollingshead (1999) speak to the impact of the social context on the learning process. “The social context in which collaboration and communication occur inherently influences learning and the on-line environment can offer a stronger sense of context than the standard classroom.”

Personal Background

My experience as a learner

As an undergraduate student, I hated working in groups. I did not see the benefits of working in this way and often opted to work alone when I had the opportunity to do so. I found group meetings to be unproductive since we rarely stayed on topic and accomplished little. I found group work to often be unfulfilling due to feelings of being stifled by and resentful of my group members.

Like many learners, I often found myself being left doing all the work while others received equal credit for it. During my last semester, after a series of unsatisfactory experiences with on-line learning, but with a great interest in computer technology, I registered for the DE section of *Technology for Educational Change*. While skeptical of collaborating on-line with people I had never met, I found it to be a very exciting

experience. I was finally given credit for the efforts I invested in the group product, and I felt that my academic strengths were exploited.

As a graduate student and instructor of *Technology for Educational Change*, my views of the value of collaboration had changed, in theory but not in practice. At the beginning of my graduate studies, I became even more dominant in group settings and did not trust my peers to complete the tasks to my specifications. I came to recognize that the resentment and feelings of being stifled by group members stemmed from my need to be in control. I found myself purposefully being part of groups who would allow me to assume the role of group leader, which resulted in a role as more of a dictator.

Practice into Theory: My experience as an instructor

Through my experience as co-instructor I realized that this was rather hypocritical and in working in a successful collaborative activity with a person I trusted and respected, I realized that my issue about working with others was the loss of control over the task. In my capacity as a teaching assistant and later co-instructor of *Technology for Educational Change*, I was able to observe learners engaged in collaborative settings that were based on the theories of collaboration. These observations, removed from my own personal experience, gave me insight into what in fact makes collaboration effective and how the theory can be put into practice while maintaining learner satisfaction and enjoyment of the process. This provided me with a greater insight into the benefits of collaboration. Over the course of the semester I saw evidence of the potential for using on-line collaboration in a face-to-face course.

On-site versus on-line

Although computer-based distance education has been around for decades (Phipps & Merisotis, 1999), the literature, 'experts' and sceptics alike, harp on the need to highly scrutinise the practice. However, this type of in-depth reflection on good practice should not be reserved for this medium. All educators and policymakers should undergo the same sort of reflection as to why they have made the decision to use the materials, tools and approaches they implement.

The issue of best practices is central to this study. It seems that we have come to view instructional and pedagogical approaches dichotomously: Directed learning or constructivism; Teacher-centred or learner-centred; Individual work or group work; On-site or at a distance. With each swing of the pendulum we move from one pedagogical extreme to the other. However, many educators do acknowledge that the best approach may be a combination of individual work and group work, lecturing, some discussion and discovery learning.

I believe it is time to include a combination of on-site and on-line learning into the learning context. This was Murray Turoff's (1999) suggestion in his presentation, *An end to student segregation: No more separation between distance learning and regular classes*, at the Telelearning 99 meeting. "It is my view that it is not the distance student who is being mistreated in this segregation but probably the face to face student. Then again, maybe the student sitting in a 500 person lecture hall is also a type of distance student even in the face-to-face class." (Turoff, 1999) I believe a move towards this 'desegregation' could be especially beneficial for collaborative learning activities.

Previous studies comparing instructional effectiveness or learning outcomes of distance education and traditional classroom learning found no significant difference between the two environments (Smith & Dillon, 1999; Shulman & Sims, 1999). I believe this is an unproductive comparison; our focus should be identifying the aspects of each environment that are more conducive to the learning process. Smith and Dillon (1999) support this approach and believe that an important element in comparative research design in this area should be to “describe the attributes of these variables based on how they might contribute to learning.” In his paper, *Virtual and face-to-face learning: Meeting points*, Edelson (2000) reflects on his experiences as an on-line and face-to-face instructor and pinpoints the elements of each environment that he feels are most beneficial to his teaching and his students’ learning process. Edelson (2000) focused his reflections on “...course structure, content and materials, class interaction, assignments and grading, modes of presentation, quality issues for students and instructor, and satisfaction” (p. 1).

Research Questions

In my pursuit to better understand the benefits of using on-line and face-to-face collaboration, and to inform future practice and course design, I explored the following research questions:

1. Do students enrolled in an undergraduate course on the theory and practice of integrating technology into the classroom, perceive their collaborative learning group to be more productive within an on-line collaborative learning environment or an on-site collaborative learning environment?

2. What elements of the more productive environment contribute to these feelings of increased productivity?

Using a mixed-method research design and case studies

In attempting to answer the research questions outlined above, I used a mixed-method research design. According to Creswell (2002), a mixed-method research design is one whereby both quantitative and qualitative data are collected in a single study, and data are analysed and reported based on precedence and sequence of presentation of information. By incorporating both quantitative and qualitative data in a study, a more complete picture of the phenomenon can be presented, since the strengths of both methods are used (Creswell, 2002). It was important that this study have a qualitative element since, according to Towns, et al. (2000), a qualitative approach to research is best suited to studying group learning. This approach can uncover student perspectives of group learning activities since methods of data collection and analysis are geared toward building an understanding of what people do, know, think and feel through what they say, write or do.

There are three types of mixed-method design: (a) triangulation, whereby qualitative and quantitative data are collected simultaneously and merged; (b) explanatory, whereby first quantitative data is collected and qualitative data are collected later to explain or elaborate on the quantitative data; and finally the (c) exploratory, whereby qualitative data are collected and quantitative data are used to establish relationships within the qualitative data collected (Creswell, 2002).

A triangulation research design was used in this study. Creswell (2002) categorises the use of triangulation as a comparison of the quantitative and qualitative data, to find associations, and agreements and/or disagreements among them. According to Creswell (2002) this design allows researchers to discuss themes that emerge and how they support or refute the statistical data, and/or by quantifying qualitative data so that it can be compared or so that frequencies can be determined.

Merriam (2001) defines the case study method as “an intensive, holistic description and analysis of a single instance, phenomenon, or social unit” (p. 27). Merriam (2001) suggests that a case study method is ideal when attempting to explain “how” and “why,” when variables are so embedded in the situation as to be impossible to identify ahead of time. According to Miles (1990), the traditional process for writing a case study is a process involving (a) the collection of extensive data through interviews, observations, and available document, (b) the categorisation of data according to an emergent coding scheme as the study proceeds, (c) the storing of data in a retrievable format, and finally (d) the reduction and analysis of data into a written narrative.

While Creswell (2002) and Merriam (2001) have outlined several types of case studies, I have chosen to use Miles’ (1990) procedures for pre-structured cases. The pre-structured case study begins with a conceptual framework and research question, the design of specific instruments, sampling specifications and the creation of a case outline prior to data collection.

CHAPTER 3

Planning

Learners and consent for participation

The participants in this study were undergraduate students registered in both the on-site and DE sections of the course *Technology for Educational Change* during the fall semester of the 2002-2003 academic year. The on-site group was the primary participants of the study, having completed collaborative activities for the course face-to-face as well as on-line. My decision to limit primary participation in the study to the on-site group was based on two important considerations. The first was that participants in the DE section would by necessity be required to compare current learning experiences with reflections about past courses. This situation raised questions about the reliability of learners' memories of past learning experiences. The second and related consideration was the design and implementation of the past collaborative activities upon which learners' memories would be based. Given the dynamic nature of collaborative learning arrangements, it was highly unlikely that different instructors would adopt similar enough strategies to make such comparisons worthwhile.

Although primary participation was limited to the on-site section, data were also collected from the DE section. As both sections completed the same learning activities, this secondary data from the DE section was deemed potentially valuable as it might provide insight into the reported comments made by learners in the on-site section.

In the *Study Guide*, purchased or downloaded by learners during the first week of classes, I included a description of the research study and how it related to the course (Appendix A). Learners were also informed of my status as a graduate student at the beginning of the semester and that my area of interest and research focused on collaborative learning. Learners were asked to consent to participate in my research after November 22, 2002 upon having completed the second of two collaborative activities. (See Appendix B for a copy of the consent form.)

Learners were informed that the research would involve no additional commitment beyond the required course activities and that the instructor/researcher would not have access to the consent forms until after final grades had been submitted and approved by the Chair of the Education Department. Learners were instructed both in the *Study Guide* and in the consent form, to contact my thesis supervisor or me with any questions or concerns about the research being conducted. The learners were informed that participation in the study was completely voluntary and that they were free to withdraw at any time, either by contacting my thesis supervisor or me. Our contact information was included on the consent form as well as in the *Study Guide*.

Data Collection

To encourage learner participation, all data collection was incorporated into the design and assessment of the course. Three major data sources were collected; (a) learner interaction in FirstClass® course and group conferences during the two collaborative activities, (b) all material contained in the learning logs, including weekly reflections and answers to guiding questions, 'lab activities', group meeting logs, and self and peer assessment forms, and (c) final individual reflection papers. All assignments completed

during the course of the semester are submitted on-line in designated folders within the class conference in FirstClass®. Each learner had their own Learning Log folder where they submitted their Benchmark, semi-weekly Learning Logs, self and peer assessment forms and Reflection Paper. A 'Drop-box' was created for learners to submit their group products at the end of each collaborative activity. This facilitated the collecting, organizing and storing of data used for the study.

It is important to note that the activities used as the basis for data collection were not specifically designed for the purpose this study. Originally designed by the teacher's assistant, the on-line activities being used were developed for the DE section of *Technology for Educational Change* during the winter semester of the 1999-2000 academic year (Bernard, 2000) and further revised during the fall semester of the 2000-2001 academic year (McEwen, 2001). The learning logs and reflection paper were conceived at the same time; however, they were modified based on feedback from past learners.

Learner Interaction

Over the course of the semester, learners were required to participate in two collaborative activities, both of which were completed on-line for the learners in the DE section. However, for the on-site section a counterbalanced research design was used whereby half the class collaborated on-line during the collaborative activity, while the other half collaborated face-to-face. This was switched for the second collaborative activity (those who collaborated on-line for first activity, collaborated face-to-face and vice-versa). Table 3.1 provides a layout of this design. The order in which groups collaborated on-line and on-site is designated in the first column of the table. Groups or

Forums are identified in the second column. This design provided students with the opportunity to collaborate within both environments and to try to ensure that the differences in productivity are truly due to the environment and not based on characteristics of the tasks.

Table 3.1 Counterbalanced Design for Collaborative Learning Activities

Learning Environment	Forums
On-line → on-site	A, C, E, G, & I
On-site → on-line	B, D, F, H, & J

Learner interaction was observed and documented during both two-week long collaborative activities, and individual learner contributions to the group product were then calculated. Individual grades for collaborative learning activities were determined using the assessment model designed by McEwen and Sclater (2002). Prior to the start of these activities, the learners negotiated the assessment criteria that was used as a basis for their self and peer assessment (McEwen, 2002). Each learner assessed their contributions to the group product as well as the contributions of their peers, by assigning high, medium or low for each criterion and providing justification for this assessment. Learners were then required to assign a global grade out of 5 for each group member. The process grade for each learner was determined by calculating the average of the self and peer assessment grades. This figure was then used as a weighting factor and multiplied by the group product score to attain individual grades. Therefore, learners received only the percentage of the group product grade that he/she contributed to the final product.

The first on-line activity was a comparative analysis between directed instructional approaches and a constructivist framework. This activity had three

components: (a) individual experience of directed instruction; (b) converting one of the individual experiences to a more constructivist approach to learning; and (c) self and peer assessment. The individual component entailed each group member describing, in detail, a personal learning experience of directed instruction. From this collection, the group chose one of the personal learning experiences to use as the basis for designing an instructional experience in the constructivist tradition. The second on-line activity consisted of designing a learning activity involving computers. This activity only had two components: (a) design phase, and (b) self and peer assessment. Every member of the group was expected to create a draft proposal for an activity. The group chose one of the draft proposals to expand upon. Strict guidelines were provided as to the scope of the design but groups had freedom in regard to the educational level, resources available and type of content to be covered.

Research Design

Given the data collected and the research questions previously outlined, I conducted a within condition as well as a cross condition case study analysis. I began by conducting a content analysis of the data collected. Through this content analysis, elements of effective collaboration emerged and served as a means of categorizing learners as well as the different elements of effective collaboration per environment. An outline of the data collection timeline is presented in Table 3.2. The weeks in which data were collected from learners is indicated in the first column of the table. The name and type of learning activity appears in the second column. Measures derived from each specified activity are described in the final column.

Table 3.2 Data Collection – Timeline and Description

Week	Learning Activity	Measure
Week 3	Learning Log #1: Individual reflection	Benchmark of prior experience with collaborative learning <ul style="list-style-type: none"> • What is collaborative learning? • What is your experience with collaborative learning? (For this question I encourage you to provide examples from personal experience, as a student or as an educator, working in collaborative learning groups.) (Content analysis)
Week 5	Collaborative activity #1 – Part 1: Individual reflection	Directed learning experience (content analysis)
Week 8	Collaborative activity #1 – Part 2: Collaboration	Group final product (Measure achievement)
Week 8	Learning Log week # 8 Individual Reflection	<ul style="list-style-type: none"> · Challenges faced this week. · How did you overcome/resolve these challenges? How would you avoid or handle a similar situation in the future? (Content analysis)
Week 9	Collaborative Activity #1 – Self & Peer Assessment Individual reflection	Satisfaction with self and peer contributions to group product (Content analysis)
Week 10	Learning Log week # 10 Individual reflection Groups switch learning environments.	<ul style="list-style-type: none"> · Challenged faced this week. · How did you overcome/resolve these challenges? How would you avoid or handle a similar situation in the future? (Content analysis)
Week 11	Collaborative Activity #2	Group final product (Measure achievement)
Week 12	Collaborative Activity #2 – Self & Peer assessment Individual reflection	Satisfaction with self and peer contributions to group product (Content analysis)
Week 12	Learning log week #12 Individual reflection	<ul style="list-style-type: none"> · Challenged faced this week. · How did you overcome/resolve these challenges? (Content analysis)
Week 13	Reflection Paper: Individual reflections about personal learning experience	Question from Reflection Paper guidelines: <ul style="list-style-type: none"> - Looking back at your description of your personal experience with collaborative learning, how has this changed? Has it? Do you think that your experience collaborating face-to-face is different from collaborating on-line? - Review your sections on "Challenges faced" and "Resolutions". What have you learned about yourself throughout the semester? What have you learner about the way you learn? Are you satisfied with your performance? If you had the chance to begin again what if anything would you do differently? · Finally, reflect upon how much time and energy you invested in this course- do you feel you gained as much as you invested? What do you think this says about learning within this medium? (Content analysis)

A Within Condition Case Analysis

I conducted a *within condition case analysis*, whereby the condition was the learning environment. Within each learning environment (face-to-face and on-line), I compared elements of perceived collaborative effectiveness to determine whether learners reported similar or different aspects of effective collaboration based on the order of the learning task, when the learning environment was held constant (Figure 3.1).

Figure 3.1 Within Condition Case Analysis

Learning Environment	Order of Activities	
Face-to-face	1 Forums B, D, F, H & J	→ 2 Forums A, C, E, G & I
On-line	2 Forums B, D, F, H & J	→ 1 Forums A, C, E, G & I

Cross condition case analysis

I also conducted a *cross condition case analysis*, whereby I compared elements of perceived collaborative effectiveness to determine whether learners reported similar or different aspects of effective collaboration based on the learning environment, when the order of the learning task was held constant (Figure 3.2).

Figure 3.2 Cross Condition Case Analysis

Learning Environment	Order of Activities	
Face-to-face	1 Forums B, D, F, H & J	2 Forums A, C, E, G & I
On-line	2 Forums B, D, F, H & J	1 Forums A, C, E, G & I

CHAPTER 4

Implementation

Participation

Consent

Prior to the last class of the fall 2002 semester, I once again explained to the learners that I would be seeking participants for my thesis research. I informed learners of my intent to distribute consent forms during the following class, and that these would also be available on-line. Learners were reminded that participation in the study was voluntary and that I would not know who had consented to participate until after the course grades were submitted to and approved by the Chair of the Department of Education. The following class, I asked for a volunteer to distribute the consent forms (Appendix C) and left the room. This method is traditionally used at Concordia University for course/teacher evaluations. Once all consent forms were returned, the envelope was sealed and a learner was asked to sign across the seal of the envelopes. Learners were informed that a fellow student in Educational Technology would keep the envelope, and his office number was provided to them, in case they wanted to verify that I had not in fact seen the consent forms prior to submitting the final grades. Similarly, learners who preferred to consent on-line, or who were absent during the class in which the consent forms were distributed, submitted their consent forms to a secured 'drop-box' within the FirstClass® course conference. This conference was a protected space to which I did not have access until after the course grades had been approved.

The final grades were submitted to the Chair of the Department of Education on December 20, 2002 and approved on December 23, 2002. I obtained access to the print-based consent forms as well as the 'drop-box' in FirstClass® during the first week of January 2003. Twenty-two learners consented to participate in the study. This represents a 61% participation rate. Of the twenty-two learners who consented to participate, twenty-one completed a print-based consent form only one submitted an electronic consent form.

Pseudonyms

Since I have assumed the role of course instructor and researcher, it was important that the identities of the learners be protected to reduce bias in the interpretation and coding of the qualitative data. A third party assigned pseudonyms for the learners and randomly assigned a number to each Forum. Table 4.1 is a distribution of the learners according to Forum assignment. Learner's names were replaced with the pseudonym in the data collected.

Table 4.1 List of Participants According to Forum Membership

Forum 1	Forum 2	Forum 3	Forum 4	Forum 5
Amber	Beatrice Bonny	Carley Cathy Cindy	Denise Debby Daniel	Edna Ellie Emily
Forum 6	Forum 7	Forum 8	Forum 9	Forum 10
Fred Franka Francine	Hailey Hope Heather	Ingrid Ida	Julie Jane	(no one from this Forum consented)

Data Collection

In the consent form, learners were informed that data for the study would be drawn from their group interactions, collaborative activities, self and peer assessment forms,

benchmark assignment, ‘weekly’ entries to learning logs and reflection papers. Although all of the data were collected and considered, only entries for weeks 8 and 12 of the Learning Logs and Reflection Papers were considered for this study. As the data analysis progressed, it became increasingly important that the text units were in fact learner perceptions and not researcher interpretations of learner attitudes. The learning log entries that contained ‘Challenges Faced and Resolutions’ sections were deemed ideal data sources as learners clearly articulated their perceptions of and attitudes about collaboration upon completing their collaborative activities. Table 4.2 indicates when logs were submitted and organized by the order/environment in which the learners completed the learning activities.

Table 4.2 Learning Logs 8 & 12 and Environment

Environment	Learning Log Week 8:	Learning Log Week 12:
On-line	Forums 3, 4, 5,7, & 8	Forums 1, 2, 6, 9, & 10
On-site	Forums 1, 2, 6, 9, & 10	Forums 3, 4, 5,7, & 8

Excluded data

Weekly Learning Logs. Responses to the ‘weekly’ guiding questions were not considered in this analysis as learners’ responses were based on their role as future educators. Their reflections and opinions were about the use of technology and learning theories with a K-11 student population who could be considered to have very different needs and capabilities than adult learners.

Self and Peer Assessment. The self and peer assessment forms were not included in this analysis as each Forum was responsible for negotiating criteria that were specific to the needs of their group goals. This lack of standardization across the Forums meant that it would not be possible to make generalizable assumptions about group processing.

Observed Interaction. On-line interaction during the collaborative activities was excluded for several reasons. First, I could not observe group interaction during the on-site collaborative activities. Therefore I had nothing to compare the observed on-line interaction with. Learner reported group processing and interaction was deemed a more appropriate option as the process was standardized across both environments. The second reason for the exclusion of observed on-line interaction was that full group participation was rare. In fact, only in three cases was consent of all group members secured. Given that such a situation would require the exclusion of contributions of non-consenting, fragmentation of the interaction could be expected to negatively impact any interpretation.

Collaborative Activities. The collaborative activities were excluded since there were very few Forums where all members consented to participate. Attempting to establish what could be included would have been an arduous task with great potential for misrepresentation and ethical implications. For example, if one learner agreed to participate but a group member who had not consented submitted the final assignment, could the document be included? What about in cases where the learners divided the labour whereby each group member was responsible for completing a section of the final product? Must I exclude the part of the assignment produced by a learner who did not consent? These important issues aside, the final group products do not add additional insight into learner's perceived attitudes towards collaboration.

Benchmark Assignments. The benchmark assignments were excluded, as they were not reflective of learners' perceived attitudes about on-site and on-line collaboration as used in Technology for Educational Change, the purpose of this case study. While these data do provide a benchmark of learner general attitudes concerning collaboration, on-line learning and the use of technology, they did not provide additional insight to the focus of this study.

Method of Analysis: Qualitative

Content Analysis

Many stages were involved in the analysis of the qualitative data for this study. The first step involved coming up with an idea of what I would be looking for in the data. I came up with a variety of possible themes and subsequent codes. After establishing this starting point, I coded all submissions from one learner. I realized that there were (a) too many codes, and (b) they did not adequately address what I was observing. Having a feel for the data, I decided to recode allowing codes to emerge rather than limiting my coding to certain pre-established themes. After coding the first document, I went through the codes that emerged, defined them, and collapsed and added codes as necessary. I continued to code the work of an additional three learners and continued to refine the codes. After coding four learners, I created a codebook, which contained, the themes, codes, a description of each code, the assumption for each code and an example from the data (Appendix D). At this stage of the coding, the benchmark, reflection paper and all learning logs were included.

The next stage of coding involved recoding all data. While a lot of interesting information came out of the first coding session, there were far too many codes and the themes had strayed too far from the purpose of the study. I therefore, refocused the codes by brainstorming, once again, the components of collaboration that I found in the first stage of coding. Table 4.3 represents these codes organized into the themes of (a) efficiency, (b) group management, (c) task process, and (d) overall preference for one medium over the other. It was at this stage that the decision to only code Learning Log Week 8, Learning Log Week 10 and the Reflection Paper was made. Also at this stage of the coding process, two learners were dropped from the study. Hailey's contributions were not included since work was submitted in French. The interpretation of her reflections was challenging and feared inaccurate. Jane's contributions were not included since she did not complete one of the assignments (Learning Log Week 12).

Table 4.3 Coding Themes

Codes	Themes			
	Efficiency	Group Management	Task Process	Overall Preference
	<ul style="list-style-type: none"> Time on task Timeliness of response Overall judgment on efficiency 	<ul style="list-style-type: none"> Setting deadlines Setting meetings Sharing workload 	<ul style="list-style-type: none"> Getting started Making decisions Sharing drafts Working on drafts/final submission Editing Sharing ideas Providing feedback 	<ul style="list-style-type: none"> Preference for face-to-face collaboration Preference for on-line collaboration

Once all coding was completed, frequencies were tabulated for each learner. This served as the quantitative data for the study. This method of qualitative and subsequent quantitative analysis is consistent with the procedures of a content analysis. Using this method of qualitative analysis, coding of raw data and the construction of categories that capture relevant characteristics are done simultaneously (Merriam, 2001). According to Merriam, a content analysis involves initially establishing categories that guide the study, while “others are allowed and expected to merge throughout the study” (p.160). This approach is quantitatively oriented in that the frequency or variety of communication is applied to characterize and compare documents. (Merriam, 2001, p. 160)

Method of Analysis: Quantitative

In an attempt to answer the research questions that drove this study, seven hypothesis tests about collaboration were conducted using a series of chi-square tests. The chi-square is used to determine whether variables are related. (Bruning & Kintz, 1997) It is used “when the data for the dependant or outcome measure to be analyzed are on a nominal scale of measurement” (Abrami, et al., 2001, p. 512). Abrami, et al. characterizes two types of chi-square tests; (a) goodness of fit, which is used for a single variable and explores how well the sample values correspond to expected values (based on a hypothesized population), and (b) test of independence, which is used for at least two variables and that determines whether the values of the two variables are related to or dependant of the other. A summary of the hypothesis tests is presented in Table 4.4. These hypotheses are research or alternative hypotheses. Only the null hypothesis was tested in each case.

Table 4.4 Summary of Alternative Hypotheses

Test	Hypothesis
Test 1: Perceived effectiveness of specific elements of collaboration across environment.	Learners will perceive each element to either be more positive or more negative within either an on-line or on-site environment
Test 2: Attitudes towards on-line and on-site collaboration.	Learners will perceive one environment to be more effective for collaborative learning.
Test 3: Attitudes towards elements of collaboration, on-line and on-site.	Learners will have stronger attitudes towards elements of collaboration within an on-line or on-site environment.
Test 4: Order effect on perceived effectiveness of elements of collaboration.	Learner perceived effectiveness of efficiency, group management or task process is not affected by the order of collaborative environment.
Test 5: Order effect on overall attitudes towards on-line and on-site collaboration.	Learner perceived effectiveness of on-line or on-site collaboration would not be affected by the order of the collaborative environment.
Test 6: Order 1 – attitudes towards elements of collaboration.	Learner attitudes towards efficiency, group management and task process within an on-line and on-site collaborative environment would not be affected by first collaborating on-line then collaborating on-site.
Test 7: Order 2 – attitudes towards elements of collaboration.	Learner attitudes towards efficiency, group management and task process within an on-line and on-site collaborative environment would not be affected by first collaborating on-site then collaborating on-line.

CHAPTER 5

Results

The seven hypothesis tests explored in this project were presented in Table 4.4. After conducting statistical analyses for each of these tests, it became apparent that the inclusion of all of these tests was not necessary. For example, hypothesis tests six and seven, in Table 4.4, did not contribute any new knowledge or provide insight into the exploration of order effect, since, a previous test proved that an order effect did not exist. Therefore, in this chapter, the results of chi-square tests exploring four of these hypotheses are presented.

The frequencies that served as the basis for these analyses are presented in Table 5. First, the responses from learners who collaborated on-line for activity 1 and on-site for activity 2 are presented. Positive and negative comments pertaining to efficiency, group management and task process are presented based on the learning log entry in which they were included. Second, the responses from learners who collaborated on-site for activity 1 and on-line for activity 2 are presented. Again, positive and negative comments pertaining to efficiency, group management and task process are presented based on the learning log entry in which they were included.

In the sections that follow the frequency table, each hypothesis test is explored. First, an explanation of each test is presented identifying the focus of the test. This is followed by the hypothesis and an explanation and/or justification for the test and corresponding hypothesis. Next, a table of observed and expected values is presented. An interpretation of these findings is included and in cases where further testing was deemed

Table 5.0

Frequencies of learner responses

		On-line collaboration followed by on-site collaboration											
		LEARNING LOG WEEK 8 - On-line				LEARNING LOG WEEK 12 - On-site				REFLECTION PAPER			
Attitude		E		GM		TP		E		GM		TP	
		P	N	P	N	P	N	P	N	P	N	P	N
on-line		0	5	0	7	0	3	0	0	0	1	2	0
on-site		0	0	0	1	1	0	0	0	1	5	0	3
												7	1
												1	1

On-site collaboration followed by on-line collaboration

		On-site collaboration followed by on-line collaboration											
		LEARNING LOG WEEK 8 - On-site				LEARNING LOG WEEK 12 - On-line				REFLECTION PAPER			
Attitude		E		GM		TP		E		GM		TP	
		P	N	P	N	P	N	P	N	P	N	P	N
On-line		0	2	0	0	1	0	1	5	0	3	0	1
On-site		0	0	0	8	0	0	0	0	1	0	0	0
												2	3
												3	2

E – efficiency; *GM* – group management; *TP* – task process

necessary, these tests and subsequent findings are presented. Finally, qualitative data, which supports, refutes and/or further explains the findings, is presented.

Test 1: Perceived Attitudes Towards On-line and On-site Collaboration

This test explored learner attitudes towards computer supported collaborative learning and traditional collaborative learning. My hypothesis was that learners would perceive one environment or the other to be more effective for collaborative learning.

The results of this chi-square test are presented in Table 5.1. The first column presents values for positive and negative attitudes. The second and thirds columns present attitudes towards on-site and on-line collaborative learning.

Table 5.1

Attitudes Towards On-line and On-site Collaboration

Observed values			
Attitudes	Environment		
	On-site	On-line	
Positive	23	20	
Negative	33	62	
Expected values			
Attitudes	Environment		
	On-site	On-line	
Positive	17.45	25.55	
Negative	38.55	56.45	
			$\chi^2 \text{ calc} = 4.32$
			$df = 1$
			$\chi^2 \text{ crit} = 3.84$
			$\alpha = .05$
			Reject H_0

This test found that there is a significant difference across environments. The most notable finding is that learners present significantly fewer positive attitudes than negative attitudes about both environments, which, while looking at the expected values does not seem surprising, given my hypothesis for this test, this result was not expected. Learners therefore do not overall perceive one environment to be ‘better’ than the other in terms of perceived effectiveness of collaboration. This is reflected in the varied responses that learners gave in their Reflection Papers as to which environment they preferred for collaboration.

Heather – I still prefer online activities because, by writing them out it is easier to see someone’s point and to catch errors.

Francine – In the end I personally wouldn’t think twice about it and say that the kind of person I am face-to-face is the way to go.

Ellie – After complaining about collaborating on-line for the first activity, our group quickly realized that working face-to-face wasn’t necessarily better. In fact, we were joking (and eventually not joking anymore) that was easier to work on-line than in person.

Hope – Working face-to-face was much easier, being able to see each other’s face, explaining and giving our views seemed to have been taken more seriously.

Emily – As for the face-to-face part of the collaborative activity, I did not like it as much as the on-line activity.

Ingrid – My experience collaborating face-to-face was better than my collaborating on-line for the simple fact that we were able to see each other give ourselves instantaneous feedbacks and solve misunderstanding more rapidly.

Given the comments above, most learners found both positive and negative aspects to collaborating face-to-face and on-line. Although, a few learners echoed Beatrice, in her belief that the best approach to collaboration is to provide learners with the opportunity to collaborate on-line and on-site. “I think whether you are collaborating on-line or face-to-face, there needs to be a balance in both” (Reflection Paper). Therefore, while Beatrice felt that collaborating face-to-face was more effective for her group, she recognizes that this may not be the case for all learners and that there is value to collaborating on-line.

Test 2: Order Effect on Overall Attitudes Towards On-site and On-line Collaboration

This hypothesis test was conducted to determine whether there is an order effect on overall learner attitudes towards on-site and on-line collaboration. My hypothesis was that the order of collaboration (on-line versus on-site) would not affect the attitudes of learners towards on-line and on-site collaboration.

The results of the chi-square test are presented in Table 5.2. The first column presents values for the order of the collaboration within each environment. The following columns present positive attitudes towards on-site collaborative learning, negative attitudes towards on-site collaborative learning, positive attitudes towards on-line collaborative learning and negative attitudes towards on-line collaborative learning. Order 1 represents collaborating on-line for the first collaborative activity and on-site for the second. Order 2

represents collaborating on-site for the first collaborative activity and on-line for the second.

Table 5.2

Order Effect – Attitudes Towards On-site & On-line Collaboration

Observed values		Attitudes			
Order		On-site positive	On-site negative	On-line positive	On-line negative
On-line – on-site		14	17	9	31
On-site – on-line		9	16	11	31
Expected values		Attitudes			
Order		On-site positive	On-site negative	On-line positive	On-line negative
On-line – on-site		11.83	16.98	10.29	31.90
On-site – on-line		4.37	16.02	9.71	15.05
		$\chi^2 \text{ calc} = 22.57$ $df = 3$ $\chi^2 \text{ crit} = 7.81$ $\alpha = .05$ Reject Ho			

These findings suggest that there is an order effect on overall attitude concerning on-line and on-site learning. Given that these findings reject the null and therefore counter my hypothesis, additional chi-square tests were conducted to further understand the relationship. In Table 5.2.1, the possible order effect on positive and negative attitudes of on-line collaboration is explored. The first column presents the order in which the activities were collaborated on-line and on-site. The following columns of the actual and expected values tables present positive attitudes towards on-site collaborative learning and negative attitudes towards on-site collaborative learning.

Table 5.2.1

Order Effect – Positive & Negative Attitudes Towards On-site Collaboration

Observed values		Attitudes	
Order		On-site positive	On-site negative
On-line – on-site		14	17
On-site – on-line		9	16

Expected values		Attitudes	
Order		On-site positive	On-site negative
On-line – on-site		12.73	20.06
On-site – on-line		10.27	14.73

χ^2 calc = 0.86
 $df = 1$
 χ^2 crit = 3.84
 $\alpha = .05$
Accept H_0

This test reveals that there is no significant difference in positive and negative attitudes of face-to-face collaboration between order 1 (collaborating on-line followed by collaborating on-site) and order 2 (collaborating on-site followed by collaborating on-line). This indicates that my hypothesis was upheld for face-to-face collaboration. This would suggest that the order effect is found in learner attitudes towards on-line collaboration. Results reported in Table 5.2.2 confirm this hypothesis. The first column of the observed and expected values tables presents the order in which the learners collaborated on-line and on-site. The following columns present positive and negative attitudes towards on-line collaborative learning.

Table 5.2.2

Order Effect – Positive & Negative Attitudes Towards On-site Collaboration

Observed values		Attitudes	
Order		On-line positive	On-line negative
On-line – on-site		9	31
On-site – on-line		11	31

Expected values		Attitudes	
Order		On-site positive	On-site negative
On-line – on-site		9.76	48.63
On-site – on-line		10.24	31.76

χ^2 calc = 6.53
 $df = 1$
 χ^2 crit = 3.84
 $\alpha = .05$
 Reject H_0

Table 5.2.3 and 5.2.4 pinpoint where specific differences lie. In Tables 5.2.3 and 5.2.4, the columns of the actual and expected values tables present the order in which the activities were carried out (order 1 representing on-line followed by on-site; order 2 representing on-site followed by on-line). The first column in Table 5.2.3 presents the positive attitudes towards collaborating on-line, whereas the first column in Table 5.2.4 presents the negative attitudes towards collaborating on-line

Table 5.2.3

Order Effect – Positive attitudes towards on-line collaboration

Observed values		Order	
Attitude			
On-line positive	On-line – on-site 14		On-site – on-line 9
<hr/>			
Expected values		Order	
Attitude			
On-line positive	On-line – on-site 0.5		On-site – on-line 0.5
<hr/>			
			$\chi^2 \text{ calc} = 6.53$
			$df = 1$
			$\chi^2 \text{ crit} = 3.84$
			$\alpha = .05$
			Reject H_0

Table 5.2.4

Order effect – Negative attitudes towards on-line collaboration

Observed values		Order	
Attitude			
On-line negative	On-line – on-site 31		On-site – on-line 31
<hr/>			
Expected values		Order	
Attitude			
On-line negative	On-line – on-site 0.5		On-site – on-line 0.5
<hr/>			
			$\chi^2 \text{ calc} = 0.00$
			$df = 1$
			$\chi^2 \text{ crit} = 3.84$
			$\alpha = .05$

Although the null was not rejected for either of these last two chi-square tests, what is clear is that the order effects found in the results outlined in Table 5.2 are very small and are not cause for concern.

Test 3: Perceived Effectiveness of Elements of Collaboration in an On-line & On-site Environment

This test explored learners' negative and positive attitudes towards efficiency, group management and task process across both on-line and on-site collaborative environment. My hypothesis was that for each element of collaboration explored, learners would have formed an opinion about each learning environment. For example, if the learners report more positive attitudes towards efficiency in an on-line collaborative environment, then they would be expected to possess more negative attitudes towards efficiency within an on-site collaborative environment. Furthermore, according to Turoff (1999), efficiency, group management and task process should be perceived more effective within an asynchronous CSCL environment.

Table 5.3 represents the results of the chi-square test conducted. The first column presents positive and negative attitudes. The following columns of the observed and expected values tables present attitudes towards particular elements of collaboration, common between to both on-line and on-site collaboration. These elements include; (a) efficiency, (b) group management, and (c) task process.

Table 5.3

Attitudes towards Elements of Collaboration (On-line and On-site)

Observed values

Attitudes	Elements of collaboration					
	Efficiency On-site	Efficiency On-line	Group management On-site	Group management On-line	Task Process On-site	Task Process On-line
Positive	8	8	5	5	10	7
Negative	4	31	22	17	7	14

Expected values

Attitudes	Elements of collaboration					
	Efficiency On-site	Efficiency On-line	Group management On-site	Group management On-line	Task Process On-site	Task Process On-line
Positive	3.74	12.15	8.41	6.86	5.30	6.50
Negative	8.26	26.85	18.59	15.14	11.70	14.46

$$\chi^2 \text{ calc} = 9.10$$

$$df = 1$$

$$\chi^2 \text{ crit} = 3.84$$

$$\alpha = .05$$

Reject

Ho

Since the null was rejected, indicating that learners were not generally of the opinion that one environment was no more effective than the other for the elements of collaboration, three additional chi squares were administered (Tables 5.3.1, 5.3.2 and 5.3.3).

Table 5.3.1 represents the findings of conducting a chi-square to determine whether a significant difference exists between learners' positive and negative attitudes of efficiency in an on-line and on-site collaborative environment. The first column of Table

5.3.1 contains positive and negative attitudes. The columns present efficiency within an on-site collaborative environment and within an on-line collaborative environment.

Table 5.3.1

Attitudes towards Efficiency – on-line and on-site

Observed values		Elements of collaboration	
Attitudes		Efficiency On-site	Efficiency On-line
Positive		8	8
Negative		4	31
Expected values		Elements of collaboration	
Attitudes		Efficiency On-site	Efficiency On-line
Positive		3.76	12.24
Negative		8.24	26.76
		χ^2 calc = 9.10 df = 1 χ^2 crit = 3.84 α = .05 Reject Ho	

A significant relationship was found. While it appears to be a minor difference, learners felt overwhelmingly more negative about the efficiency of on-line collaboration. “It takes me three times longer to do stuff on line” (Franka, LL12). This sentiment was echoed by Debby (Reflection Paper), “It took a bit more discipline and more time because you had to be constantly checking FirstClass than getting the project done in one sitting.”

In terms of opinions about group management (Table 5.3.2) and task process (Table 5.3.3), learners did not report a significant difference. As was the case with efficiency,

learners did report overwhelmingly, a greater number of negative attitudes towards group management, for both learning environments.

Table 5.3.2 represents the findings of conducting a chi-square to determine whether a significant difference exists between learners' positive and negative attitudes of group management in an on-line and on-site collaborative environment. The first column presents positive and negative attitudes. The following columns present group management within an on-site collaborative environment and within an on-line collaborative environment.

Table 5.3.2

Attitudes towards Group Management – on-line and on-site

Observed values		Elements of collaboration	
Attitudes		Group Management On-site	Group Management On-line
Positive		5	5
Negative		22	17
Expected values		Attitudes	
Attitudes		On-site positive	On-site negative
Positive		5.51	4.49
Negative		21.49	17.51
		χ^2 calc = 2.46 df = 1 χ^2 crit = 3.84 α = .05 Accept Ho	

Meanwhile, Table 5.3.3 presents the findings of conducting a chi-square to determine whether a significant difference exists between learners' positive and negative attitudes of task process in an on-line and on-site collaborative environment. The first

column presents positive and negative attitudes. The following columns present task process within an on-site collaborative environment and within an on-line collaborative environment.

Table 5.3.3

Attitudes towards Task Process – on-line and on-site

Observed values		Elements of collaboration	
Attitudes		Task Process On-site	Task Process On-line
Positive		10	7
Negative		7	14

Expected values		Attitudes	
Attitudes		On-site positive	On-site negative
Positive		7.61	9.39
Negative		9.39	11.61

$\chi^2 \text{ calc} = 0.91$
 $df = 1$
 $\chi^2 \text{ crit} = 3.84$
 $\alpha = .05$
 Accept H_0

These findings, which accept the null hypothesis, suggest that learners have formed an opinion as to which environment is more conducive to the process of completing the group task. While there is no significant difference between negative attitudes of on-site task process and positive attitudes towards the on-line task process, a significant difference between positive attitudes towards on-site and negative attitudes towards the on-line task process was found. This suggests that learners feel that the process of completing a

collaborative activity is more effective face-to-face than on-line. Julie most notably expressed this sentiment,

I find that when you're face-to-face it's easier to elaborate on an idea. Also, when you're face-to-face and you are talking and trying to explain yourself you sometimes get stuck and you're not quite sure how to explain but often the person who is listening to you understands what you are saying. But on-line if you're stuck and not sure how to explain yourself with writing, you're stuck, no one understands what you're saying...so I find that a lot of thoughts and ideas are lost on-line because of that.
(Reflection Paper)

Test 4: Order effect on perceived effectiveness of various elements of collaboration

This hypothesis test was used to determine whether there was an order effect in relation to learner perceptions of efficiency, group management and task process. My hypothesis was that the order in which the learners collaborated, order 1 being on-line followed by on-site and order 2 being on-site followed by on-line, would not affect learner perceived effectiveness of efficiency, group management and task process.

The results in Table 5.4 confirm this hypothesis. The first column presents the order in which learners completed their collaborative activities. The following columns in Table 5.4 present the negative and positive attitudes learners possess towards efficiency, group management and task process.

Table 5.4

Order Effect on Perceived Effectiveness of Elements of Collaboration

Observed values						
Order	Efficiency Positive	Efficiency Negative	Elements of collaboration		Task Process Positive	Task Process Negative
			Group management Positive	Group management Negative		
On-line – on-site	9	16	4	20	10	20
On-site – on-line	7	19	6	19	7	9
Expected values						
Order	Efficiency Positive	Efficiency Negative	Elements of collaboration		Task Process Positive	Task Process Negative
			Group management Positive	Group management Negative		
On-line – on-site	8.23	18.01	5.14	20.07	8.75	10.80
On-site – on-line	3.40	16.99	4.86	18.93	8.25	10.20
					$\chi^2 \text{ calc} = 0.91$ $df = 1$ $\chi^2 \text{ crit} = 3.84$ $\alpha = .05$ Accept Ho	

There is no statistical significant difference on learner perceived effectiveness based on the order in which they collaborated on-line and on-site. Therefore, it is safe to say that whether learners collaborated on-line or on-site first, there was no difference in their positive and/or negative attitudes towards the effectiveness of efficiency, group management and task process. This being said, one learner did comment in her week 10

learning log that she believed that her group was at an advantage based on the order in which they collaborated on-line and on-site. "I have been talking to my friends who have been doing it [collaborating on-line] already and feel being the second groups around we are at an advantage, because we can learn from their mistakes." (Amber, Learning Log Week 10).

CHAPTER 6

Discussion and Implications

Although many authors have cited the benefits of collaborative learning (e.g. Abrami & Bures, 1996; Bernard, et al, 2000; Brandon & Hollingshead, 1999; Chui, 2000; Clark, 2000; Cockrell, et al, 2000; 1999; Feather, 1999; Hiltz, 1998; Johnson, et al., 1991; McWhaw, et al., in press; Towns, et al, 2000), overall learners in *Technology for Educational Change* do not perceive collaborative learning to be an efficient or even necessarily an enjoyable experience. While these findings do not really surprise me in that learners often express a dislike for collaboration, what does surprise me is that I never sensed this over the course of the semester. Even while coding the data, I did not realize how negatively the learners felt about their collaborative experiences. This is, perhaps a function of the guiding questions posed in the Learning Logs that were used in the study. A component of each of the semi-weekly Learning Logs asked learners to reflect on the challenges they faced during the previous week and how they overcame these challenges. Therefore, when the learners read through their Learning Log entries to respond to the questions in the Reflection Paper, they would only be reminded of all the “challenges” they faced collaborating and not on the positive aspects of the process, since these were not documented.

This being said, learners did not change their opinions about the use of collaboration as an effective *teaching* method; they just do not feel that it is productive for themselves as *learners*. This indicates that they may not have made the connection between their experiences as learners and their role as potential teachers, or perhaps is simply a reflection of their individual learning preferences. It would be interesting to

have the learners go back to their Reflection Papers, a semester after completing this course and then again in their first year of teaching, to see if their attitudes have changed and what this means for their own teaching. Perhaps learners maintain that collaboration is an effective way of teaching because that is what they are told to think, by their instructors and the literature presented to them. It would be interesting to see whether once my current learners begin teaching return to lecturing and not incorporate the methods modelled in this course. This would either suggest that teachers select teaching methods based on their own preferences as learners, or, as Barnett et al (2002) suggests, pedagogical decisions are made based on based on how their preconceived ideas about teaching.

Some interesting findings concerning learner perceptions of on-line and on-site collaboration and the three elements of the collaborative process that served as the focus of the study were found. The findings on learner's perceptions on efficiency, group management and task process, and learner preference for on-line versus on-site collaboration are discussed in the following sections.

Efficiency

Learners reported overwhelmingly that they did not feel that collaboration was an efficient way of learning and completing the activities. "It was hard to get the group to arrange time to get together for group work when it came to face-to-face and yet it was frustrating to leave messages on-line and not have any replies" (Amber, Reflection Paper). This being said, they did report feeling that face-to-face collaboration wasn't as 'bad' as collaborating on-line, which is contrary to Sotillo's (2000) suggestion that even

synchronous CMC is more efficient in terms of time on task than ordinary classroom discourse. “In a face-to-face setting, disagreements are solved on the spot and ideas can be given simultaneously, whereas on-line, you would have to wait for a reply and wait for a comment” (Heather, Reflection Paper).

This being said, after examining the qualitative data more closely, there does seem to be some possible explanations for these negative feelings toward on-line collaboration, which are not reflected in the quantitative data. You will recall I cited Turoff's (1999) benefits of asynchronous CSCL several times in this study. For learners to capitalize on the benefits of asynchronous computer supported collaborative learning, they must actually use asynchronous communication, which mostly was not the case in this class. Many learners felt that collaborating face-to-face was not efficient since trying to find a convenient time was nearly impossible. For example, one learner expressed these frustrations about trying to find a time and place to meet.

Franka - We couldn't agree on a date to meet and do our assessment since we all have different schedules in and out of school and when we decided to meet on a certain day our plans changed as people had found out during that same week they had soccer games and doctor appointments. (Learning Log Week 8)

Yet most still attempted to meet synchronously using the 'chat' function in FirstClass®. Even more striking is that several groups actually met at the one of the labs on campus, sat next to each other and either used the chat function or posted short messages to their group conference. “I sent the group a message, stating to meet at 11:45 on Thursday at

the lab so we could all be on-line at the same time and work on the project together (of course by FirstClass!)” (Beatrice, Learning Log Week 10). If they felt that face-to-face collaboration was not efficient and that they found it hard to meet to complete the face-to-face activity, I can only imagine their frustrations as they sat next to each other and typed what they wanted to say rather than simply speaking.

This clearly indicates, in general, the learners did not see the value in collaborating in this way, and therefore, that in my role as course instructor, I did not do enough to promote positive interdependence in the course design, which Johnson et al. (1991) and Brandon and Hollingshead (1999) suggest are essential for collaborative learning to work successfully. I do not expect that all learners would enjoy collaborating within a computer-supported environment; however, I think that it is important that learners understand the logistics of how learning within this environment can be accomplished. When teaching this course in the future this is definitely something that has to be re-examined. Perhaps including more articles supporting asynchronous CSCL would be the place to start. Although adopting a constructivist philosophy means allowing learners to decide what works best for them in terms of how they learn, learners seemed to be more satisfied with the on-line collaboration when they were all working on it at the same time at the beginning of the semester. Therefore, perhaps having the entire class collaborating on-line for the first collaborative activity and strongly suggesting that learners do not use the synchronous functionality available in FirstClass, would change the way learners perceive the use of this medium.

While I have mentioned several times that on-line versus on-site comparative studies are often inconclusive, it would be interesting to compare learner perceptions of

the efficiency of asynchronous collaboration between learners taking an on-campus course with an on-line component with learners taking a course completely on-line. For example, do learners in the DE section of *Technology for Educational Change* value the benefits of asynchronous computer supported collaboration more than learners in the on-site section? This being said, given that most learners enrolled in the DE section are not true distance learners (i.e., most live in the Greater Montreal area and do come to the university for some courses) they may very well perceive this type of learning than learners who live outside of the city, province or even country. I suspect that the further learners are from the university, their peers and their instructor, the more they will value asynchronous computer-mediated communication. Every semester, there is at least one group in the DE section of *Technology for Educational Change* who try to meet face-to-face to complete part of their collaborative activity. This is not possible for learners who live in outlying areas.

Group Management

Learner attitudes towards face-to-face group management were also very interesting. Overall, they reported feeling that on-site group management was not desirable. The findings in this regard can be attributed to the learners experiencing great difficulties in finding a time and place to meet that was convenient to all group members. “Another issue was the fact that we did not get together with each other to do any face-to-face collaboration because of our hectic lives” (Cathy, Learning Log Week 12). This being said, they did not feel that collaborating on-line was the answer. “Once again, the biggest challenge was planning a day where everyone in our group could meet on-line

and discuss our collaborative activity” (Julie, Learning Log Week 12). This again could be attributed to the way in which they collaborated on-line and that the structure of the activities did not give them the flexibility to try collaborating on-line to overcome these challenges. “Another difficulty I found was resisting messaging each other over FirstClass. Because we had done our project on-line last time it seemed like a quick and easy way to give each other info in order to complete our project” (Debby, Learning Log Week 12). Meanwhile, some groups who encountered difficulty collaborating on-line broke the ‘rules’ by resorting to face-to-face communication to make decisions; “Well to solve the meeting online, in Thursday’s class (the one with the guest speaker) we decided to post up the pros and cons by Sunday that week, we kept writing to each other in FirstClass but we couldn’t figure out a day to meet so we called each other just to find out what day to meet on-line” (Julie, Learning Log Week 12).

During the first year of teaching the on-site section of *Technology for Educational Change*, all learners were required to collaborate on-line for the first activity and had the choice of collaborating on-line or face-to-face for subsequent activities. I think that this situation was ideal. Learners were afforded the experience of collaborating on-line, which they might not have experienced fully had they not been required to do so, but had the freedom to collaborate using all tools at their disposal. If I were to conduct further research within the context of this design, I would include a question in the Reflection Paper to address specifically which tools or which elements of each environment learners used or felt was more effective in completing collaborative activities. This would provide me with a rich data source, but more importantly it would encourage learners to reflect on their collaboration more deeply.

Task Process

The process that is undertaken to complete a collaborative activity is the only element of collaboration where learners actually seemed to form a collective opinion on whether it was more effective within a face-to-face or on-line learning environment. Learners reported feeling more favourable about engaging in the collaborative process on-site than on-line. This being said, learner reactions to the task process appear to be in reaction to either the inefficiencies of collaborating on-line or in response to feelings that face-to-face collaboration is more efficient. Daniel and Carley share these sentiments.

Daniel – I found that my experience of collaborating face-to-face was different from collaborating on-line because I found that collaborating face-to-face made the work go faster. Since if we work face-to-face we communicate more effectively and there was no waiting for the other members of the group to respond to ideas, and it made it easier to express our ideas than it was expressing our ideas on-line. (Reflection Paper)

Carley – It is easier to communicate face-to-face for the group can come up with ideas and criticisms on the spot, and not have to wait to see if others in the group would get them on time. (Reflection Paper)

On-Line Versus Face-to-Face

Overall, I do not think a clear judgement can be made as to whether learners perceive to be more productive or effective collaborating on-line versus face-to-face. While I had suspected that this would be the case based on the literature reviewed (Smith

& Dillon, 1999; Shulman & Sims, 1999), I had thought that learners would discern aspects of the collaborative process that were more conducive to collaborating on-line as well as aspects that were more conducive to collaborating face-to-face. Again, this lack of definitive, clear cut answers can be attributed to the ways in which the learners collaborated, and the instructional design of the activities.

This being said, learners did feel that trying to coordinate the schedules of four to five university students, with part-time employment, family commitments and social lives, was all but impossible, and they felt that this aspect was more difficult when collaborating face-to-face than collaborating on-line. This is consistent with the literature (McWhaw, et al., in press) that suggests that on-line learning and distance education in general has become more prevalent in universities to reflect the needs of an increasingly diverse student population. “The face-to-face collaboration I found to be a little more difficult because of the busy lives people lead today (jobs, school, family, leisure activities, etc.)” (Cathy, Learning Log Week 8). However, they felt that collaborating face-to-face was more efficient than collaborating on-line, due in part to the time consuming nature of having to type questions and response, waiting for responses and not knowing when to expect to hear from their peers.

Amber - The next issue was one of the members seemed to never log on or make any suggestions and when she finally did log on, clearly seeing that we already had a concept and had been working on it, she writes a note with an idea, the day before it was due AAAHHHHHHHH. (Learning Log Week 10)

Cathy – I keep going on-line for feedback or a response to my messages and not getting any. (Learning Log Week 8)

This indicates that the duration of the on-line collaborative component was not long enough for the learners to establish some sort of schedule or routine, which is so important when collaborating.

In the final analysis, many learners remained that collaboration, especially on-line collaboration, was just too time consuming. Francine, for example, seemed to feel that collaborating on-line was not a good return on investment. “I guess my point of view is that the medium isn’t fair in my mind, seeing that so much more time and effort is put into on-line and the marks are lower or about the same as in-class classes. I don’t agree with the learning medium” (Reflection Paper).

Implications

Since I found that the order in which learners collaborated for each environment did not have a serious effect on learner perceptions and satisfaction of the learning environment, I will, in future, begin the course with the entire class collaborating on-line for the first activity and, in true constructivist fashion, allowing them to chose which environment they would like to use for their second collaborate activity. I believe that since many groups began by collaborating face-to-face, (a) they had established a way of collaborating that was somewhat successful and therefore resented having to limit themselves to one means of communication for the second activity, and (b) learners who began collaborating on-line observed the others collaborating face-to-face and therefore

formed preconceived ideas of which was better based on how their team was functioning. If everyone were on an even playing field, collaborating within the same environment, these feelings of resentment would be lessened. This could be an area for future study.

The possibility of restricting on-line collaboration to asynchronous communication could also be advantageous for the future. I believe learners will have a very different sense of what the DE learners experience in the completion of their collaborative activities. I also believe that through this experience, they will experience the benefits of asynchronous collaboration that Turoff (1999), and others have written about.

Another area to look at when preparing for future sections of *Technology for Educational Change* is the way that groups are formed. First, many learners reported feeling that having instructor-engineered groups was not effective. They felt that there were people in the class with whom they had previously worked and had developed a good working relationship with. I am not sure that in the future I would permit learners to select their own groups, however I would change the way the process of engineering groups. I would pay closer attention to matching learners in terms of the computer knowledge and skills, I would continue to divide learners in such a way as to ensure a balance of education majors and non-education majors, and finally I would also try to more evenly balance native English speakers with second-language learners.

Conclusion

Learners enrolled in an undergraduate course on the theory and practice of integrating technology into the classroom do not perceive that collaborating on-line is more effective

than collaborating on-site, and vice-versa. Learners reported feeling that, in terms of their own personal learning experience, overall collaborative learning is not an efficient way of completing course work. However, they did report slightly less negative experiences with face-to-face collaboration than with on-line collaboration. When engaged in a collaborative learning activity, learners reported that it is more difficult to manage the group effort within a face-to-face collaborative context than within an on-line environment. This is driven by difficulties in scheduling group meetings and following that is, in reality, contributing what to the group product. Learners did report a preference for face-to-face collaboration when it comes to the process of completing the collaborative activity.

What is surprising is that while learners may report a greater number of negative views about certain aspects of collaboration in one of the environments over the other, they do not in turn report more favourable views about the same issue within the opposite learning environment. This indicates that future research must be more specific in terms of what is explored. Learners should be asked to reflect on the areas of efficiency, group management and task process on an on-going basis before, during and after the collaborative activities. This will, perhaps, provide more concrete evidence to inform future practice in using a hybrid of face-to-face and on-line collaboration within an on-site course.

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APPENDIX A:
Description of Research
From 2002 On-Site Study Guide

Researching Best Practices

As your careers as teachers begin, you will often hear colleagues saying (or may even find yourself saying) what a lonely profession teaching is and how you never really know how well you are doing. At the post-secondary level, learners fill out course evaluation forms to indicate to their teacher (as well as to the institution) where he/she has gone wrong and where his/her strong points are. Finding out what works and what doesn't, should not be reserved to such formal activities. As educators, we should be engaged in on-going review of our practices. In this course, you are encouraged to reflect on the course, your learning as a student and the potentials as an educator through your learning logs. As the instructor for this course, my reflections of best practice will be shown through your observations in your learning logs, reflection paper, discourse within the various course conferences and any other interaction we may be engaged in. Therefore, I encourage you to be honest and up front with your feelings and comments throughout the course. The course has evolved over the years (I would like to think for the better) because learners have been honest about what works and what doesn't. Seeing as our course, in many ways, is a unique one, and seeing as I am also sitting on your side of the desk ☺, it is important to me that we share our experience with others. Therefore, at some point during the semester, I will be

posting a consent form to include our experiences in my research and thesis. You are by no means obligated to participate and I will not know who participates until after the final course grades are submitted. Your participation in this research will not have you complete any extra work outside from the course assignments. More detail about consenting to research will be posted in the course conference and discussed in class during the semester. If you have any questions and/or concerns about my research, you may contact me through FirstClass® or my thesis supervisor (Allyson Hadwin) through FirstClass®.

APPENDIX B:

Consent Form

Productivity in collaborative learning environments

I (Jennifer Sclater) am researching the factors that influence productivity and learners' self-reported levels of satisfaction in collaborative learning environments. This study will contribute to our understanding of computer mediated communication (CMC) course design and development. I will be evaluating the way in which learners feel most productive ("getting things done") in completing group work (face-to-face versus on-line).

My evaluation of productivity will be based on student interaction during collaborative activities (FirstClass® messages posted in the problems conference area), and student reflections (as expressed in individual learning journals and final reflection paper).

The information collected from the above sources will (a) inform future practices and course design for EDUC 305 (DE & A), (b) provide instructors and instructional designers with a better understanding of the potential uses of collaborative computer mediated communication in both a distance education and on-site environment, and (c) inform both myself and other instructional designers about learners' feelings and attitudes towards collaborative on-line learning. It is hoped this information will help instructors improve their integration of collaboration into their courses.

I am asking you to voluntarily take part in this study. If you agree to participate, rest assured that all information provided by you for the purposes of this research project will remain confidential.

What does consent mean?

Your participation is voluntary; you are under no obligation to take part in this study. You may choose to discontinue your participation at any time. If you decide to withdraw your consent prior to the end of the course, no information you have generated will be used in the study.

In the event that you decide to withdraw your consent after the course, or you feel uneasy about your participation in the research, I encourage you to contact me via email () or FirstClass® (Jennifer Sclater). Alternatively, you may contact my thesis supervisor via email or FirstClass® ().

Your participation will not involve additional work beyond the course requirements.

Prior to studying materials being released for research purposes, your assignment will be marked (as usual) by your instructor. The instructor will not know who has consented to participate until final grades have been submitted. Your participation in the research is completely voluntary however completion of the activity is a mandatory component of your course grade.

Data from this study may be published, however all information gathered for research will be labelled by a pseudonym so that your participation is entirely confidential. If you decide at any time that you do not want to continue participating, all information about you will be erased from the research files.

What data will be collected?

If you agree to participate, in this study the following three sources of data will be collected.

- a) Learner interaction in FirstClass® course and group conferences during collaborative activities.
- b) All material contained in your learning journal, including weekly reflections and answers to guiding questions, group meeting logs and self and peer assessment forms.
- c) Final individual reflection papers.

Who do I contact with concerns?

Once this information has been compiled, a brief summary of results and a complete explanation of the study will be provided upon request. I will also be pleased to discuss the results once my thesis is complete. Any questions or concerns you have with respect to this research should be addressed to Jennifer Sclater via e-mail or via FirstClass® (Jennifer Sclater) or my thesis supervisor via e-mail or FirstClass® ().

Student consent to participate in research

I agree to participate in research conducted by Jennifer Sclater in preparation for her master's thesis in Educational Technology.

I have read the above description and understand that my participation is completely voluntary and will have no bearing on my final grade for this course. Furthermore, I understand I may withdraw my participation at any point during the course of the study (as well as after the course has been completed) and that the researcher will not have access to my consent form until after the final grades have been submitted.

I freely consent and agree to participate in the collection of data for this research project.

I agree to participate. []

I do not agree to participate. []

Name (Please print clearly)

Student ID

APPENDIX C

Code Book

Theme	Code Name	Description	Assumption	Example
Technology (Process/Practice)	Experienced with various “tools”	- learner lists several different computer applications and other types of technology that he/she is familiar with.	Learners who are comfortable with technology may be more open-minded to on-line learning/collaborating on-line.	
	Little experience with various “tools”	- learner does not list many different computer applications or other types of technology that he/she is familiar with. - learner reports limited knowledge of computer technology.	Learners who are not comfortable with technology may be less open-minded and more apprehensive to on-line learning/collaborating on-line.	“I have not used many educational technologies thus far. “ – Carley (only listed one tool) “I have always had a phobia about computers and now I have learned that there is nothing to be afraid of.” - Carley
Technology (attitudes)	Value in using of technology.	- Reports benefits in using technology or reports feeling that technology is “a good thing”.	Positive Interdependence – if the learners sees the value in using the technology they will be more likely to be more engaged in using it.	“I am a firm believer that each child learns in different manners, so I feel that technology simply offers teacher more resources to get them the support they need.” - Amber

	Does not value using technology	- Reports unfavourable feelings towards using technology.	Positive Interdependance – if learners do not value the use of technology they will be less likely to use it.	<p>“The major challenge that I had to overcome in order to make it to class was my dislike of computers. 19 I have always thought that the world would be a better place without computers. 20” - Bonnie</p>
Collaboration (Process/Practice)	Disadvantages of collaborating on-line	- Describes elements or components of the on-line collaborative process that were less favourable	Learners will feel that there are some aspects of the collaborative process that are less favourable when collaborating within an on-line environment.	<p>“However, there are disadvantage to this, it requires much more time on everyone's part. 1095 You don't always get a reply from the others' when you send a message. 1096 Communicating ideas to each other takes more time and you really have to discipline yourself to not communicate face-to-face. 1097 If your working on line all the time there's no growth in socializing with others and your more isolated. 1098 You will have difficulty in face-to face peer interaction.” 1099 - Beatrice</p>

	Advantages of collaborating on-line	- Describes elements or components of the on-line collaborative process that were more favourable	Learners will feel that there are some aspects of the collaborative process that are more favourable when collaborating within an on-line environment.	There are advantages to collaborating on-line such as, you can send messages to your group and they can reply at any time (day or evening), you can keep track of who's participating and doing their share of the work. 1092 It is easier to assess your peers because it is visible to see how the other people in your group are putting effort into the project. 1093 Also, you stay more on topic and your less distracted." - Beatrice 1094
	Disadvantages of collaborating on-site/face-to-face	- Describes elements or components of the on-site collaborative process that were less favourable	Learners will feel that there are some aspects of the collaborative process that are less favourable when collaborating within an on-site environment.	The disadvantages are that it's easier to get distracted and talk off topic when face to face. 691 It's also harder to arrange a meeting time when everyone is free. 692 - Bonnie
	Advantage of collaborating on-site/face-	- Describes elements or components	Learners will feel that there are some aspects of the	Face to face collaborative learning,

	to-face	of the on-site collaborative process that were more favourable	collaborative process that are more favourable when collaborating within an on-site environment.	advantages are that it's easier to carry a conversation. 688 You don't have to wait for the others to type their answers. 689 There is more of a social interaction when working face to face, you can see the others facial expressions and body language. 690 - Bonnie
Collaboration (Attitudes)	Values collaborative learning	- Reports benefits in using collaborative learning or reports feeling that collaborative learning is "a good thing".	Positive Interdependence – if the learners see the value in using collaborative learning they will be more likely engage in the process/activity.	"I learnt quickly that as a team we accomplished a good thing while alone I don't think I could have done it." - Amber
	Does not see value of collaborative learning	- Reports unfavourable feelings towards collaborative learning or working in groups	Positive Interdependence – if the learners do not see the value in using collaborative learning they will be more less likely engage in the process/activity.	"One reason why I'm not fond of working in groups is for this very aspect that not everyone does their share of the work." - Beatrice
Reflection (Process/Practice)	Demonstrates reflective practice.	- Reflects on own practice.	Learning style. A learner who engages in on-going reflective practices (consciously or unconsciously) can be characterized as being a reflective learner.	"I also realise that I thought I learned better face-to-face but, I think I learn better in various environments and I can adapt to any situation (I might panic at first about the

				details) but, in the end I adapt and move on.” - Beatrice
Reflection (Attitudes)	Values the reflective practice.	- Reports value in being engaged in the process of personal reflection.	Positive Interdependence – if the learner sees the value in being in this type of activity, he/she will be more likely to engage in the process.	“The wonderful thing about writing about what you are being challenged with or what your perceptions is on topics is that you are forced to STOP and think about the issues.” 974 - Amber
	Does not see the value in reflective practice.	- Reports unfavourable feelings towards engaging in reflective practice.	Positive Interdependence – if the learner does not see the value in being in this type of activity, he/she will be less likely to engage in the process.	(new code...no one yet)
On-line learning (Attitudes)	Values on-line learning	- Reports value in learning in an on-line environment.	Positive Interdependence – if the learner sees the value in being in this type of activity, he/she will be more likely to engage in the process.	
	Does not see value in on-line learning.	- Reports unfavourable feelings towards on-line learning.	Positive Interdependence – if the learner does not see the value in being in this type of activity, he/she will be less likely to engage in the process.	
Task Related (Process/practice)	Order of Activities	- Reports advantages and disadvantages of order of tasks.	Control for order effect.	I have been talking to my friends who have been doing it already and feel being the second groups around

				we are at an advantage, because we can learn from their mistakes. - Amber
	Successful group processing experiences	- Reports successful aspect of the group processing.	Which aspects of the collaborative process did learners feel were most successful within their group processing.	were really organized in terms of completing our collaborative 2 activity. 983 We communicated well our ideas and the format of how we chose to do this assignment. 984 We were both open minded to each others ideas and as a result, we stayed positive and encouraged each other throughout the whole process; I think we did a well job. 985 - Beatrice
	Unsuccessful group processing experiences.	- Reports aspects of the group processing that were less successful.	Which aspects of the collaborative process did learners feel were less successful within their group processing.	When we were discussing how we would answer the questions I agreed partially but I didn't say anything because the other group members seemed to think what we were doing was alright. 713 If I could change

				anything I would have spoke up about the first group project. - Bonnie
Task Related (Attitudes)	Working within instructor assigned group.	- Reports advantages and disadvantages in working with strangers.	Positive Interdependence – if the learner sees the value in being in this type of activity, he/she will be more likely to engage in the process.	The groups picked for us really helped, one was not put with friends from previous classes, This meant that we had to get to know each other through our work. -Carley