

Communication and Collaboration in the Corridor

**Robert Sanders, Ed.D.
para instructional designs, LLC
Cincinnati
Ohio**

**Presentation:
Tuesday March 5, 2002
8:30-10:00 AM**

INTRODUCTION

Long gone are the days in which students sit in long, straight rows in the classroom, listening passively to the teacher as she lectures on the subject of the hour. Today's educational environment looks drastically different, with students working in clusters of twos, threes, or more, collaborating with one another on multidisciplinary projects that blur the distinction between math and English, social studies and science. Today's students are often actively engaged in the curriculum.

Distance learning technologies appear to be one way in which teachers can offer students the opportunity to continue this collaboration on a broader scale. This potential addresses Robert Selman's contention that educators need to devise ways for students to progress beyond their egocentric views of the world (as cited in Sugar and Bonk, 1995). Reil adds that electronic communities will provide students with a more global education and enable them to view complex issues with a more global perspective (as cited in Sugar and Bonk, 1995). The advantage of distance learning technologies, whether they be phone, fax, interactive television (ITV) or computer mediated communication (CMC), is that they enable students to create shared meanings around roles, ideas, objects, and perspectives. These new opportunities for collaborations and student interactions engage students in a process of shared meanings. According to Reil, electronic communities of learners provide an environment in which these collaborations can take place and students can collaboratively produce and analyze information (as cited in Sugar and Bonk, 1995). Teachers can now take advantage of these new technologies, and the worlds they open up to students, to change the way they teach and learn in today's classrooms.

Today, the emphasis is on distance learning technology, with it being used to provide instruction and opportunities to students who may not have been exposed to this instruction and these opportunities in any other way. Technologies, both ITV and CMC in particular, are becoming more common in educational settings, not only in high schools, but also in elementary and middle schools. Many schools are realizing that distance learning technologies can allow students to connect to people, places, and events outside the four walls of a classroom, without the need to physically leave the classroom. ITV's power is that it allows students to make these connections live, face-to-face, and interactive. CMC technology enables students to learn and collaborate *anytime, anywhere*. Either way, new opportunities for learning are provided.

Just as there are many challenges in a conventional teaching and learning environment, instruction that is mediated by ITV or CMC faces many challenges as well that can impede the effectiveness of the collaboration intended during these mediated interactions. The barriers of distance and of the technology used to bridge that distance are often difficult to overcome. Kochery (1997) found that students learning over a distance often feel alone and separated from not only the teacher, but also from the socialization with other students. Interaction is a key ingredient to the social construction of meaning and information. Students must feel comfortable and willing to work with others to build on what they already know in order to create a new understanding of the world around them. Kochery (1997) went on to say that an important part of learning involves actively working and interacting with other students to construct knowledge. Without this interaction, students can have a much more difficult time learning the intended objectives.

Studies have examined student interaction and collaboration in a conventional classroom environment. However, few studies and fewer theories focus on instruction delivered and mediated via ITV or CMC technologies. This issue of collaboration in a technology-mediated environment is one worth investigation and analysis. Other than the work done by McLuhan and Fiore (1996), there are few researchers or theorists that have really addressed mediation and have developed theories pertaining to the interplay between the elements of mediation that are ever present. Altheide (1995) argued that there is no theory in the social sciences that addresses the relationships between actors, context, events, media, and audience. Altheide uses the term "actors" in this context to refer to individuals who engage in *acts* or *action*. We know that media has a profound impact on how the content is understood, and in a broader sense, how we all make sense of our own lives on a daily basis. Therefore, there is great need for a theory that begins to explain these relationships.

There is much more to know about these collaborations, however, before teachers replace everything they're doing in the classroom with ITV or CMC mediated collaborative activities.

There is a need to make sense of the student interactions that take place in mediated collaborative environments (Sugar and Bonk, 1995). There are many questions that must be asked regarding student collaboration and electronic mediating technologies that have yet to be answered. According to Maines and Couch (1988), these new technologies are changing our sociological systems. McLuhan and Fiore (1996) continue to argue that the medium is the “massage.” It is important for us to understand how and why this is happening and what the impact will be on us later in our lives. Clearly, there is much to be learned about this new educational environment and the impact that technology might have on the mediation of communication and collaboration between students and teachers in today’s classrooms. It is important to look at how the medium used in the collaboration of students and teachers impacts the learning that might subsequently take place during this collaboration. Mediation of communication in any form, or *medium*, is an important and interesting phenomenon to study.

Very little research has been conducted in the area of electronic mediated collaboration or the subsequent mediated construction of communities, societies, or social worlds. Altheide (1994) pointed out that little attention has been given to how individuals communicate and engage in social activity in an electronically mediated environment and how this technology influences this interactivity. Work by Tinzman, Jones, Fennimore, Bakker, Fine, and Pierce (1990) suggested that collaborative groups of students learn better and solve problems better than students working individually, and that communication and collaboration between students is essential for learning. However, these studies do not involve the use of electronic mediating technologies. Therefore, it is important that new and relevant questions be asked about this phenomenon in the context of electronically mediated environments and that research be conducted based on these new questions to better understand the phenomenon in question. Sugar and Bonk (1995) explain that these new types of interaction require us to ask questions about how individuals come to create shared meaning. It is particularly important to look at this interaction and collaboration in the context of the technology or medium used.

In order to accomplish this end, researchers must choose a theoretical lens and a methodology that allow one to focus on the problems and concerns of the subjects, or actors, and to generate potential solutions based on these particular issues. The following paper has been adapted from a much larger study conducted. What follows are those questions, data, and conclusions that pertain to mediated communication and collaboration.

The specific focus of my research was to answer the question, *How is collaboration accomplished through the use of electronic mediating technologies?* To answer this research question, I also needed to ask the following question, *How do distance learning (DL) technologies contribute to the nature, organization, and consequences of teacher and student interactions?*

In order to answer this question and to guide and focus my own investigation of the problems and concerns that arose from the use of technology mediated collaboration, I used the theoretical lens of Symbolic Interactionism (SI), first developed by Mead and later expanded by Blumer and others (Blumer, 1962; Blumer, 1969; Mead, 1934).

REVIEW OF RELATED LITERATURE

Electronic Mediated Communication

Communication can be defined as interpreting, ordering, exchanging and sharing of meaning (Altheide, 1995). Altheide went on to argue that communication is the foundation to any social activity and is therefore necessary in symbolic interaction. Rothenbuhler (1988) provided a particularly insightful description of the relationship between communication and SI:

Communication is thought of to the extent that it’s about something, not in the ways it is something. Communication can be, in this referential model, informing about something or even offer what is called an indirect experience of something. But social life itself is communicative; its experience-ability is due to its communic-ability. The experience of social life is the communicative enactment of symbolic structures just as communication is the meaningful experiencing of social life (p. 241).

As Rothenbuhler indicated, actors experience social life through the process of communication. He argued that communication provides us the means of experiencing our environment and our ability to communicate, and hence interact with others, enables us to experience what he is calling a social life. As Altheide pointed out earlier, communication is the foundation of social action and without it there would be no social action or social objects. Interaction requires communication.

All communication involves some kind of medium. The most basic of these is the human voice. We often don't think of the vocalization of words and phrases as a medium of communication, but of course it is. Just as Morse code and smoke signals are also examples of communication media. Each one of these mediates a message between the sender and the receiver and has been developed by humans to assist them as they communicate and interact with one another. The focus of this study is on how one particular set of technologies affects various communicative activities in school classrooms.

When a message is communicated, it is mediated in some way. Altheide (1995) explained that there is an impact to the logic and form to any medium that is used for mediation of communication. Each medium will interpret, order, exchange, or share meaning of a message in its own unique way, according to the logic and form of that medium. A medium organizes and presents communication in a particular way that may have social consequences, and, the way in which a medium does this is independent of the content of the message being communicated. Media are not "neutral conduits." Rather, they are symbolic objects that stand for different meanings for different people (Altheide, 1995, 1999). The fact that the medium has the potential of shaping the message being communicated has serious implications for the study of communication and related areas.

My purpose is not to examine each and every medium that can be used to mediate communication. Rather, I am interested in a select group of information technologies that support electronic mediated communication (EMC). These technologies include various synchronous and asynchronous distance learning technologies in use in many schools today (e.g. videoconferencing or interactive television, email, and various GroupWare applications). Often, these are used in conjunction to support communication and collaboration in distance learning projects. Combinations of technologies that promote and support communication and collaboration between students can help to enhance learning (Pea, 1993). Tumminello & Carlshamre (1996) explained how these technologies can be used both to discuss project issues synchronously, but also by allowing collaborating students and teachers to work within their own schedules.

Many of the studies done in the area of electronic mediated communication have been focused on the use of these media in education and on learning. Students must not be distracted by the technology they are using to communicate. Wasson and Bourdeau (1988) found that the media used to communicate must be as transparent as possible to those using the media for the message to have any impact on learning. Technology must be both easy to use and have minimal impact on the transmission of the message. EMC has also been found to aid actors in the social construction of knowledge (Bull, Kimball, & Stansberry, 1998) and promotes equal access to collaborative interaction and learner reflection (Murphy, Drabier, & Epps, 1998). Students who use EMC to communicate with others have opportunity to reflect because of the asynchronous nature of many mediating technologies. All students participating have the same chance of contributing and interacting with the group to construct knowledge. Networked communication environments provide a means of interaction that allow for collaborative learning to take place which, in turn, leads learners to higher levels of thinking (Bull, Kimball, & Stansberry, 1998). Students can raise questions, discuss issues, and take interdependent responsibilities in the solving of problems when using networked technologies. In fact, the use of EMC in distance learning applications has been found to improve the perceived quality of the process of problem solving and student satisfaction with that process (Yaverbaum & Ocker, 1998). In a similar study of students in a telecommunications learning environment, Aviv and Golan (1998) found that students were very satisfied with the course and that they believed that this environment helped them understand the course materials. Perhaps one reason for this is that EMC allows for more student analysis and reflection (Yaverbaum & Ocker, 1998). Students aren't exposed to the distractions that exist in the conventional classroom. Often, time is not as much a factor in EMC environments, thus allowing students to take the time needed to plan and prepare a quality contribution. Aviv and Golan (1998) found that the level of electronic communication and

collaboration of students is based on how important this collaborative work is in the learning process, the project design, and the leadership. Therefore, it is imperative that the teacher realizes this importance of collaborative work early on and conveys that importance to her students.

Despite the number of studies that begin to describe electronic mediated communication in educational settings, Baym (1995) has pointed out that there is a gap in the literature or around electronic mediated social interaction. There are a few, including one conducted by Waskul (1997) who stated that electronic mediated communication can change social worlds by modifying time, space, and barriers to interaction. With these modifications, interaction can take on an entirely new dimension. The characteristics of the medium used in communication and interaction may have an effect on the message being communicated, and may in fact, convey a certain message itself that is independent of the intended message. Couch argued that while media has an impact on actors independent of the message it transmits, the interaction and the social structures in which these interactions occur that determine the effects of these media (Chen, 1995). In other words, while the medium may have a message, it is limited in some ways by existing social structures and the interaction itself. The use of electronic communication technologies is a social act. Actors construct their use of media as they interact with others (Chen, 1995). Media is not in control of the message conveyed. The actors are choosing the media and constructing mediated messages through their interactions with others.

Collaboration

Collaboration can be many things to many people and can manifest itself in many different activities and on many different levels of complexity and concreteness. Jehng (1997) defined collaboration as a process in which several actors share their own bodies of knowledge to form one single body of knowledge. Collaboration is a mutual, shared construction of knowledge very similar to Hilz's (1998) assertion that collaboration is a learner centered activity and that it emerges out of student interaction and sharing in the construction of knowledge through evaluation and cooperation. Hilz use of the term "cooperation" is important as many often confuse "cooperation" with "collaboration." They are not the same. Cooperation can be defined as individuals *acting* jointly with others (Holland, 1998). Holland went on to explain that collaboration, on the other hand, is defined as individuals *working* jointly with others. Collaboration requires greater interaction between actors than cooperation because collaboration usually requires that actors work together on all parts of the project rather than by dividing the work (Jehng, 1997). While this may be a subtle distinction, it is an important one. People *acting* jointly and *working* jointly are two different things. Working implies more of an awareness of the other, and more importantly, a conscious effort to share with them in the construction of knowledge, joint negotiation of alternative ideas, concepts or possibilities, and reliance on other students and teachers as resources (Fjuk, 1995). Salomon (1992) argued that working collaboratively requires shared information and meanings, a complementary division of labor, and the need for joint thinking that can be examined, changed and elaborated upon. Collaboration is dependent upon activities that will support this thinking, working, and sharing. Students are not going to be collaborative if the assignments emphasize individualization or competition. Oliver, Omari, and Herrington (1998) argued that two of the most important factors in successful collaboration are group composition and specially designed learning activities. They found that students who had better relationships with one another tended to collaborate better and that role definition in the activities help to structure and support collaboration. Students must also see a value in working together. The work should not, and cannot, be contrived. Collaborative work must be authentic work that is content related, participant dependent calculations, problem solving or debates (Berg, 1999). For collaboration to occur, students must find value in working together interdependently (Comeaux, Huber, Kasprzak, & Nixon, 1998).

Collaborative learning has a number of advantages, including more frequent interactions, higher order thinking, more time in the zone of proximal development, and the need for creative and critical thinking skills (Oliver, Omari, & Herrington, 1998). Kochery (1997) argued that the greatest benefits of collaboration are the increased sense of social support and more positive personal interactions between students and teachers. Collaboration requires genuine interdependence in which students are sharing information, meanings, conceptions and conclusions. Collaborative products have gone through the process of examination, change, elaboration, and negotiation by students within a collaborative group (Wasson & Bourdeau, 1998). These researchers went on to explain that for collaboration to occur, students must "share

goals to complete activities, share activities to achieve goals, share resources to complete activities, and share activities to produce resources” (p. 213).

Unfortunately, most of the research in collaborative learning focuses on actors who are physically face-to-face (Spector, 1999). Since my study was more interested in mediated collaboration, finding those few studies that actually examined and discussed collaboration in an electronic mediated environment was necessary. What I found was that most of these studies centered on the use of CMC as the mediation tool. Actor collaboration, in these cases, was mediated by email, chat rooms, threaded discussions, or all of the above. Very few studies included ITV as a tool to mediate communication or collaboration. Regardless, many of the issues raised in these studies are relevant to the impact of any mediating technologies on collaboration. A discussion of these other mediating technologies also helps to build that contextual wall of research to identify where in the wall are the “missing bricks.”

According to Levin and Ben-Jacob (1998), “Collaboration will be the hub in the wheel of pedagogical strategies necessary for success in the new millennium.” Collaboration will be important for the 21st century, as the workplace will require more and more, the ability for employees to work with one another. The workplace of the 21st century will also be different in that many times these workers will be separated by time and/or distance. Therefore, Levin and Ben-Jacob (1998) argued that it is imperative for teachers to provide their students with meaningful collaborative experiences, both in conventional classrooms and in on-line environments. However, it is important to note that on-line often implies that there is a separation of learners in terms of time and/or distance. And, distance adds additional complications to collaboration (Tumminello & Carlshamre, 1996). This supports Rojo and Ragsdale, (1997) concern that there are many problems inherent in the development and participation in a collaborative electronic community. When collaborating over a distance, actors must make more changes in the way they manage this collaboration than in how they work (Tumminello & Carlshamre, 1996). One challenge of on-line environments, and one advantage as well depending on one’s perspective, is the fact that the learning group may be much more diverse than a group in a conventional classroom. Actors of different ages, genders, nationalities, ethnic groups, cultures, economic groups, etc. are more able to come together around a shared project or problem. The advantage is that, in collaborative electronic environments, all these actors engaged in the project can offer resources to others in the group (Rojo & Ragsdale, 1997). However, the disadvantage, or the challenge it creates is that there is often a greater divergence of ideas as a result of a greater diversity of actors. It is logical that when there is a divergence of ideas, collaboration will be difficult (Stahl, et al., 1999). They went on to argue that while there does need to be a certain amount of divergence during the brainstorming phase of collaboration, convergence must occur during the process of negotiation and consensus. A collaborative group is constantly striving for this convergence of ideas and sharing of meanings. Collaboration can fail when actors do not share meanings for objects or the goals for the collaborative process (Jehng, 1997).

Structure is important to the success of any mediated collaborative effort, as is communication. Teachers and students must have not only an understanding of the technology they are using to mediate the communication and collaboration, but they must also have the structures, processes, and support systems in place to feel more comfortable with this new approach to collaboration. Stahl, et al. (1999) explained that the most important step in supporting collaborative learning has to do with developing a structure for “social practices.” Behaviors in an EMC collaborative project are influenced by the students’ perceptions of the presence of others (Jehng, 1997). Providing a structure for social practices to reinforce this perception of other students in their collaborative group is then necessary. These practices are the procedures that help constitute the culture of a community, to be discussed at a later point in this review.

Despite the fact that technology allows social change to happen at a much faster rate, it is still important to provide the necessary amounts of practices and systems to support the shift from knowledge construction that is individualized to one that is collaborative in nature (Stahl, et al., 1999). Teachers need to make a concerted effort to create a learning environment that encourages student interaction and provides social support for their sharing of ideas, both of which can be done successfully using collaborative learning models and strategies (Kochery, 1997). Collaborative learning and EMC have a reciprocal relationship: Collaborative learning is enabled by EMC, and EMC requires students to collaborate (Cifuentes, Murphy, Segur, & Kodali,

1998). Elaboration, ongoing and increasingly more in-depth communication, is important to the success of cooperative and collaborative learning groups (Susman, 1998). Fortunately, Hilz (1989) has argued that electronic mediated communication is higher than the communication in conventional classroom learning environments. He went on to contend that the use of collaborative learning activities could make on-line learning as least as effective as conventional learning. If this is in fact the case, then we can feel more confident as we venture into this new world of mediated communication and collaboration.

METHODOLOGY

Focus of Study

The focus of this study was on a small group of teachers and students in order to create an in-depth descriptive analysis of the electronically mediated interactions between these subjects.

Units of Analysis

For this particular project, a multiple-case selection was determined to be most appropriate. Using a sampling frame guided by the research question and conceptual framework of SI, multiple-case sampling allowed for deeper understanding of a single-case finding by identifying how, where, and why the case is as it is, or does as it does (Miles and Huberman, 1994).

Sixteen informants provided the rich descriptions of the Northeast Corridor (NEC) project, the interactions that happened in the context of the project, and the collaboration, community, and culture that emerged out of these interactions. Four of these sixteen informants were "Coordinators," those individuals who were in charge of and initiated the project in some way. There were six teachers I viewed as "Facilitators" of the project: Linda, Brad, Marcia, Mindy, Patrice, and Peter, representing five different schools. Six students, representing four of the schools also participated as informants.

These teachers were all in the fourth month of a year-long project designed to encourage members of the community to participate in the decision making process. The NEC is the region extending from the downtown area of a large midwestern city northeast to the outer ring suburbs of that city. This area is heavily traveled and the fastest growing of the region and hence, is experiencing numerous problems including, traffic congestion and lack of mobility. The city's planning organization is studying this area to determine alternative transportation solutions to address these problems for the future. Students and teachers in nine high schools in this large midwestern city participated in researching the problems of traffic congestion in the Northeast corridor of this city and making recommendations to the city planning organization based on the data they collected. Throughout the project, students communicated through a variety of means, including face-to-face interactions, fax, email, telephone, but mostly, two-way interactive video, often referred to as DL. The goal was to have each participating teacher integrate the NEC Project into his or her curriculum and facilitate student research around the one of the issues related to the project.

FINDINGS

The question, *How is collaboration accomplished in an electronic mediated environment*, is one that educators need to ask and need to answer. With schools investing millions of dollars in electronic mediating technologies, whether those be new phone systems, computer networks, or videoconferencing labs, we must better understand how these technologies can be effectively used in an instructional setting. More importantly, because these technologies are communication, or "mediation," technologies, we need to examine how they are used to mediate communication, and ultimately, collaboration across classrooms.

One question I used to guide my data collection was *How do distance learning technologies contribute to the nature, organization, and consequences of interactions?* Students communicated and interacted with students from other schools in a number of ways during the course of this project. They used a variety of technologies including fax, email, phone, and ITV to engage in activities

that focused on the goals and objectives of the project as defined by the project coordinators and themselves. In many cases, they even interacted face-to-face with other students and individuals from business and community groups. As we now know and understand, all communication and interaction is mediated in some way and can have various effects on interpretation and the development of meaning (Altheide, 1995, 1999; Aviv & Golan, 1998; Bull, Kimball, & Stansberry, 1998; Chen, 1995; Murphy, Drabier, & Epps, 1998; Pea, 1993; Waskul, 1997; Wasson & Bourdeau, 1988). Their studies suggest that interaction, and in many cases, interaction that is mediated electronically, can facilitate collaboration and learning, and improve students' perceptions of the processes involved in problem solving. Students interpret social objects through their interactions with others, regardless of how this interaction is mediated. Some have suggested that the medium by which this interaction takes place even shapes the message being delivered through interaction. So, the question of how this technology might have influenced the interactions between the actors I studied has significant relevance to subsequent collaboration, community building and emergence of culture.

First, most of the students and teachers interviewed suggested that the technology used to facilitate interactions was relatively transparent to them, and that it was simply a tool they used as part of the project. While there were certainly some who mentioned the limitations of the technology for communication and collaboration, nearly all the participants in the project I spoke with communicated the need for this technology in the project and the realization that the project would not and could not have been as collaborative if the distance learning technology had not been used. Mediated collaboration vs. face-to-face collaboration was not the issue. Rather, the issue was mediated collaboration vs. no collaboration at all, as they all realized that face-to-face communication and collaboration, while desirable, would not have been possible to schedule often enough for this project to have been successful. The videoconferencing technology provided the only means of regular communication and interaction between project participants. There was a desire to have more face-to-face interactions to provide more opportunities for participants to feel like they were really "there," and thus feel more of a bond to others in the project and to the project itself. The students and teachers who felt more valued in the project attributed some of this value to the bonds and relationships that they built as a result of the project. While face-to-face is a good way to build these bonds, they admitted that the videoconferencing technology, more so than other technologies like phone, email, or fax, helped to create these bonds and build on these relationships as well.

Teachers, and students especially, expected the videoconferencing sessions to be interactive and were aware of the limitations of the technology. They reported inconsequential effects of the videoconferencing technology and seemed to be able to filter out the content message from the media's message. Perhaps being raised in a media rich society has provided these young people the tools to separate the medium from the message. The media were merely tools and they had the power to determine the effects. They could, as Chen (1995) discussed, construct their own uses for media. While they acknowledged that this particular medium could focus or limit the message, just a lens focuses or limits the perspective of a camera, they did not identify or acknowledge any inherent qualities of videoconferencing to shape, alter, or distort messages being mediated. This was not the case, however, with their assessment of phone, email and fax, hence their preference for the videoconferencing as the primary way of communicating and interacting.

Secondly, this new tool seemed to encourage interactions that helped to redefine the potential of collaboration and community in education. Videoconferencing helped to remove barriers of time and space, which were often cited as relevant to collaboration and defining components of community (Repman and Logan, 1996). With the introduction of the technology, time and space were no longer relevant to collaboration and community, thus shifting the focus on the sharing of perspectives and vision as more important components. All the technologies could be used to share perspectives and the project vision with the project participants. These technologies allowed the coordinators, teachers, students, and community and business participants to interact, literally 24 hours a day, seven days a week. The technology changed the way they interacted by changing the relationships they had with one another (Altheide, 1999). Through this constant interaction with an unprecedented variety of people as collaborators and resources, new perspectives could be heard and developed.

Out of this, two elements of collaborative interaction emerged that were consistent with the current research in collaborative learning. As Bull, Kimball, and Stansberry (1998) pointed

out, networked environments similar to that of the NEC Project, provide for interaction that allows collaboration to occur, thus leading to higher levels of thinking. First of all, there was a noticeable positive interdependence among those individuals more involved and who shared in the vision for the project. Students and teachers both talked about their need for others to meet their project responsibilities. Whether that need was for community responses, information from business, or critiques from other students, these others played a vital part in what each of the schools had to do in the project. Secondly, while many of the students appeared to be working individually, Donna, Cindy and Susan in particular, they could still be considered collaborative in that they were working toward a shared goal or end. While their awareness of this collaboration varied widely, the work they were doing contributed equally to the project's ultimate goal of identifying a solution to the traffic congestion problem in the NEC. All the students and teachers, whether they realized it or not, were to some degree made a collaborative contribution to this project. I will discuss this further later in this chapter in discussing the primary research question.

DISCUSSION AND CONCLUSION

This brings us back to my primary research question, *How is collaboration accomplished in an electronic mediated environment?* I have established through answering my sub-questions that collaboration was, in fact, accomplished. But, I feel that I have yet to provide an explanation of how this was, in fact, accomplished. There was an expectation in going into the field that if collaboration was to occur in this project, it would take place as day-to-day collaborative learning activities. These activities would either take place within each classroom, or two classrooms would team up to participate in regularly scheduled activities that were deemed collaborative, or more likely, cooperative. I expected to see students and classes, as Holland (1998) discussed, *acting* jointly with others rather than *working* jointly with others, dividing up responsibilities at the beginning and fitting them all back together at the end like a jigsaw puzzle. However, what I witnessed, and what the data bore out, was collaboration in which students took on differentiated, but interdependent roles and participated in specific learning activities (Oliver, Omari, & Herrington, 1998), where the work was authentic, content related, and focused on problem solving (Berg, 1999), in which students found value in working interdependently (Comeaux, Huber, Kasprzak, & Nixon, 1998), and where there was elaboration and ongoing, in-depth communication occurring between students and those with whom they were collaborating (Susman, 1998). These collaborative characteristics were not necessarily happening, though, on a daily basis or in neat little activities with neat little names. They were manifested in the acceptance and on-going participation in a shared vision, in the meeting of shared educational needs, and around a process of problem solving to achieve a shared goal.

However, this collaboration could not have occurred without the technologies used to mediate the communication and interactions that took place between participating actors. While a variety of mediating technologies were used, such as phone, email, and fax, the one technology that everyone used and indicated as the primary means of mediation, was videoconferencing. This medium provided coordinators, teachers, students, and community and business leaders a tool with which they could share information, collaborate and problem solve. The medium did not appear to have any significant impact on the content of this information or on these processes or collaboration and problem solving. Rather, the actors identified videoconferencing as an invaluable tool that provided unique and worthwhile experiences that they would otherwise not have had access to. This project provided an opportunity for teachers and ultimately, students to join a collaborative community and adopt a culture of sharing. This opportunity appeared, from those data collected, to have changed their lives. For those lives that weren't changed, it appeared that the teachers made the conscious decisions to not change, which in turn, was also a decision for their students not to be changed as well.

Therefore, to answer my original research question, collaboration is accomplished in an electronic mediated environment by building communities of learners through a high level of interaction in authentic learning activities. In this, there must also exist a support structure that encourages and nurtures a shared vision for the project purpose and goal, and a culture of individual responsibility within the context of interdependency of these responsibilities. This is how collaboration was accomplished in the electronic mediated environment of the NEC Project.

This study, as studies often do, raises more questions than it answers in its attempt to answer the question, *How is collaboration accomplished in an electronic mediated environment?* While collaboration in the mediated environment of this NEC Project can now be better understood, the study does not reveal much about other collaborative, mediated environments. Further quantitative studies should be conducted to provide a way to generalize the findings of this project to understand and make claims about similar projects. Other qualitative studies could be designed to answer the questions I identified earlier around the need to better understand the teachers' motivation to accept or reject the project vision and goals. Why different teachers accepted or understood the vision more than others is both an interesting question to ask and an important one to answer in light of the findings of this study. If teachers are the gatekeepers to the vision, we must better understand how they differ and how these differences can be overcome when it comes to this acceptance and understanding. Likewise, the inclusion of additional informants in a follow-up study to this one might reveal a wider diversity in student involvement, even within one particular teacher's class. Therefore, there would also be a need to better understand what variables are necessary for students, as well as teachers, for collaboration to be accepted and used in an electronic mediated project environment.

REFERENCES

- Altheide, D.L. (1999). The technological seam. Studies in Symbolic Interaction, 22, 223-245.
- Altheide, D.L. (1995). An ecology of communication: Cultural formats of control. New York: Aldine De Gruyter.
- Altheide, D.L. (1994). An ecology of communication: Toward a mapping of the effective environment. The Sociological Quarterly, 35 (4), 665-683.
- Aviv, R. & Golan, G. (1998). Pedagogical communication patterns in collaborative telelearning. Journal of Educational Technology Systems, 26 (3), 201-208.
- Baym, N. (1995). The emergence of community in computer mediated communication. In Steven Jones (Ed.), Cybersociety, Thousand Oaks, CA: Sage.
- Berg, C.A. (1999, February). Software to facilitate collaborative inquiry and on-line communities of learners. In SITE 99: Society for Information Technology & Teacher Education International Conference, San Antonio, TX. . (ERIC Document Reproduction Service No. ED 432 215)
- Blumer, H. (1969). Symbolic interactionism: Perspective and method. New Jersey: Prentice Hall, Inc.
- Blumer, H. (1962). Society as symbolic interaction. In Arnold Rose (Ed.), Human Behavior and Social Processes (pp. 179-192), Boston: Houghton Mifflin.
- Bull, K.S., Kimball, S.L., & Stansberry, S. (1998, March). Developing interaction in computer mediated learning. In Coming Together: Preparing for Rural Special Education in the 21st Century. Conference Proceedings of the American Council on Rural Special Education, Charleston, SC. (ERIC Document Reproduction Service No. ED 417 902)
- Chen, S.S. (1995). Carl Couch: Bridging sociology and communication. Symbolic Interaction, 18 (3), 323-339.
- Cifuentes, L., Murphy, K.L., Segur, R., & Kodali, S. (1998). Design considerations for computer conferences. Journal of Research on Computing in Education, 30 (2), 172-195.
- Comeaux, P., Huber, R., Kasprzak, J., & Nixon, M.A. (1998, November). Collaborative learning in web-based instruction. In WebNet 98 World Conference of the WWW, Internet and Intranet Proceedings, Orlando, FL. (ERIC Document Reproduction Service No. ED 427 693)
- Fjuk, A. (1995). Towards an analytical framework for CSCdistanceL. In Schnase & Cunniss (Eds.), Proceedings of CSCL 95 (pp. 130-134). Hillsdale, NJ: Erlbaum.
- Hiltz, S.R. (1998, November). Collaborative learning in asynchronous learning networks: Building learning communities. In WebNet 98 World Conference of the WWW, Internet and Intranet Proceedings, Orlando, FL. (ERIC Document Reproduction Service No. ED 427 705)
- Holland, D.G. (1998, June). Using technology to communicate, cooperate, and collaborate. Proceedings of the Association of Small Computer Users in Education (ASCUE) Summer Conference, Myrtle Beach, SC. (ERIC Document Reproduction Service No. ED 425 717)
- Huberman, A.M. & Miles, M.B. (1994). Data management and analysis methods. In Denzin, N.K. & Lincoln, Y.S. (Eds.), Handbook of Qualitative Research. Thousand Oaks, CA: Sage Publications.

Jehng, J.J. (1997). The psycho-social processes and cognitive effects of peer-based collaborative interactions with computers. Journal of Educational Computing Research, 17 (1), 19-46.

Kochery, T.S. (1997). Distance education: A delivery system in need of cooperative learning. Proceedings of selected research and development presentations at the 1997 National Convention of the Association for Educational Communications and Technology, Albuquerque, NM. (ERIC Document Reproduction Service No. ED 409 847)

Levin, D.S. & Ben-Jacob, M.G. (1998, August). Collaborative learning: A critical success factor in distance education. Paper presented at the Annual Conference on Distance Teaching & Learning, Madison, WI. (ERIC Document Reproduction Service No. ED 422 843)

Levin, D.S. & Ben-Jacob, M.G. (1998, November). Using collaboration in support of distance learning. In WebNet 98 World Conference of the WWW, Internet and Intranet Proceedings, Orlando, FL. (ERIC Document Reproduction Service No. ED 427 716)

Maines, D.R. & Couch, C.J. (1988). Communication and social structure. Springfield, Ill: C.C. Thomas.

McLuhan, M. & Fiore, Q. (1996). The medium is the message: An inventory of effects. San Francisco: Hardwired.

Mead, G.H. (1934). Mind, self and society. Chicago: University of Chicago Press.

Miles, M.B. & Huberman, A.M. (1994). Qualitative data analysis: An expanded sourcebook (2nd Ed.). Thousand Oaks, CA: Sage Publications.

Murphy, K.L., Drabier, R., & Epps, M.L. (1998, February). Interaction and collaboration via computer conferencing. In Proceedings of Selected Research and Development Presentations at the National Convention of the Association for Educational Communications and Technology (AECT), St. Louis, MO. (ERIC Document Reproduction Service No. ED 423 852)

Oliver, R., Omari, A., & Herrington, J. (1998). Exploring student interactions in collaborative world wide web computer-based learning environments. Journal of Educational Multimedia and Hypermedia, 7 (2-3), 263-287.

Pea, R. (1993). Seeing what we build together: Distributed multimedia learning environments for transformative communications. The Journal of the Learning Sciences, 3 (3), 285-299.

Repman, J. & Logan, S. (1996). Interactions at a distance: Possible barriers and collaborative solutions. TechTrends, 41 (6), 35-38.

Rojo, A. & Ragsdale, R.G. (1997). Participation in electronic forums: Implications for the design and implementation of collaborative distributed multimedia. Telematics and Informatics, 14 (1), 83-96.

Rothembuhler, E.W. (1988). Live broadcasting, media events, telecommunications, and social form. In D.R. Maines & C.J. Couch (Eds.), Communication and Social Structure (pp. 231-243). Springfield, IL: Charles C. Thomas.

Salomon, G. (1992). What does the effective CSCL require and how do we study its effects? SIGGUE Outlook, Special Issue on CSCL, 21 (3), 62-68.

Spector, J.M. (1999, February). Teachers as designers of collaborative distance learning. In SITE 99: Society for Information Technology & Teacher Education International Conference, San Antonio, TX. (ERIC Document Reproduction Service No. ED 432 259).

Stahl, G., Butcher, K., Caron, J., Johnson, G., Lenell, E., Long, S., & dePaula, R. (1999, April). WEBGUIDE: Guiding collaborative learning on the web with perspectives. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Quebec, Canada. (ERIC Document Reproduction Service No. ED 429 584)

Sugar, W.A. & Bonk, C.J. (1995). World forum communications: Analyses of student and mentor interactions. Proceedings of the 1995 Annual National Convention of the Association for Educational Communications and Technology (AECT), Anaheim, CA, 17, 571-583.

Susman, E.B. (1998). Cooperative learning: A review of factors that increase the effectiveness of cooperative computer-based instruction. Journal of Educational Computing Research, 18 (4), 303-322.

Tinzmann, M.B., Jones, B.F., Fennimore, T.F., Bakker, J., Fine, C., & Pierce, J. (1990). The collaborative classroom: Reconnecting teachers and learners, videoconference 3. restructuring to promote learning in America's schools, a guidebook. Elmhurst, IL: North Central Regional Educational Laboratory. (ERIC Document Reproduction Service No. ED 327 931)

Tumminello, J. & Carlshamre, P. (1996). An international internet collaboration. Technical Communication: Journal of the Society for Technical Communication, 43 (4), 413-418.

Waskul, D.D. (1997). Reality hackers: Selfhood, on-line chat, and computer-mediated symbolic interaction. ProQuest Digital Dissertations. [On-line]. Available: <http://wwwlib.umi.com/dissertations/Item:9806585>

Wasson, B. & Bourdeau, J. (1998, June). Actor interdependence in collaborative telelearning. In ED-MEDIA/ED-TELECOM 98 World Conference on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications, Freiburg, Germany. (ERIC Document Reproduction Service No. ED 428 734)

Yaverbaum, G.J. & Ocker, R.J. (1998, November). Problem solving in the virtual classroom: A study of student perceptions related to collaborative learning techniques. In WebNet 98 World Conference of the WWW, Internet, and Intranet Proceedings, Orlando, FL. (ERIC Document Reproduction Service No. ED 427 750)