

Measuring Communication Apprehension, Writing Apprehension, and Group Satisfaction Levels in Face-to-Face and Virtual Settings

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Introduction

The advent of new technology is quickly having a profound impact on our college campuses. Students are walking everywhere across campus with cell phones or PDAs in their hands, and iPods in their ears. Professors are posting syllabi online so that they can preserve paper and make changes to the schedule as often as they wish. E-mail is fast replacing the paper flier as the preferred way to reach students and faculty. Students can now write their research papers by looking up sources online from the comfort of their dorm rooms with just the click of a mouse. We are experiencing a digital revolution of computers and new technology that is of enormous impact. In almost every aspect of the educational experience, technology and computers have integrated themselves into our daily lives. There are numerous studies that investigate the advantages and disadvantages of introducing such technology into the classroom. This paper contributes to that discussion by examining the relationship of both communication apprehension and writing apprehension to group satisfaction levels in both a face-to-face setting and a virtual setting. First, the current literature on CMC, communication apprehension, and writing apprehension will be reviewed. Next, the methodology employed in this study, including the students' timeline and the surveys used, will be described. Results indicated that writing apprehension was a major factor in determining group satisfaction levels in both virtual and face-to-face situations. The paper will conclude with discussions of the

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results, the limitations of the study, and suggestions for future research.

Literature Review

Defining CMC

The new technology of computers and the Internet have had a great deal of impact on our communication patterns, especially in the classroom. Researchers are now looking at how we communicate with computers and, more specifically, with the other people using these computers. Computer-mediated communication (CMC) is the use of new technologies such as e-mail, listservs, webpages, chat rooms, and the Internet to interact with and engage in the world. Santoro (1995) argues that “CMC can be defined narrowly or broadly. At its narrowest, CMC refers to computer applications for direct human-to-human communication. At its broadest, CMC can encompass virtually all computer uses” (p.11). We can thus broadly look at CMC as using a computer for any part of our work or personal lives; narrowly, we can look at CMC as using the computer specifically for communicating with other humans. Shedletsky and Aitken (2004) offer a similar definition of CMC: “Computer-mediated communication is communication in which a computer mediates or facilitates the interplay between people. We consider all human-computer interaction a type of computer-mediated communication because in reality, people are still communicating” (p. 20). Both definitions take the perspective that computers are, in some way, helping or *mediating* the communication between two or more individuals. This mediated communication can be done via e-mail, listserv, chat rooms, letters typed in word processing software, or even by faxing something over international distances. Thus, taking elements of these two definitions, we reach an operational definition of CMC as the use of computers and various Internet functions to support the interaction of and communication with other individuals near and far.

The digital revolution of computers has had far-reaching consequences. The Internet has brought new challenges into all aspects of the human world including interpersonal relationships (e.g., Hancock and Dunham, 2001), friendships and support groups (e.g., Wright, 1999), the political arena (e.g., Sundar et al., 2003), and organization

communication (e.g., Zornoza et al., 2002). Computer-mediated communication has also revolutionized traditional educational settings and classrooms throughout the nation (e.g., Worley and Chesebro, 2002). Kubey, Lavin, and Barrows (2001) argue that “[u]se of the Internet as a resource for education enjoys near-universal support from students, parents, educators, and institutions, including the United States government” (p. 366). Computers have, and will continue to, transform almost every aspect of the classroom. Lectures have been enhanced through PowerPoint and other multimedia avenues. Discussions are continued long after class over electronic bulletin boards and other listservs. Distance education allows for whole classes to be taught via audio and video streaming.

One of the main questions that researchers and educators are attempting to answer is whether the introduction of CMC into educational pedagogies is beneficial to students and professors — essentially, whether it is good to add some form of CMC to lessons and studies. Previous research has already examined at the introduction of CMC in the organizational environment and its relative success there. From this research comes the Media Richness Theory (MRT) first developed by Daft and Lengel. Sheer and Chen (2004) argue that, “The original MRT predicts that managers’ choice of medium depends on the richness of the medium and the equivocality of the task, defined as the existence of multiple interpretations about an organizational situation” (p. 78). In other words, the medium and the task determine the best way for a message to be communicated. If the medium is “rich” (if it allows for multiple interpretations) then the task being communicated can be more equivocal. If the medium is “lean” (if it does not allow for multiple interpretations) then the task should not be that complex. Researchers agree that face-to-face communication is the richest of the media, while e-mail, letters, and memos are the leanest of the media (e.g., Dennis and Kinney, 1998). In terms of CMC and the educational setting, the richness of the medium (or the lack thereof) must be taken into consideration when designing classroom tasks based around the computer. In this study, the MRT is being tested as it relates to communication apprehension, writing apprehension, and group satisfaction levels. Is the task that will be given to the students too ambiguous to be adequately performed

in the chat situation, and if so, how will this affect the aforementioned three variables? Generally, the question of whether CMC is good for the classroom necessarily involves questions of how rich the medium is and how effective it is in teaching the students, given the equivocality of the messages presented by the professor.

Opinions about how CMC can enhance a student's educational experience are varied — from professors who are whole-heartedly embracing the new technology to those who firmly believe in “chalk-and-talk” lectures. A review of the current literature on the introduction of CMC into the educational setting reveals no definitive answers to these questions, but rather offers two different camps or philosophies.

CMC Should be Embraced in the Classroom

First, there is research that suggests that the introduction of CMC into the classroom can be beneficial to both students and professors. Despite the relative leanness of much of CMC, educators can overcome these barriers to provide instruction. Studies have shown that when used effectively, CMC can be useful to education (e.g., Althaus, 1997; LaRose and Whitten, 2000; McComb, 1994). Althaus (1997) found that the use of listservs and electronic bulletin boards resulted in higher scores and greater perceived learning among the students. He argues that, “on all available measures of academic performance, students who were actively involved in the computer-mediated discussion groups earned higher grades than other students” (p.173). Althaus' report claims that with the introduction of CMC, numerical test scores of students who used CMC increased as opposed to the scores of those students who chose not to use CMC.

LaRose and Whitten (2000) also argue that teachers could work within the obvious limitations of CMC (as explained above in the discussion of the Media Richness Model) to effectively teach and enhance the learning environment. Although the Internet may filter out non-verbal cues and limit the immediacy (or feelings of closeness and bonding) of teachers and students, LaRose and Whitten's research found that student and teacher satisfaction were enough to overcome these obstacles. They then used findings from their research to offer practical advice to those teachers who are building courses with web

supplements. LaRose and Whitten (2000) argue, “Instead of recommending a set of standard features that all Web courses should have to maximize their immediacy, it might be more productive to use the four types of incentives as general guidelines and then leave it to the imagination of the course developer to create course features that supplement those incentives (p. 332). In short, it is the duty and responsibility of the classroom instructor to effectively use the Internet, recognize its shortcomings, and work around them to introduce it effectively in the classroom.

Finally, McComb (1994) is in favor of the introduction of CMC (in this case, employing mainly e-mail) to education because of its sheer practicality. She writes there are three clear benefits of CMC: it extends learning beyond the classroom, it balances power, and it is extremely efficient. Her educational pedagogy involves blurring the boundaries between the traditional roles of students and teachers. McComb argues, “CMC augmentation helps produce a learning environment which extends beyond classroom time and space, in which students and teachers have a more equal balance of power.” (p. 163). While there is still a professional working relationship necessarily defined by the terms of “student” and “professor,” the power that comes from being in front of a classroom or behind a lectern can be diminished through using the same e-mail system. For McComb, then, CMC has become not only an effective instructional tool, but also an integral part of achieving classroom goals and improving the overall experiences of the students.

To summarize the research that argues in favor of CMC, the pedagogical advantages include actual increases in student scoring, greater perceived learning and satisfaction among both teachers and students, and many practical technological features. While these benefits are persuasive, there are those who still argue against the introduction of CMC in the classroom.

CMC Should Not Completely Take Over the Classroom

A second camp of researchers argues that the limitations that come along with the Internet are too great in order to justify introducing CMC into the classroom (e.g., Bailey and Cotlar, 1994; Carrell and Menzel, 2001; Flaherty, Pearce, and Rubin, 1998; Tenorio, 2003). In

other words, CMC is just too lean of a medium for use in a rich educational setting. Because of the lack of immediacy, which affects willingness and motivation, Carrell and Menzel (2001) argue in favor of the live instructional setting rather than the technological, interactive one. They feel that the only obvious advantage of technological instruction is the ability to reach more and more students at a lower cost — but this one advantage is still not enough to take the place of face-to-face student and teacher interaction. Carrell and Menzel (2001) claim, “In the end, we feel comfortable that we will not be replaced by televisions and computer monitors just yet” (p. 239). Despite the financial advantage of working in a distance education class, it is the effect on immediacy and student motivation that will keep face-to-face interaction the preference of a majority of students and professors.

Secondly, Flaherty et al. (1998) state that the introduction of CMC into the classroom could actually be detrimental to the students. Their research finds that CMC — limited in their study to e-mail, listservs, and FTP — and face-to-face interaction are not acceptable alternatives to each other. As the researchers claim, “The face-to-face channel has more social presence than the Internet; the possibility of immediate feedback with face-to-face interaction conveys greater personal closeness.” In short, one medium cannot effectively replace another; in most areas, face-to-face interaction was found to be richer and more satisfying.

Finally, although Tenorio (2003) believes that the implementation of CMC could be beneficial, he argues ultimately in favor of an emphasis on the education itself. If the educational experience is not up to par, then introducing CMC into the classroom would only help a lukewarm situation. Bailey and Cotlar (1994) offer a similar argument: CMC should not be introduced just for technology’s sake, but rather as a way to enrich the entire educational experience. They argue, “Technologies are not ends in themselves, but rather the vehicles that can provide more efficient and cost effective methods that compliment more traditional modes of education” (p. 192). Most educators would agree that introducing technology for technology’s sake is not effective for the student or the classroom experience. Thus the traditional modes of education must be in place and must be effective for the student in order for the computer-mediated supplementation to be effective as

well.

In short, those scholars who argue against the whole-hearted introduction of CMC into the classroom feel that while this new technology undoubtedly could supplement the instruction of the professor, it must be introduced with caution and trepidation. Their research has found that face-to-face interaction between professors and students cannot be blindly replaced by instruction via the Internet. Such technology could both take away from the advantages that face-to-face interaction offers and detract from the entire learning experience.

What Next?

Obviously then, the question of the benefits and advantages of CMC in the education setting cannot be answered by a simple yes or no. Several factors come into play when the professor considers introducing CMC in the classroom. Is CMC going to replace face-to-face education all together, or simply supplement it? How will the individual professor measure its success or failure? Are the limitations of lowered cues and asynchronous time strong enough to warrant avoiding exposure to a phenomenon that is obviously here to stay? This study investigates the issue of CMC in the classroom and will contribute to the discussion of its benefits and drawbacks. More specifically, this paper explores student satisfaction levels of CMC, shown to be by itself an indicator of student performance, in conjunction with two areas of communication that has also been shown to have a great deal of impact on a student's education: communication apprehension (CA) and writing apprehension (WA).

Student Satisfaction Levels

One of the variables explored in this study is group satisfaction: essentially, whether student perceptions of both the virtual and face-to-face situations are positive or negative. Previous research has already looked at satisfaction levels in students as related to distance education and online environments (e.g., Card, 2000; Scalia and Sackmary, 1996). These studies indicate that satisfaction levels are important to understanding how both professor and students interact in online situations and among other members of a class. In one study

that involved distance education courses at Regent University, Virginia, many of the faculty had become concerned that lower levels of student satisfaction with the online courses had resulted in lower grades and participation. Woods (2002) writes, "Several students indicated feeling isolated from faculty and other students in the class. These same students demonstrated high levels of procrastination and low levels of participation in required online group discussion" (p. 379). Although Woods' research suggested that an increase in the numerical output of CMC from professor to student may not raise satisfaction levels, this same research shows how important it is to study this variable in terms of the Internet. While these studies have primarily examined individual levels of student satisfaction, we can apply these same principles to studying group levels of satisfaction. Just like CA and WA, student satisfaction becomes a critical factor in determining student grades and student participation in a course.

Communication Apprehension

Jerry Seinfeld once said, "Surveys show that the #1 fear of Americans is public speaking. Death is #2. That means that at a funeral, the average American would rather be in the casket than doing the eulogy" (David and Seinfeld, 1990).

Many people report a fear of communicating in public, whether giving a speech in front of colleagues or presenting a project proposal to only one supervisor. Researchers have dubbed this fear of communicating in public communication apprehension. According to McCroskey and Richmond (1977), communication apprehension (CA) is an "individual's level of fear or anxiety associated with either real or anticipated communication with another person or persons" (as cited in McCroskey and Daly, 1987, p. 142). Individuals with high levels of CA are mentally afraid and can even become physically sick over the thought of communicating with others. The higher the level of CA, the worse the fear becomes.

There are two different types of CA: trait and state. Freimuth (1982) explains that state CA comes with a time- and place-specific situation that can induce the CA. Perhaps a business worker is only afraid of speaking in front of his boss, or a student taking Public Speaking is only timid in front of an entire classroom. On the other

hand, fear or anxiety with respect to many different communication situations characterizes “trait” apprehension. Thus a person with high trait CA “may be anxious about speaking to one other person as well as giving a public speech” (Freimuth, 1982, p. 123). Although categorized differently, both trait and state levels of CA can influence how individuals perform in a variety of situations. The issue for this study is not necessarily which CA category a student may face (state or trait), but rather how their overall level of CA affects their educational satisfaction in a group environment.

Previous research indicates that CA can indeed affect student performance and satisfaction in the classroom. Several studies have concluded that students with low CA (less apprehension about communication) have a better chance of succeeding in the classroom (e.g. McCroskey and Richmond, 1977; Freimuth, 1982). In short, those students who are not afraid of speaking up in front of the class or in front of the professor have a much better educational experience than their peers do. They are perceived to be more involved, friendly, and intelligent than other students (Daly, 1991). Higher levels of CA are more often associated with dropouts and lower GPA scores. But how can one difference between students so greatly impact their classroom performance? Good communication skills have become essential in several of today’s environments. Grau and Grau (2003) argue, “stronger, more sophisticated communication skills are essential for leaders of the twenty-first century workplace” (p. 3). Great importance has been placed on good communication skills in the workforce, and this emphasis has naturally been carried over to the classroom. To succeed in the classroom means being comfortable in many different types of communication settings. The classroom, however, does not require just good verbal communication skills; the ability to write and effectively express ideas in writing is becoming even more essential.

Writing Apprehension

In addition to a fear of communicating in public, many students may also hold a fear of communicating on paper. Daly and Miller first called this fear writing apprehension (WA) in 1975. They note that “Individuals with high apprehension of writing would fear evaluation of their writing, for example, feeling that they will be negatively rated

on it. Thus they avoid writing when possible and when forced to write exhibit high levels of anxiety” (p. 244). One of the main factors in the onset of WA is this fear of evaluation or judgment, whether on the part of peers or supervisors. Daly (1978) adds, “The apprehension construct is concerned with a person’s general tendencies to approach or avoid situations perceived to demand writing accompanied by some kind of evaluation. The high apprehensive individual finds writing unrewarding. Consequently, he or she will avoid, if possible, situations where writing is perceived as required” (p. 10). Students with high levels of WA often perform lower on essays and on standardized tests like the verbal section of the SAT (Daly, 1978).

Unfortunately, situations in which some type of writing is not required are becoming harder and harder to find. More and more jobs are requiring a comfortable understanding of the English language and how to write effectively. Even in 1977, Daly and Miller understood that our occupational world is demanding more writing. Although essays and papers may not be required every semester, almost everyone with a job must possess some kind of writing competency (Daly and Miller, 1977). In the twenty-first century, as our economy is moving further away from the industrial to the digital and informational, work involves not just face-to-face communication but also more memos, letters, e-mails, presentations, and other written forms of dialogue. Therefore, just as with CA, it is important to measure the level of WA in any student who hopes to enter the workforce.

Relating WA and CA to CMC

Once originally confined to traditional communication, CA and WA can now be expanded to all areas of communication, including computer-mediated communication (Daly and McCroskey, 1997). Because CMC is a unique environment that combines both written and “verbal” forms of communication, it is necessary to study both CA and WA levels in students. Like satisfaction, previous research has already focused on why CA and WA are vital to understanding more and more about the new phenomenon of the Internet (e.g., Campbell and Neer, 2001; Mabrito, 2000; Patterson and Gojdz, 2000). Campbell and Neer (2001) argue that CA can have an impact on how individuals choose to communicate on the Internet and their

communication styles. In looking at the online behavior of high WA students, Mabrito (2000) found that those particular students were more apt to participate in global newsgroups rather than those based in a local setting. In other words, those students who were afraid of writing chose to interact with strangers rather than those individuals closer to home. Finally, Patterson and Godjdyz (2000) examined various forms of communication apprehension with different media, concluding that a particular type of anxiety did not affect an individual's decision to use CMC. Thus, several different studies have already looked at various aspects of CA and WA in terms of CMC. Again, the assumption has been that because humans are typing and communicating at the same time while engaging in CMC, one is justified in studying both WA and CA.

Both CA and WA are related to a student's success and in the classroom; thus, individual levels of these characteristics can help determine their performance and more importantly, their satisfaction in a CMC environment. By giving the students a project that forces them to work within both a CMC and a face-to-face situation, we can see if and how the WA and CA levels are correlated with the students' own satisfaction with a group project. Initial findings suggest that because WA and CA arise in many different situations, these two attributes will naturally carry over into the CMC situation as well (McCroskey, 1997). If students are uncomfortable with writing or communicating in face-to-face situations, then they will be uncomfortable writing or communicating in chat rooms. Consequently, one could argue that satisfaction would decrease as a result of this discomfort with chat rooms.

At the same time, however, we must remember that CMC is *not* like regular communication. We cannot say that the computer is another human; talking with someone across the world on the Internet is not the same as chatting with them face-to-face. How will this medium affect the student's level of CA and WA? Will the student believe that it is easier or harder to communicate via computer? By comparing group projects completed in a CMC environment and in a face-to-face situation, we can see if the medium affects the levels of apprehension as well as the levels of satisfaction.

Research Questions

Thus, the aim of this study can be set out in these questions:

RQ 1: Will varying levels of CA affect student satisfaction in a group project performed in a face-to-face situation?

RQ 2: Will varying levels of CA affect student satisfaction in a group project performed in a virtual situation?

RQ 3: Will varying levels of WA affect student satisfaction in a group project performed in a face-to-face situation?

RQ 4: Will varying levels of WA affect student satisfaction in a group project performed in a virtual situation?

RQ 5: What are the effects of face-to-face and virtual environments on the three dependent variables of communication apprehension, writing apprehension, and group satisfaction?

RQ 6: How will students rate their own satisfaction in both face-to-face group work and virtual group work?

RQ 7: What implications, if any, will these findings have on whether to introduce chat in particular, and CMC more generally, into the classroom?

Methodology

This is a two-condition study (virtual and face-to-face) within-subject experiment (n=23) that measures three dependent variables: CA, WA, and group satisfaction. To measure these variables, three previously tested, reliable surveys were used.

Participants and Course Description

Participants in this study were students in an upper-division elective communication course entitled COMM 380, "Communication and Technology," offered at a medium-sized university in the Southeast. The students were mainly juniors and seniors and selected the class based on their own interests and schedules. The course fulfilled the elective requirements for the communication major and also counted towards general education requirements. This is the third year that the course has been offered at the college. The description from the course's syllabus outlines the purpose and goals of the class:

The purpose of this course is to introduce the student to the

intersection of communication and new technology. Specific topics to be covered include historical perspectives on communication and technology, computer-mediated communication (CMC), online identities, online relationships, virtual communities, virtual organizations, pop culture, critical views, and more. The goal of the class is to understand both theoretical and practical implications and applications of new technology and communication material.

The class was offered three times a week, meeting for fifty minutes at a time. Main evaluation methods included a major research paper due at the end of the year, three tests that covered both the textbook and lecture materials, regular activities on WebCT, and reflection papers that further discussed course topics.

Before this study began, it was assumed that students had a general working knowledge of both computers and the Internet. Because these were juniors and seniors at the college, the researchers felt that they had encountered a form of this technology at some point in their previous academic years. At the same time, the professor took time during a class period specifically to explain WebCT and the chat features within that network. Thus, when the students were asked to sign on for their group projects, they would be familiar with the basic technological cues.

Procedure

In this study, students were randomly assigned to six different groups on the first day of class. These groups then worked together during the rest of the semester on the assigned tasks. The assignments for the group were to take two common topics in discussions of communication technology (namely, online dating and online communities) and, using three news articles provided by the researchers, to discuss the topics and specifically to relate them back to course materials. Thus, the students analyzed case studies based on real events in the news and used theories that they had learned in class to back up their conclusions. While every group examined the same subjects, one set of three groups completed all the work for their first project face-to-face, while the other three groups did their first project

virtually. The two sets of groups then exchanged media for the second project, thereby avoiding ordering biases. A group paper was then written after the groups had met, summarizing the group's findings. In addition to this group paper, students were asked to write an individual paper on their experiences.

Students had approximately one month to complete both assignments. They were first asked to examine online dating and then online communities. The groups met for about a week and a half, during which they had to discuss the three articles and the questions posed by the professor, and write a group paper together. After the prescribed period of time ended, the group papers discussing the articles and the group's findings were due. One class period after the group papers were due, the students turned in their individual papers. These papers were reflections on the student's experiences in their groups and what they liked and did not like.

The purpose of this study was to evaluate student satisfaction in small groups that worked together to complete a task in both face-to-face and CMC environments. Therefore, it was necessary to devise a task that would allow for effective small group work. On one hand, the specific task chosen for this research was not important: students would not be evaluated specifically on the quality of the completed task. They would instead be graded upon their participation in the group and their cooperation in the three surveys that were administered throughout the semester.

On the other hand, the specific task *did* matter. If the students did not show some vested interest in the task they were assigned, one could argue that the quality of work would diminish and consequently, the levels of satisfaction of the groups would diminish as well. Straus (1999) argues that when designing a research project involving small groups, "most small group researchers would agree that one cannot fully understand group process or performance without taking into account the nature of the tasks being performed" (p. 166). In other words, the task that was assigned to these communication students would have an impact on the subsequent research and data.

The task chosen for this study was selected and designed based on a typology developed by Straus. She argues that tasks can fall into four different categories: generate, choose, judgment, and negotiate

(Straus, 1999). Specifically, this project used the “judgment” task based on its greater interactivity and required cooperation among group members. Straus claims that “because the group is seeking a preferred, rather than correct, answer, attaining consensus requires communication not just of ‘facts’ but also of values, beliefs, and attitudes about the merits of alternative solutions” (p. 170). On its own, meeting with a group and answering a set of yes/no questions is not considered to be a judgment task. The group members are also expected to debate an issue among themselves, experience conflict, and come to a consensus based on individual beliefs and the combined beliefs of the group.

Independent Variables

In this study, face-to-face and chat room interaction were analyzed to measure their effects on group satisfaction, CA, and WA. The groups were required to complete two case studies: one done entirely through face-to-face interactions, and one done entirely through the chat room technology offered by WebCT. One set of three groups conducted their face-to-face project first, while the others first interacted via chat room. The two media were then reversed for the second case study, in an attempt to avoid any ordering biases.

Both face-to-face and virtual groups were required to meet three separate times for thirty minutes each. It was necessary to set some boundaries as to how often the groups would meet and for how long. Although the groups would necessarily have to meet at some point to complete the task, a required number of meetings were set to establish a sense of camaraderie in the face-to-face groups and a real “virtual community” in chat interactions. Jones (1998) argues that for a cyber-place, such as WebCT, to be considered a true virtual community, the groups must meet four criteria: (1) the groups must meet primarily in an interactive environment; (2) the groups must include a wide variety of different students (or communicators); (3) group members must establish a minimum level of sustained membership; and (4) group members must sustain a minimum level of activity. Although Jones’ research focuses specifically on virtual interaction, the same criteria were used for the face-to-face groups in this study to ensure consistency and accuracy.

Dependent Variables

Students also used the WebCT technology to access the surveys that were used to evaluate group satisfaction, CA, and WA. These surveys were administered three times during the semester: once at the beginning of the study, next after the first task was completed, and finally after the second task was completed. Students had five days after the task was turned in to the professor to complete the surveys.

Group satisfaction levels were measured using the Small Group Relational Satisfaction Scale (RSS) developed by Anderson, Martin, and Riddle (2001). (Wave One: $\alpha=.93$, $sd=.45$, $mean=3.87$; Wave Two: $\alpha=.86$, $sd=.68$, $mean=3.83$.) Answer choices were given in a five-point Likert scale, with 5 meaning more satisfied with the group. This scale was chosen because it evaluates not the performance or numerical success of a group, but rather how the students *felt* about being in their own particular group. Anderson, Martin, and Riddle (2001) argue that the usefulness of the RSS comes from “identifying specific factors that relate to relational satisfaction in on-going workshops. Specifically, attitudes about groups, assertiveness, responsiveness, and feedback were related to the satisfaction that members experienced from workgroup relationships.” Different group conditions were provided to students for evaluation in the survey: for example, “I look forward to coming to the group meetings,” or “I prefer not to spend time with members of the group.”

The Communication Apprehension scale was taken from by Daly and McCroskey (1997). Specifically, this study utilized the Willingness to Communicate (WTC) scale because it has been proven to be the broadest and most reliable test for studying CA (McCroskey, 1997). (Wave One: $\alpha=.92$, $sd=.63$, $mean=3.54$; Wave Two: $\alpha=.94$, $sd=.72$, $mean=3.46$.) The scale offers a variety of scenarios and asks participants to predict how often they would willingly speak in that situation on a 0% to 100% scale. Answer choices were again on a five-point Likert scale, with 1 being 0% and 5 being 100%. The WTC survey covers several basic areas of communication including groups, meetings, interpersonal interactions, public speaking, conversing with strangers, acquaintances, and friends (Daly and McCroskey, 1997). In addition to providing sub-scores for all these areas, the WTC scale

also provides an overall score of the student's willingness to communicate. The WTC scores reflect a level of communication apprehension; higher WTC scores actually translate into a higher degree of comfort in a variety of communication situations.

The final survey administered to the students was the Writing Apprehension scale, first developed by Daly in 1975. (Wave One: $a=.96$, $sd=.71$, $mean=3.33$; Wave Two: $a=.96$, $sd=.66$, $mean=3.41$). Still being administered today, the test was first designed to aid teachers in identifying those students who may struggle in their studies because of WA (Daly, 1975). The test was designed to measure a student's level of WA in a variety of situations. First used for compositions, the WA scale can now also be applied to CMC because of the written element of communicating in a chat room or over e-mail. The survey uses a five-point Likert scale and asks students to identify with a series of statements regarding writing and different writing situations. A score of 5 meant that the student was very comfortable writing.

Again, like the scores for communication apprehension, the writing apprehension scores reflect a student's level of comfort; higher numbers mean higher writing comfort. Because higher scores indicate that students feel more comfortable writing and communicating across a variety of settings, rather than being more apprehensive in a setting, the terms CA and WA will now be interposed with Communication Comfort and Writing Comfort. In the raw scores from the two surveys, higher values for CA and WA do *not* mean higher levels of communication apprehension and higher levels of writing apprehension. When talking about high scores on the CA and WA scales in the results, these numbers translate into high levels of Communication Comfort and Writing Comfort.

Results

Because the first four research questions asked about a relationship between the independent and dependent variables, a regression test was first used to determine this relationship. Next, paired t-tests and subtractive tests were run to calculate the differences in the three variables between the two media and to see if there were any biases based on ordering.

TABLE ONE
Regression Tests to Measure Relationships between Variables

Group Satisfaction:	F-t-F Setting	Virtual Setting
Communication Comfort	B=.14	B=.55, p=.001***
Writing Comfort	B=.42, p=.0012**	B=.53, p=.014

NOTE: n=23; *p < .05; **p < .01; ***p < .001

The first research question asked if there was a relationship between Communication Comfort and group satisfaction in a face-to-face setting. A regression test was run to establish this relationship was used for both waves of the experiment. As shown in Table One, the regression test showed that beta=.55. There was no statistically significant correlation between Communication Comfort and group satisfaction in the face-to-face setting.

The second research question was whether there was a relationship between CA and group satisfaction in a virtual setting. The regression test showed a beta of .55 ($p < .001$). These results are indicated in Table One. There was a positive correlation: as Communication Comfort increased in the virtual setting, the group satisfaction levels increased as well.

The third research question examined whether there was a correlation between Writing Comfort and face-to-face group satisfaction. As illustrated in Table One, in the face-to-face setting, a regression test between scores of Writing Comfort and group satisfaction revealed beta=.42 ($p < .01$). The higher the Writing Comfort of a student, the higher the levels of satisfaction were in the face-to-face setting.

The fourth question asked about the correlation between Writing Comfort and satisfaction in a virtual setting (see Table One). Like Communication Comfort, there was a positive correlation between these two variables. The regression test resulted in a beta of .53 ($p <$

.05). Students were comfortable writing not only in a face-to-face setting, but also in a virtual setting.

TABLE TWO
Mean Scores and T- Scores for Three Dependent Variables in Two Media

	F-t-F Mean	Virtual Mean	T-Test
Communication Comfort	3.47	3.54	t=-1.39
Writing Comfort	3.34	3.41	t=-1.67
Group Satisfaction	3.79	3.90	t=-1.06

NOTE: n=23

Tests were then run to answer the fifth research question: what are the effects of the two media on the three dependent variables? In other words, we sought to determine if scores would increase or decrease based on working in the face-to-face setting or in the virtual setting. A paired t-test was used to compare the scores for the three variables for each individual in a face-to-face versus virtual setting. A high t-score indicated that the levels of apprehension and/or satisfaction were quite different from each other in each setting. A negative t-score would indicate higher virtual scores in the three variables: higher Communication Comfort, higher Writing Comfort, and higher group satisfaction in the chat room (see Table Two). The only test that was marginally suggestive was for Writing Comfort, with $t=-1.67$ ($p=.11$). For CA, the t-test was -1.39 , not being statistically significant. The WA t-test value was -1.67 , again not significant, but the p-value was the closest, being .11. These results suggest that the greatest difference in the scores for the virtual and face-to-face groups occurred with high levels of writing apprehension. The tests for Communication Comfort and group satisfaction did not show particularly large of differences in scores between the virtual and face-

to-face groups.

TABLE THREE
Subtractive Tests Among the Three Variables to Test for Order Effects

	T-Scores
Communication Comfort	t=1.53
Writing Comfort	t=1.96 (p < 1.0)
Group Satisfaction	t=.44

The final test was a subtractive test between face-to-face and virtual scores in the three variables (see Table Three). This subtractive test looked for order effects between the two media: whether there was a difference between working first in the virtual setting or working first in the face-to-face setting. If the tests from this subtractive test were significant, that would indicate that order was important for the three conditions. In other words, participating in the virtual setting first would have a different effect than participating in the face-to-face first. The subtractive value for Communication Comfort was $t=1.53$, which was not statistically significant. The subtractive value for satisfaction was $t=.44$, again not significant. However, the subtractive value for Writing Comfort was $t=1.96$ with a p-value of .07 (see Table Three). The mean for face-to-face first was $-.14$ with a standard deviation of .12. The mean for virtual first was $.01$, with a standard deviation of .01. While this is not statistically significant, it is marginally or suggestively significant. These statistics thus *suggest* that Writing Comfort scores would change if going from face-to-face to virtual or if going from virtual to face-to-face. A subsequent focus group that was conducted among these same students offers insight as to why there might have been an ordering difference when the study had been designed with the intention of eliminating as much bias as possible (see below).

Student Perceptions on Satisfaction

The second part of these results is a qualitative analysis of students'

reactions to working either in a face-to-face or virtual setting. Students were asked to write a one-page reflection paper after each task was completed and were instructed to comment on their experience: what they liked, did not like, and what they would change if they could. In other words, the students were asked to reflect on their own feelings of satisfaction in both the face-to-face and virtual environments. While there is not a direct connection to CA and WA as in the quantitative section, these comments provide more depth into the issue of introducing CMC into the classroom. In general, the response papers focused more on student and group satisfaction levels, rather than their own perceptions on their levels of CA and WA.

Again, the comments from the students generally reflected both the advantages and disadvantages of working either in a face-to-face or virtual setting. The main advantages of face-to-face, according to the students, was the greater amount of discussion and ideas, the friendships that were formed, and the presence of nonverbal cues. For example, one student wrote, "Besides the ease of communication, I encountered one unexpected upside, I formed friendships. I was able to get to know my group members on a personal level through idle chatting at our group meetings." Another student stated, "Looking back now, I realize that I relied on the nonverbal cues a lot more than I normally would with someone. Everyone showed nonverbal cues that meant they weren't certain and this was the main reason other people were willing to speak up and risk being wrong." Overall, the face-to-face setting seemed to be the one with which students were most familiar and comfortable.

However, there are some disadvantages to meeting face-to-face, as highlighted by these students. These main disadvantages included finding a time to meet that was conducive to everyone, dealing with those members who would forget to come or would not share the group load, and the fact that face-to-face group work presents more distractions. One student stated, "In fact, the only problem that was apparent to each member of our group was how difficult it was to find a time in which we could all meet. Each of us has a full course load, along with a job and other responsibilities outside of school." As far as distractions, a frustrated student wrote, "We met at nine p.m. in the library at the request of one person in the group, which everyone agreed

to even though there were some apprehensions about it. It became very clear that nine p.m. was requested so it could be that person's social hour." Clearly, although face-to-face communication is more familiar to the students, it also comes with its own difficulties and challenges.

Many students claimed that the virtual part of this study was their first experience ever working together in a chat room. As with the face-to-face setting, some clear advantages and disadvantages became apparent through the students' writings. The advantages of the virtual setting included the convenience of meeting in a chat room, the informality of such an environment, and the novelty of such a new experience. One student claimed, "It was very convenient to find time to meet because we didn't have to leave our houses. We just had to sit in front of the computer and we could be in our pajamas and so it was more relaxed than meeting in the library." As to his first time in the chat room, a student wrote, "Overall, I liked the assignment because it required me to explore a new medium of self expression and discussion, rather than the face-to-face setting I am accustomed to." Thus, these students did recognize the importance of experiencing new situations and did recognize some of the advantages of introducing CMC in the classroom.

These same students, however, also felt the disadvantages that virtual teamwork presented. These disadvantages included technological malfunctions, the lack of nonverbal cues, and the difficulty in coordinating ideas among members. Comments like this from a student were typical in many of the reflection papers: "delayed entries are something to get used to while chatting online. A participant may read a comment and respond to it only to find that when he/she glances at the screen, the remark being responded to has been forgotten." Other difficulties in the chat feature of WebCT included being kicked out of the chat room and struggling to log into the chat room in the first place. Student comments were also focused on how difficult it was to coordinate ideas and papers while working exclusively in the virtual setting. "The thing that I didn't like about the assignment was that it made our jobs harder. We had to collectively write the paper, but do it in a way as to not physically meet." E-mail attachments and other forms of asynchronous communication made this hurdle

slightly easier to overcome, but students still found it tempting to meet face-to-face to exchange ideas.

Some students definitely favored the face-to-face environment, others liked the virtual setting, and still others were comfortable in both. One student who clearly had a difficult time in the chat setting wrote, “Even though I was excited in the beginning to get to meet virtually, by the end I know I will NEVER want to chat again — EVER!” However, another student who completed the first task virtually and the second task face-to-face wrote, “Although at first I assumed that meeting over the Internet was more difficult than meeting face-to-face, I am starting to see the convenience of online group work. Meeting online seems to be beneficial in many ways that I never even realized before completing this project.” Finally, one student believed that meeting in both face-to-face and chat situations was rewarding. She wrote, “Both interactions allowed my group members and me to meet effectively and complete the discussions about our articles necessary to compose a group paper. I enjoyed both meetings and would prefer either one.” The opinions about working in a face-to-face setting as opposed to a virtual setting seem to be as varied as those opinions on which is more beneficial to the students.

While these reflection papers proved valuable in observing how students felt about their experiences both in the face-to-face setting and in the virtual setting, it is ironic that a study measuring writing apprehension would ask those same students to *write* about their experiences. An alternative method of a focus group among the same students was thus employed to eliminate this concern and gather direct feedback from the students themselves. Again, the discussion focused on how the students felt about their experiences. Similar points were made about the advantages of the face-to-face environment. One student commented that the “face-to-face feedback was better. The nonverbals helped. You knew when they agreed with you.” The ease of exchanging ideas and materials in a face-to-face setting even convinced one virtual group to “cheat” — that is, to meet once face-to-face to exchange paper ideas when they were instructed to meet entirely virtually. Overall, while the face-to-face environment may have been the most familiar to the students, there were still the same complaints and compliments that seem to arise with any face-to-face

group project.

Likewise, the comments on the virtual setting reflected many of the comments in the reflection papers. One of the main themes in terms of the virtual setting were those supposed “distractions.” A student stated that in the chat rooms, “We got so easily sidetracked. You can’t control the flow of conversation with nonverbal cues.” While this seemed to be a disadvantage to some students, others actually saw this as one of the main advantages to working virtually. A typical comment from this camp was: “We got to know each other better online. The distractions were beneficial. When we met face-to-face, we felt really comfortable together.” Clearly, these distractions, including making breakfast, watching television, or working on two assignments at once, could either have brought the groups together or have gotten them off topic much more easily.

The quantitative results discussed earlier in the paper did mention the possibility of an ordering effect; statistics suggested that going from virtual to face-to-face or vice versa was somehow related to student levels of Writing Comfort. In their focus group, these students provided insight as to why there might be such an ordering bias. One said, “It was so much easier going from face-to-face to virtual. Our paper was much better.” Elaborating on this point, another classmate stated, “You learn people’s work styles much better when going from face-to-face to virtual.” Thus, while this study was designed with the purpose of eliminating ordering effects, these students’ comments indicate that when comparing virtual and face-to-face settings, the order does matter. Meeting face-to-face first seemed to allow the group members the chance to get to know each other and know individual work styles. Meeting virtually did not seem to provide this same knowledge. Clearly, although every effort was made to avoid ordering bias, the very nature of the chat rooms and face-to-face group work undermined these efforts.

Discussion

The Internet is here to stay; how it will shape educational settings and pedagogies is still being dually explored in the classrooms and in communication research. Researchers have yet to offer a definite opinion on whether it is beneficial to introduce CMC into the classroom.

This study contributes to the discussion of CMC and education by looking at the chat medium as it relates to three different variables: communication apprehension, writing apprehension, and group satisfaction levels.

Overall, these tests yield significant statistics that further aids our understanding of communication in the virtual setting. Communication Comfort levels were positively correlated with group satisfaction levels in the virtual setting but not in the face-to-face setting. In other words, when meeting virtually, differing levels of Communication Comfort would help determine group satisfaction. However, this same variable did not seem to indicate the level of satisfaction when working face-to-face. Writing Comfort levels were positively correlated with group satisfaction in both the face-to-face setting and virtual setting. Not only is Writing Comfort a good indicator for satisfaction when working with face-to-face in a group, it is a good indicator for satisfaction when working with a group virtually.

Why might Writing Comfort levels be positively correlated with group satisfaction in the virtual and in the face-to-face setting, and not Communication Comfort? One simple answer might be that the number of students was too small to reveal much statistically significant data for Communication Comfort (as will be discussed below). However, this does not explain why Writing Comfort variables were significant were looking at group satisfaction levels in both settings. WA was also the one variable that was suggestively significant for comparing differences in the two environments, unlike group satisfaction or CA.

One of the main tasks of the group was to write a group paper. Whether working face-to-face or virtually, students had to examine and evaluate each other's writing in order to form a coherent paper. The virtual setting, however, included not only this element of the project, but also something more: the presence of the written word on the computer screen. Students still are thinking of communication within a chat room as being mainly *written*, not *verbal* communication. Although the use of "emoticons" and avatars seem to introduce verbal cues into computer-mediated communication (e.g., Huffaker and Calvert, 2005), this study indicates that many students perceive chat still to be a written medium. This conclusion was supported and

elaborated upon by many of the students' discussions in their reflection papers. As noted above, many students felt that the lack of verbal cues in the chat room and the physical task of using a keyboard made them aware that they were communicating in a different way. One student commented, "I personally had the problem with the actual technical process of typing out what I had to say. I wasn't ever taught to watch the screen and type. I have to look at the keyboard in order to type." In the subsequent focus group, another student commented, that "normal face-to-face wouldn't have a writing element."

Because of the element of writing, computer-mediated communication cannot be an equal substitute for face-to-face communication. However, as the technology continues to improve and advance, perhaps even this obstacle may be overcome. Popular chat servers are now offering voice chat: a way to actually *hear* the others that one is chatting with, and to *talk* back with them (e.g., Guernsey, 1999). If educational programs such as WebCT were to offer this same service, the divide between face-to-face and virtual may be further eliminated.

At the same time, professors might embrace the written aspect of CMC, rather than using it as an excuse to reject the use of CMC in the classroom. Some might argue that because writing apprehension was the main indicator in the virtual setting, professors would not wish to expose students to a situation that clearly made some uncomfortable. However, other educators have realized the benefits of having a writing element in their classroom. For example, Cummings (2004) took full advantage of the writing elements in CMC to help further the English writing skills of Japanese students — students who would naturally be expected to be apprehensive about their writing skills. She discovered that these foreign students were, despite early hesitations, enthusiastic about the opportunities that CMC allowed for practicing writing outside of the classroom. As previously stated by Daly and Miller (1977), employers are looking for a broad range of both good communication skills and good writing skills. One of the main duties of any professor in any discipline is to prepare students for "the real world." By using the chat rooms as a way to improve writing skills, professors could be introducing a writing element where there would not have been one earlier.

Perhaps the surprise that researchers and educators may experience after realizing that students still think of chat rooms in terms of writing indicates a larger phenomenon of trying to define the virtual world in terms of the face-to-face world. After all, chat rooms represent a near synchronous communication style: shouldn't this CMC medium especially be similar to face-to-face? While previous studies may attempt to make CMC more "like" face-to-face with similar verbal cues and communication feedback (e.g., Perrone et al, 1996), perhaps researchers should now focus on making the two media complement each other. While the Internet is no longer considered to be a tool but a medium, as Perrone et al. (1996) argue, educators should remember that it is still primarily a *written* medium. This study indicates that we cannot, and should not, attempt to define the Internet in verbal terms. Because an element of writing is so prevalent in a virtual environment, where there would be none in a face-to-face setting, CMC should be seen as a supplement to and not a true substitute for face-to-face interaction, whether in a social situation or in a classroom.

In addition to suggesting that face-to-face teaching and virtual instruction be seen as complements to each other, this research takes the communication field in the direction of directly eliminating the comparison of the two media. CMC is *not* face-to-face, no matter how technology may improve it. The communication field already acknowledges that there are some styles of communication that are not similar to face-to-face styles. For example, many books and studies look at the importance of nonverbal cues without comparing them to their exact counterpart, verbal cues. The many definitions of CMC should also stop relying solely on verbal definitions — how much is it like face-to-face, in what ways is it not face-to-face, and how one can use CMC to simulate face-to-face. Hardly anywhere in these definitions is the acceptance of the written element that proved so prominent in this study. Overall, CMC is actually an amalgamation of both verbal and written communication. Instead of focusing on how to make CMC more like face-to-face communication, perhaps we should instead be trying to define that "something" that is this new field.

There still exists a larger question of whether professors *should* introduce computer-mediated communication into the classroom, especially in light of this research that suggests that it is still not a true

replacement for face-to-face interaction. A qualitative look at student responses again shows how varied opinions are about the effectiveness and usefulness of chat rooms in the classroom. Some students are in favor of it, while others wish to work exclusively in the face-to-face setting. For example, some students like the ease and convenience of using a chat room, while others are too distracted by technological difficulties and message lags within the virtual structure. Perhaps a compromise is the best solution to this problem. Educators should consider using a combination of both face-to-face and virtual communication in courses and instructions. Rittschof and Griffin (2003) argue that there is a lack of verbal cues in the virtual setting just like these students alluded to; however, they also argue that a face-to-face environment can be simulated and can help strike that balance between the two media. With this compromise, a professor is still combining elements of both verbal (working face-to-face with the student) and written (interacting in chats) communication into education. Ultimately, however, the question of whether it is good to add CMC to a classroom depends entirely on how good that classroom teaching is already.

Limitations

While this study offers insight into CMC, there are still some limitations associated with it. One of the limitations of this study is the sample size; one classroom of twenty-three students was used to generate the data. A larger sample size might have revealed more significant statistics and stronger conclusions. While the researchers followed the minimum criteria outlined by Jones (1998) to establish a sense of “virtual community,” longer time periods for the groups to meet and work together might also have an impact on group satisfaction levels outside of writing apprehension and communication apprehension. While the irony of having writing apprehensive students write a paper to communicate their level of satisfaction was answered by having a focus group with the students, this solution did not address the communication apprehensive students in the focus group. A third option that eliminated both communication and writing apprehension would be useful.

Future Research

Future research in the area of computer-mediated communication and education should continue to explore the question of the effectiveness and usefulness of the virtual environment for both professors and students. Specifically, in the exploration of these same variables — communication apprehension, writing apprehension, and group satisfaction — larger sample sizes may reveal more conclusive data. Further studies may also wish to move in the direction of developing scales that specifically measure CA, WA, and group satisfaction specifically in regards to CMC. While previous research suggested that the surveys used in this study could be transposed, more CMC-specific questions may reveal stronger findings. Other studies may wish to examine the question of the writing element in the virtual setting — especially when a chat room could be thought of as the closest to synchronous communication besides video- and voice-streaming. If chat rooms are still being thought of as written media, will more asynchronous forms of communication like listservs and e-mail ever move away from being considered written? Finally, researchers and educators should explore the possibilities and implications of attempting to turn such a medium into a verbal form of communication, including examining questions such as the effectiveness and usefulness of such a change. The challenge for communication scholars may now be moving away from defining CMC in terms of verbal communication and instead developing the study of CMC as its own discipline.

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