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Factors which influence students’ participation in using an electronic mail and bulletin board technique

Yao, Hung-Liang, Ph.D.
The Ohio State University, 1993
FACTORS WHICH INFLUENCE STUDENTS' PARTICIPATION IN USING AN ELECTRONIC MAIL AND BULLETIN BOARD TECHNIQUE

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Hung-Liang Yao, B.A., M.A.

*****

The Ohio State University

1993

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Approved by

Adviser
College of Education
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To My wife--Hui-Wen,
Who supported and
encouraged me
throughout the
process, and our son
-- Tony, who liked to
play with dad's
computer.
ACKNOWLEDGMENTS

I would like to thank all the participants in this study, who generously shared their opinions, experiences, and their time with me.

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Last, but not least, I want to give my deepest appreciation to my parents, who supported me through the years financially, and emotionally.
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Major Field: Education

Studies in Vocational, Technical Education--Training and Development
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CHAPTER I

INTRODUCTION

Background of the Study

The main purpose of this study was to investigate how an electronic mail and bulletin board technique functions in an instructional setting. This type of technique is using electronic mail and electronic bulletin boards to facilitate basic group discussions utilizing a computer network (Palme, 1985; Feenberg, 1987). It is also described as a type of computer-mediated communication, because it requires users to communicate with each other through the use of computers (Romiszowski, 1989; Florini, 1989). With the technological advancement in computer-mediated communications and telephone networking, and the prevalence of personal computers, this type of technique is being utilized extensively in education, business and industry, the military, and government (Andrew, 1989).

The term-- electronic mail and bulletin board technique was used throughout this study. The reason for using this terminology can be explained by discussing the number of communication modes possessed by a computer-mediated
communication technique. Basically, they are three different communication modes available in a computer-mediated communication environment. In general, they are one-on-one, one-to-many, and many-to-many. The computer-mediated communication environment in the Ohio State University was facilitated by the Magnus system, which permitted the use of communication software, such as Procomm Plus and Red Ryder, and provided supports for its users to perform communication through one-on-one (electronic mail), and one-to-many (electronic bulletin boards) communication. Based on the number of communication modes included in the Magnus system, the term—electronic mail and bulletin board technique was then chosen to represent the type of instructional and learning tool used in the class studied.

Communication techniques such as electronic mail, electronic mail and bulletin boards, and computer conferencing are types of computer-mediated communication (Romiszowski, 1989). To differentiate the differences among these three techniques, a comparison is made based on the number of communication modes contained in each technique. In general, electronic mail technique supports one-on-one communication (Kaye, 1987). A person can only communicate with others one at a time. Electronic mail and bulletin board technique provides one-on-one, and one-to-many communication. A person can communicate with other users in various designated areas
(called bulletin boards) created in the mainframe computer system. Computer conferencing technique is considered to be more sophisticated and completed technique in facilitating communication compared with the previous two. The most distinctive feature of it is in the area of facilitating simultaneous, many-to-many communication. In other words, it is capable of providing live, simultaneous group communication, which help its users become more interactive during the communication process (Kaye, 1987). A sketch of the differences with the number of communication modes among these three techniques is presented in diagram 1.

Diagram 1

| Communication Modes Possessed by Electronic Mail, Electronic Mail and Bulletin Board Technique, and Computer Conferencing Technique |
|---|---|
| **Computer Conferencing Technique** | Complex (supports one-on-one, one-to-many, and many-to-many communication) |
| | I |
| | I |
| | I |
| **Electronic Mail and Bulletin Board Technique** | (supports one-on-one, and one-to-many communication) |
| | I |
| | I |
| **Electronic Mail Technique** | (supports one-on-one communication) |
| **Basic** | |
Electronic Mail and Bulletin Board Technique

To use electronic mail and bulletin board technique, there are some requirements. Participants must have an account in a mainframe computer which contains communication software for this type of technique, a personal computer connected to the mainframe computer by a modem, or a computer that is connected directly to the mainframe.

Electronic mail and bulletin board technique has both advantages and disadvantages. In general, the advantages of it are that it is interactive, flexible (time and space), accessible to the tutors and peers; and it permits collaborative actions in learning and organized presentation of ideas (Kay, 1990; Norton & Stammen, 1989; Mason, 1988; Roberts, 1987; and Hailes, 1986). However, the utilization of this type of technique has its problems, too. They are the participants' procrastination (Gilcher, 1989), lack of participation, and "lurking," a term for logging on and observing what is occurring but not participating in the process of discussion (Mason, 1988; Gilcher, 1989; Philips & Pease, 1985). Also, there are potential information overload problems occurring in both the mainframe computer system and participants' personal files (Harasim, 1990), feedback problems such as the speed a person receives the responses (Philips and Pease, 1985), and communication anxiety (Feenberg, 1987; Mason, 1988). To achieve success in using electronic mail and bulletin board technique
in instruction, those problems identified above should be
addressed in the instructional design and implementation
process to meet students' needs (Trainor, 1990).

The Importance of Electronic Mail and bulletin board Technique

For business and industry to remain competitive, professionals, employees, and employers need to continually upgrade their knowledge about the development of their profession-related field. Courses offered through public education, seminars, tutorials, conferences, and executive development programs are the sources most frequently used to update knowledge and skills. As reported by Nowlen (1988), organizations in business and industry devote much energy upgrading and maintaining their employees' skills and knowledge to remain competitive.

Because of economic growth and change in the modern lifestyle, the nature of today's students in higher education are also changing. The changes reported by Harasim (1990) included:

1. A growing portion of university and college students are working adults who have families and are looking forward to pursuing additional education.
2. It is difficult for those in a working situation to work and attend class without experiencing conflicts.
More and more adult students are willing to use new learning technologies in courses which meet their needs.

To meet these changes with today's adult students, our existing educational system must undergo modifications in such areas as fixed learning sites and predetermined learning times. The application of electronic mail and bulletin board technique provides several benefits for adult students both in higher education and business and industry:

1. It offers flexible schedules for both time and learning space, which can accommodate the users' busy lifestyle.

2. It saves travel time for those in business and industry. Employees can remain productive without sacrificing time required to travel to a college or university campus.

3. It provides a much cheaper and more efficient approach in reaching other information sources nationally and internationally. It helps expand the boundary of knowledge inquiry and information exchange.

4. It brings people into closer relationships and creates interactive opportunities, which help the development of knowledge expansion.

Electronic mail and bulletin board technique also provides various opportunities for students and professionals in
pursuing their educational goals. The main features of it include, but are not limited to: flexible learning time and space, savings in travel time and cost, and easier access to local, national and international information sources. These features can contribute significantly to the field of education, especially in adult/vocational and technical education and training.

Rationale for the Study

The rationale for this study can be described by discussing the follows;

(A) The use of electronic mail and bulletin board technique is a growing trend in the '90s not only for education but also for business and industry, the military, and government.

(B) The number of adult learners is increasing because of changes in our global economy, their job requirements, and self-fulfillment. However, the lifestyle of the '90s is moving at an increasingly faster pace. Hence, adult learners need to optimize the time between learning and working, and have a more convenient approach for learning new knowledge, skills, attitudes, and values.

(C) Most literature of electronic mail and bulletin board technique is related to the following areas:
1. introduction and application of this type of technique in a pure electronic learning environment (i.e., distance education).

2. social and psychological factors associated with its users, and

3. instructional design concepts related to its development.

With above reasons, there is a need in learning how this type of technique functions in a traditional learning environment.

Research Question

This study investigated "What factors influence participants' use of an electronic mail and bulletin board technique in an instructional setting?" This question can be examined further by asking (a) "What are the users' motives in selecting a class which employs electronic mail and bulletin board technique as an instructional and learning tool?" (b) "How do participants' emotions change from the beginning to the end?", (c) "What are the obstacles preventing participants from actively participating during the instructional process?", and (d) "What are the positive elements encouraging participants in using this type of technique in learning?" Before we can apply this type of technique to adult, vocational technical education and training, professionals in these areas need to gain a better understanding of the participants' reactions to the use
of electronic mail and bulletin board technique as an instructional delivery strategy. As Clark (1983) advised, if we want to use a technology productively, we must understand the communicative interaction with such advanced technology.

Nature of the Study

The purpose of this study, from a qualitative, naturalistic perspective, was to learn what factors influence participants using electronic mail and bulletin board technique as a learning tool. Because of the nature of qualitative research, there will be no attempt to predict individual behaviors or to reveal any cause and effect relationships. Also, no pre-assumptions will be made prior to the collection of data.

The methods used to collect data for the study were participant observations, interview, questionnaires, and computer communication documents. According to Bogdan & Biklen (1992), participant observation is a systematic and effective method of collecting data to describe a group's lifestyle and to understand their behaviors in a particular setting. Participant observation was chosen, because:

1. It permitted this researcher to observe what is occurring in the classroom, computer laboratory, and at the participants' home.
2. It permitted this researcher to detect all the possible movements of the participants.

3. It permitted this researcher to conduct a more in-depth inquiry (interview) with the students. By doing so, phenomena and behaviors occurring in the class could then be explained by acquiring information directly from the students.

4. It permitted this researcher to minimize the tension or dissonance that tends to accompany the physical presence of a non-member when the group meets (Jung, 1991).

To supplement the observation data, a structured, open-ended interview was used at the end of the instructional period to:

1. gather information from the participants' own words (perspectives) about their electronic mail and bulletin board experiences which helped this researcher develop insights on how participants view the program.

2. allow participants to respond freely during the interview.

3. obtain data systematically and thoroughly from each subject (Patton, 1990).
Questionnaires were used during this study. The purpose for using them was that they provided this researcher much information in a short period of time.

In addition, dialogues were collected from the participants (namely, participants' computer communication records) to assist this researcher understand how each individual participant experienced this program. According to Patton (1980), the use of such documents has a dual purpose:

1. They are a basic source of information about program decisions and background or activities and process. With this study, the subjects' communication records will provide information about how they felt about the program and what communication media other than the electronic mail and bulletin board technique were used.

2. They can provide this researcher ideas and clues about the interesting phenomena of the program. Various data collection methods can then be used to gather related information about the facts behind them.

Definition of the Terms

The following terms are defined to understand their use in this study.

1. Electronic mail and bulletin board technique. The use of electronic mail and electronic bulletin boards to
facilitate group discussion over a computer network (Feenberg, 1987).

2. Electronic mail and bulletin board learning environment. Learning environments involved the use of electronic mail and bulletin board technique.

3. Electronic conference. It refers to participants who use electronic mail and bulletin board technique to participate in a discussion as part of their learning requirements.

4. Computer-mediated communication technique. Communication techniques which requires users using communication software and computer to communicate with.

5. Factors. Things that influence participants' learning results, such as incentives and disincentives.

6. Participants. The subjects included in this study who interact with each other through using an electronic mail and bulletin board technique in learning.

Significance of the Study

Although electronic mail and bulletin board technique has been adopted in many fields, such as education, the military, business and industry, most research has focused on the development and application of it. However, in the field of education, especially in Adult, Vocational technical Education
and Training, we must understand what factors serve as incentives and disincentives for using this type of technique before employing it in the teaching-learning situation. Furthermore, knowing the interaction of those factors and the relative influence of each factor in the participants' motives will be useful to those educators in using it.

This study provides information about learners' reactions of using an electronic mail and bulletin board technique in the class (EDSTDS 664, Development of Technical-Skill Training Materials). The information gathered during this study was based on participants' actual learning experiences of using this type of technique. The results of this study will add to the general body of knowledge and application of such technique. It will also provide a referential set of findings about participants' reactions toward the use of this type of technique in a learning situation. These findings will also provide information to those interested in using it to deliver instructional materials as well as to the instructional design specialists who can produce a better instructional delivery system by considering the findings generated from the study.
CHAPTER II
REVIEW OF RELATED LITERATURE

Introduction

Since the first introduction of electronic mail and bulletin board technique in 1970, many researches have explored the applicability of this type of technology in distance education (Florini, 1989; Mason, 1988; Haile & Richards, 1985). Various benefits of the technique such as increasing accessibility to the instructor, flexibility in learning time and space, and interactions among students, have been reported by many researchers (Haile & Richards, 1984; Kaye, 1990; Roberts, 1987; Glehill & Dudley, 1988). Because of its unique features, the application of electronic mail and bulletin board technique has been adopted in government, business and industry, the military, and education. (Feenberg & Bellman, 1990)

To understand the contents of electronic mail and bulletin board technique, this review focuses on these areas: the foci of current literature; the advantages and disadvantages of electronic mail and bulletin board technique; how electronic mail and bulletin board technique works; instructional and learning concepts supporting the use of
electronic mail and bulletin board technique, and adult learning characteristics.

The Focus of Current Literature

In this section, literature on computer-mediated communication technique (mainly, electronic mail and bulletin boards, and computer conferencing) was reviewed. Palme (1985) indicated that all computer conferencing systems are also electronic mail systems. Therefore, some features of computer conferencing technique are also applicable to describe electronic mail and bulletin board technique. Descriptions on computer conferencing technique were used intensively in the following discussion for these reasons:

1. It is a more completed computer-mediated communication technique in facilitating one-on-one, one-to-many, and many-to-many communication.

2. It shares many similarities with electronic mail and bulletin board technique, such as increasing interaction, and eliminating geographic isolation.

Common features between these two techniques can be described as follows (Palme, 1985; Feenberg, 1987, Kaye, 1987):

1. It permits users to send, receive, and check stored information through the mainframe computer.

2. It permits users to read, answer, delete, and file and/or forward the messages to an individual or group.
3. It allows users to manage messages better through the "header" which contains the sequence number, date, sender, subject, status, and length of a message.

4. It permits two users to communicate with each other simultaneously through the "chat" mode.

5. It facilitates group communication by using a mailing lists for communicative convenience or establishing a bulletin board on a particular topic.

A review of related literature is described as follows:

1. Much literature concerns the examination of computer-mediated communication technique. This area can be further divided into the following:

   a. Introduction to various delivery strategies

       Bacsich (1985) examined electronic mail and bulletin board technique for distance education; Stoll (1988) explained the use of telecommunication and distance learning in New York; Palme (1985) discussed the difference between computer conferencing technique and electronic mail; and, most of all, Verdiun & Clark (1990), in their book, *Distance Education*, provided a detailed introduction and comparisons about current delivery strategies used in distance education, including electronic mail and bulletin board technique.
b. The introduction of computer conferencing systems and the experiences of using the computer conferencing technique in instruction and learning.

In this category, much literature is concentrated on introducing and describing experiences in using computer conferencing technique. For example, Mason (1988) reported her experience with using computer-mediated communication for distance education at the Open University through Cosy System, and Norton and Stamman (1989) reported the use of this type of technique in vocational education. Haile and Richards (1984) described the computer conferencing system (Participation) they used in the NYIT and the results showing substantial improvement in students' learning. In his article "An Analysis of Computer conferencing Supporting the Distance Learners," Hail (1986) reported that the computer conferencing technique helped eliminate social isolation and increased interaction among computer conferencing participants. Roberts (1987), in his article "The Electronic Seminar: Distance Education By Computer conferencing" also reported a similar experience.
2. Other areas of interest in studying computer-mediated communication techniques (especially, in computer conferencing technique) are the social factors and psychological reactions of participants.

Generally, computer conferencing technique has been considered to be flexible and accessible and to have a positive effect on its future applications. Because of these promising features in the process of communication, participants can maintain a balance between work and learning. However, in reality, participants communicate with each other only through the computers. To most participants, the traditional face-to-face communication accompanied with warm, live feelings and body language disappear. Familiar signs in conventional communication (i.e., face-to-face communication) are missing; instead, there may be hollow feeling from seemingly talking into a black hole. As pointed out by Feenberg (1987), "the communication connection in a computer conferencing situation is not as concrete as in a face-to-face situation" (p.45). He indicated that this leads to a form of "communication anxiety" characteristic of this new medium.

Kiesler, Siegel, and Mcguire (1984), in their article, "Social Psychological Aspects of Computer-Mediated Communication," discussed the effects of
computer-mediated communication on a person. Their main objectives were to explore how people participate in computer-mediated communication and how computerization affects a group's efforts to reach a consensus. The phenomena of psychological reactions when using the computer mail and bulletin board technique to communicate are identified as follows:

a. Time and information processing pressures
   
   A request for an instantaneous response made by other participants may promote inconvenience to receivers in the conference.

b. Absence of regulating feedback

   The traditional face-to-face communication may fulfill most people's expectations in the conversation process. They can judge others by listening to their reactions and watching their body movements. However, in the computer conferencing situation, people can only read what others send them and then return their responses. The time required to transmit the information may affect feedback and the desire for further interaction.

c. Dramaturgical weakness

   Various nonverbal behaviors are missing in the computer communication process. The meaning of a person's message may be blocked behind the screen.
The need to develop ways of showing emotions is increasing. Kiesler, Siegel, and Mcguire (1984) said that Hiltz and Turoff have reported the phenomenon that computer conferencing participants have developed ways to show emotions, i.e., hugs and kisses, via the computer screen.

d. Fewer status and position cues

The use of computer conferencing technique can provide participants an equal communication status. But, there are concerns about people in a higher status in an organization who want to demonstrate their leadership skills in various management situations.

e. Social anonymity

This issue concerns the effect of using computers in communication. The general reactions toward it are that computer is depersonalizing. According to the authors, most participants feel that the intimate, close feeling in a face-to-face communication is missing in computer conferencing.

f. The problem of computing norms and immature etiquette

Traditionally, we have the custom of office and home rule. Because of the use of the computer
conferencing technique, the traditional line between these two is blurring.

g. "lurking"

In discussing the lurking problem in the computer-mediated communication situation, Thorngate (1985) said that it makes other participants in the same conference have less desire to add more comments. He claimed that to achieve better computer conference results, we need the two most desired conditions: groups of people who know each other and who are also willing to act and talk with each other. A similar comment was made by Mason (1989), Gilcher (1989) and Philips and Pease (1985).

3. The consideration of design in computer-mediated communication

Many articles address the issue of how to create a good computer conferencing environment and on what considerations the design should be based.

Romiszowski (1989), in his article "Computer conferencing and the Distance Learner," pointed out that the focus in designing instruction for computer-mediated communication should be the strengths of the medium and the learner. He suggested that when instructors use computer-mediated communication techniques as an instruction strategy, students should be provided with
help and information in solving technical problems. He recommended that instructors should act as group facilitators who create a congenial, non-threatening climate and provide group maintenance, acting as group moderators.

Florini (1989), in her article, "Computer conferencing: A Technology for Adult Education," provided general concerns in designing a computer conference. These concerns are related to curricular materials, training and working with faculty, the operating system, software, and instruction. She said that a comprehensive discussion on designing computer conference is somewhat premature, because extensive research still needs to be conducted.

Hruh and Karen (1990) pointed out that "the quality of distance education depends on the degree of interaction" (p.1). They indicated that the consideration of interaction should include the following:

1. learner interaction with the presenter;
2. learner interaction among persons at a local site;
3. learner interaction with persons at other sites; and
4. vicarious interaction.
These four categories are important for those in the adult, vocational, technical education and training to consider when designing computer-mediated instruction.

The application of electronic mail and bulletin board technique in learning and instruction must have a solid theoretical foundation. Such authors as Feenberg and Bellman (1990), and McCreary (1990) proposed models for designing computer-mediated instruction based on social and behavioral factors. The following section contains the rationale behind their proposed models and the major concerns associated with them.

Feenberg and Bellman (1990) proposed the idea of "social factors" as a new way of looking at the design of computer-mediated communication, with particular attention addressed to education. The rationales are:

1. Computer-mediated communication is a sociotechnical system.
2. Computer-mediated communication system has not been designed to mediate social activities. Computer-mediated communication is still considered as a personal tool.
3. People who use computer-mediated communication are considered as members of groups and who have their own characteristics and should be recognized by designers.
4. The application and effectiveness of computer-mediated communication depends on the design of the software.

Considering the above four reasons, Feenberg and Bellman suggested that the design of computer conferencing should be based on:

1. the understanding of social factors that affect group work;
2. the user's real-world demands;
3. the concept of easy integration with other instructional tools; and
4. a wide range of social forms from informal to formal.

To incorporate the idea of using social factors as a primary concern in designing computer-mediated communication, they proposed the Social Factor Model which consists of a four-stage approach: Classification, Analysis, Simplification, and Specification.

In her article "Three Behavioral Models for Computer-Mediated Communication," McCreary (1990) suggested three different models for designing computer-mediated communication. The first is Houle's model of Motivational Orientation. With a particular interest in looking at the adult learning motivation, Houle develops a model focusing on three types of voluntary
participants, namely goal-oriented, activity-oriented, and learning-oriented. The manager who organizes the computer-mediated communication system should look for different signs from its users and act as a liaison among the mainframe computer operator, other managers and the potential users of the system.

The second model, Tuckman's Stage of Group Development, illustrated the role of the conference moderator. According to McCreary, Tuckman found that "whatever the group setting or length of group life, each group exhibits close approximation to a four-phase pattern of group development" (p.56). These four patterns are forming, storming, norming, and performing.

The third model, Perry's Model of Cognitive and Ethical Development, is based on the concept of the role of the computer-mediated communication collaborator. According to McCreary, Perry's model contains nine positions and a four phase sequence: Dualism, Multiplicity, Relativism, and Commitment. She concluded that Perry's model benefits participants who want to and can help each other in collaborative learning. In her opinion, this model demonstrates, by far, the closest relationship with the participants.

Computer-mediated communication provides a convenient means for users to communicate with each other. Because of its
nature, participants in the computer-mediated communication form a "community". To help participants experience fewer problems in an electronic mail and bulletin board learning environment, much effort is devoted to discovering the best learning situations for the participants. The results of this are shown in the development of guidelines furnished by authors experienced in the computer-mediated communication; the concerns expressed by those who wish to have complete use of computer-mediated communication within a preferable working situation; research on human interaction in computer-mediated communication; social factors identified to generate a product that is user friendly; and finally, the study of human behaviors. Various roles, such as moderator, diffusion manager, and collaborator, are studied. Finally, we must remember that in the instructional process, it is the method that matters, not the media (Clark, 1983). Although this results in many arguments, the concept can be helpful when designing instructional activities for electronic mail and bulletin board learning events.

Advantages and Disadvantages of Electronic Mail and bulletin board Technique

Electronic mail and bulletin board technique is a computer-mediated tool for communication. It uses a computer system as a medium to receive, store, and distribute
information generated by the systems' participants. The main features of this type of technique include (Mason, 1988; Norton & Stamman, 1989):

1. It has the capability of storing information (messages) which provide a convenient means as a message preserver and retriever for the system's users.

2. It has the capability of carrying on several discussion topics simultaneously.

3. It has the capability of conducting a conference with one-to-one or one-to-many modes, which promotes interaction between students and tutors and between students and students.

With the above three main features, a list of major advantages have been reported in various research literature (Kaye, 1988; Norton & Stamman, 1989; Mason, 1988; Roberts, 1987; Haile, 1986). Generally, these advantages include:

1. It increases the accessibility for participants to gain instruction.

2. It provides a means to fulfill participants' social needs. Users can communicate with each other via computers. Geographic isolation can be eliminated with this type of communication technology.

3. It provides participants with flexible learning time and space. Today, many people are living an increasing
faster pace life. Most must find a balance between their family life and work schedule, while updating their knowledge to remain competitive and productive in the workplace. Electronic mail and bulletin board technique is a suitable means to meet their needs.

4. It possesses the asynchronous feature that people can communicate at their convenience without the traditional pressure normally seen with face-to-face instructional methods.

5. It gives participants equal status in the learning process. Participants can feel free to participate in the conference without obstacles, i.e., speaking ability and racial or appearance problems.

Because of the advantages of electronic mail and bulletin board technique, its use has increased internationally. For example, Nakonechny and Harner (1988) reported an international adaptation project in nursing; Shatzer (1987) described AT&T technical training with Japanese company employees through an electronic mail and bulletin board network; and Castro, Stirzaker and Northcott (1986) explained how two universities in Australia and England corporate with each other on course development via the use of electronic mail and bulletin board technique. As documented in OSU USENET News on Unix (1990), current computer networking has provided access to more than 500,000 computers internationally for sending mails,
transforming documents, and even logging into many distant computers. The communication capability of this type of technique provides a convenient approach for the corporation of an international project. Thus, advantages can be seen as:

6. It helps expand and broaden our knowledge by reaching out into the world. Through different computer systems, we can communicate more efficiently with people on the other side of the world.

7. It can help overcome the major obstacle—language proficiency in an international learning setting (Church, 1982). For example, foreign users (those whose native language is not English) can have more time to organize their opinions before they respond in a computer-mediated communication situation. The anxiety resulting from face-to-face communication can be eliminated, and the opinions generated in the learning process can be thorough and more meaningful.

Electronic mail and bulletin board technique provides various advantages for its users. Its unconventional communication style and distinctive features appeal to those in the field of higher and distance education. Nevertheless, some disadvantages have been reported in some computer-mediated communication literature (mainly in electronic mail and computer conferencing). They include:
1. Procrastination (Gilcher, 1989). The asynchronous feature in computer-mediated communication process creates the potential for procrastination. Participants can have more time to prepare and respond to the questions or discussion, however, some delay or omit their responses.

2. Participation and "lurking" problems (Mason, 1988; Gilcher, 1989; Philips and Pease, 1985). Reports show that some participants log on and attend conferences as silent observers. Mason (1988) provided a dialogue that reflects the feeling from a participant about this "lurking" phenomenon, "... they are like great vacuum cleaners of knowledge sucking up all the little bits" (p.18).

3. Time efficiency (Harasim, 1990). Frequently, participants in a computer-mediated communication situation tend to shift from one discussion topic to another, which makes the discussion process longer than that in the traditional classroom. Also, the process to gain consensus might take a long time if some participants have less enthusiastic to log on frequently. Questions such as how to use discussion time efficiently and how to avoid long waits in the decision-making process need to be considered in the instructional design process.
4. Information overload (Harasim, 1990). This problem may have a strong association with open discussion in the computers. As the discussion continues, more interesting topics are discovered. This may lead to information "pile up," which is a burden for those who have less time or who are newcomers in conferences.

5. Feedback problem (Philips & Pease, 1985). This issue has been studied in all teaching methods. With the notion of flexible learning, time and space, a study of the effects of feedback in electronic mail and bulletin board communication situation should include such issues as the speed of feedback and intimacy.

6. Communication anxiety (Feenberg, 1987; Mason, 1988). The feeling of speaking into a black hole or a vacuum is described by Feenberg (1987). Participants do not know when their messages can be received by the intended receiver or when can they receive the responses. The intimacy of feedback disappears because of the asynchronous feature of electronic mail and bulletin board. How to help participants overcome their anxiety should be considered by the conference organizer (or moderator).

In summary, electronic mail and bulletin board technique provides a unique and convenient approach in communication. Its accessibility and flexibility appeal to many people who must
find time in their busy schedule to improve their professional knowledge. Roberts (1987) noted that "...perhaps the most significant change that computers will bring to higher education will be the freeing of learning from its historical constraints of time and space" (p.6). A list of advantages and disadvantages associated with electronic mail and bulletin board technique is summarized in Table 1.

How Electronic Mail and Bulletin Board Technique Works

With its capabilities of shortening distances and eliminating geographical isolation, electronic mail and bulletin board technique brings people together even from thousands of miles away. But how does it work? First, to participate in an electronic conference, participants need the following:

a. access to a microcomputer, modem, communication software, telephone line, and an account on the mainframe computer which houses the communication software; or

b. access to a computer terminal that has a direct connection with the mainframe computer.
Table 1

**Electronic Mail and bulletin board Technique**

**Origination:** Computer-mediated communication

**Application:** government, business and industry, the military, and education.

**Capabilities:**

a. receiving, distributing, and storing information  
b. permitting various discussion topics simultaneously  
c. possessing various communication modes (i.e., one-to-one and one-to-many).

**Advantages:**

a. accessibility to instruction  
b. social affiliation  
c. equality in the communication process.  
d. expansion of knowledge internationally  
e. easier cultural interaction  
f. asynchronous communication

**Disadvantages:**

a. the potential for procrastination  
b. "lurking"  
c. time efficiency problem  
d. information overload  
e. lack of feedback  
f. communication anxiety

In general, with all the various electronic mail and bulletin board systems, a participant activates the computer and modem first. Then he/she uses those two devices to log into the mainframe computer through a telephone line (if he or she operates it from a remote site). Once the process is completed, several functions, such as checking, retrieving messages, or sending messages, can be performed. Participants can send
messages to each other to discuss academic or business-related subjects; fulfill their social needs; check their file to see whether they have any messages; read unfinished messages; log on whenever they are available; and respond to others whenever they are ready. Finally, they do not have to be confined by where they are. As long as they have access to a computer with a modem and a telephone line, they can communicate with others anytime and anyplace.

A concern about the application of electronic mail and bulletin board technique is that what makes it available for the public. This type of technology has existed for more than two decades, however only recently has it become more affordable to the public because of technology breakthrough in the development of computer chips.

With the increasing popularity of personal computers in adult, vocational, technical education and training, there occurred increasing availability of using electronic mail and bulletin board technique in teaching and learning situation. According to Florini (1989) and Mason (1988), the reasons for this include:

1. The breakthrough in microchip technology. This innovation makes the microcomputer less expensive, leading to its increasing popularity and affordability.

2. As a result of the microchip technology breakthrough, more and more people are becoming accustomed to using
computers as a medium of processing data or communicating with others.

3. The quality and availability and development of communication software have improved. This provides participants access to the mainframe computer and its various functions, i.e., chatting, discussing, and getting help, resulting in a user friendly feeling.

Instructional and Learning Concepts Supporting the Use of Electronic Mail and bulletin board Technique

With the use of electronic mail and bulletin board technique in instruction and learning, the teacher and students are separated physically but, can be connected through communication media (Verduin & Clark, 1991; Garrison & Shale, 1987). Thus, teacher may stay in a learning center while students are scattered locally, nationally, or internationally. Because of the geographical dissemination, questions such as how to find a better way to communicate with each other with the computer; how to provide a program that has flexibility in time and space and what concepts can be applied to adults in higher education should be answered.

To understand the questions raised above, the following discussion will focus on the concepts of communication, self-directed learning, collective/collaborative learning, open
learning, and computer-mediated communication technologies for instructional delivery.

\textbf{Communication} \hfill Wedemeyer (1981) provided a model that includes four essential elements of communication in distance education and the interaction among them.

\begin{center}
\begin{tabular}{|c|c|}
\hline
Teacher & Learner \\
\hline
I & I \\
\hline
Content & Mode/Media & Content \\
\hline
\end{tabular}
\end{center}

(If we compare his model with the traditional communication model, the teacher is the sender of the message; the learner is the receiver; the content is various information; and the mode/media is various technologies used to improve communication)

Wedemeyer (1981) stated that "Teaching and learning can safely and effectively be carried on with no loss of interaction through various communication means, although teacher and learners are separated in space and time." (p.37). However, this statement raises concern about "no loss of interaction." Garrison and Shale (1990) said the importance of what we use to communicate has much influence on the outcome of our communication. For example, using printed materials in a teaching learning situation from a distance, the medium may be able to carry many messages. However, because of the speed of
sending those materials by mail, the degree of interaction between the teacher and the learner might be minimal.

Two important concepts about communication need to be emphasized. First, communication strategies play an important role in a remote learning situation because of the separation between teacher and learners. Secondly, various communication devices or strategies have their own advantages and disadvantages. How to select a tool that can increase the interaction between teacher and learners and between learners and carry the intended messages in a faster and more reliable way are critical concerns to those interested in using the device. Furthermore, it may not be a good idea to rely primarily on the instructional media in a teaching and learning situation. The instructional method may share an equal important status. Supporting this concept, Clark (1983) argued that "it is the way we use to teach that matters, not the medium itself" (p.13).

**Self-Directed Learning**

The key persons who popularized the idea of self-directed learning are generally considered as Malcolm Knowles and Allen Tough (Brookfield, 1985; Langenbach, 1988). Knowles (1975) defined self-directed learning as "a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources,
choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (P.18). According to Knowle's explanation, self-directed learners control the entire learning process--from taking the initiative to evaluating the learning outcomes. Controlling learning can be considered a distinctive characteristic in self-directed learning (Brookfield, 1985). Another issue in both Knowle and Tough's work is that it is unnecessary to be a self-directed learner to work alone. Although the word "self-directed" seems to imply a meaning of autonomy, independence, and isolation, Knowles (1975) and Tough (1979) suggested that it means learners can depend on outside sources to plan their learning. For example, Knowles pointed out that learners can get help from their teachers to plan the learning. Tough used four types of sources to facilitate learners in a learning situation: self, a group or leader of a group, a one-on-one helper, and a non-human resource (i.e., books).

Successful use of electronic mail and bulletin board technique by students requires self-direction and self-motivation as part of the learning process. With the application of self-directed learning in higher education and this type of technique, adults can select discussion topics that benefit them the most and that match their learning characteristics, i.e., taking control in the learning process.
Collective/Collaborative Learning

According to Andrew (1990), collective learning originated from the military term "collective training." He said that collective learning is used to develop an individual's knowledge, skills, and abilities through group work; collective training is used to prepare a team to work on a problem in realistic situation.

According to Romer (1985), the concept of collaboration "may involve two individuals, essentially peers, choosing to work together because each brings a different dimension to a task conceived as synthetic... or it may involve several individuals or faculty" (p.9).

The reason this concept is included here is that learning in adult, vocational, technical education and training does not always appear in an individual form. Group projects may be used in a learning process in which the learners are required to achieve their learning objectives through teamwork by employing the concept of collective learning. Also, collective learning can be used with electronic mail and bulletin board technique. Various assignments such as small group discussion and group projects are examples of how students can be encouraged to learn collectively. Andrew (1990) suggested that "collective learning can best be used in working in a problem-solving situation and reaching solutions; in encouraging group
interaction and corporation; and working at the synthesis level of Bloom's taxonomy, converging to similar ideas" (p. 7).

Open Learning

According to Paul (1990), "open learning," is characterized by accessibility, flexibility, and student control over learning. She explained that "Open learning is depicted as an idea-type, a construct which incorporates a number of fundamental values" (p. 46). The dimensions of openness include: accessibility (i.e., free learning time, and free learning site); flexibility (i.e., self-pacing, various support in learning, and control over learning content and structure); and the selection of instructional systems.

The open learning concept presented above is a method of providing more opportunities for students to participate in learning activities. Sub-concepts such as accessibility, flexibility, control over learning, and self-pacing can permit more adults to obtain an education and also provide them programs appropriate for their characteristics as learners.

Computer-Mediated Technologies for Instructional Delivery

The major focus of the following discussion is the application of computer-based technology in today's field of adult, vocational, technical education and training. Although there are many other technologies used in delivering learning programs, there is no intention in the following discussion to
either deny or overlook their functions and contributions. The main purpose here is to discuss the technologies that are considered as powerful, suitable tools and the trend of the future.

The best way to appreciate those new technologies is to understand their effects on the field of education, especially in adult, vocational, technical education and training. It results in a revolutionary change in the way we communicate and instruct learners. Garrison (1990) said that the importance of a new technology for education outlives its potential to mediate communication between teacher and learner by creating a two-way communication channel. The best way to appreciate those new technologies is to understand their effects on the field of education.

With learning involving the separation of teacher and learners, we should consider such factors of the media as how fast they can transfer the information and their ability to provide a channel permitting immediate, mutual communication. By far, the most updated technology application appears to be computer-based. Because of its powerful capability, the application of this technology in the field of education is unlimited.

There are two types of computer communication used in the field of education. They are the off-line/local mode and on-line/transmitted mode. Computer-Assisted Instruction (CAI),
Computer-Managed Instruction (CMI), and Intelligent Computer Assist Learning (ICAL) are representatives of the off-line/local mode. Electronic mail and bulletin board technique, and computer conferencing technique are examples of the on-line/transmitted mode (Harasim, 1990; Garrison, 1990; Verdiun & Clark, 1991). For the purpose of discussion, the following descriptions are concentrated on the electronic mail and bulletin board technique related topic—on-line/transmitted mode.

With the on-line/transmitted mode, electronic mail and bulletin board technique can store, receive, and distribute information; permit learners to work on their own schedule; offer a flexible learning site; and permit one-to-one and one-to-many communication (Harasim, 1990; Kaufman, 1986b). Kaufman (1986a) listed such additional features of electronic mail and bulletin board technique as: directory, electronic mail, conferences, private work space, word processing, bulletin board, newsletter or journal, and database.

With electronic mail and bulletin board technique, learners can choose the topic for discussion; the teacher and learners can be separated; and there are opportunities for those who desire to learn. The technique apparently meets the requirements of most adult learners who are both working and studying. Its flexibility meets their desire to control their learning; its capability and fast speed in transforming
information shortens the distance between the learners and teacher; and its capability of one- and two-way communication permits the chance for learners to become more interactive with each other.

As pointed out by Harasim and Johnson (1985), certain characteristics of electronic mail and bulletin board technique make it particularly suitable for professional development activities and adult learners. The characteristics are:

1. access to experts and respected peers;
2. one-to-one or one-to many communication;
3. active learner participation;
4. linking of new learning to concrete on-the-job problems;
5. follow-up feedback and support for implementation from peers and/or experts;
6. self-direction: control over stopping or starting time, space, and place of learning.

Another frequently used device in on-line/transmitted mode is electronic mail. According to Palme (1985), a pure electronic mail system is primarily based on the one-on-one communication. However, for electronic mail and bulletin board technique, it can be open (i.e., people can join freely on the topics that are interesting to them), or it can be closed (i.e., the intended information can only go to those who are supposed to receive it). Overall, he argued that participants
in an electronic mail and bulletin board communication situation can have greater control over what they have to read; and, it is more suitable for group communication.

In conclusion, learners in all aspects of today's education are different from those ten or twenty years ago in the following areas:

1. Because of the evolution of industrialization, the demand for a highly efficient workforce is increasing.

2. Because of the diverse geographic and busy schedules, learners prefer to study at a convenient place and at their own pace.

3. Learners have a better chance of communicating in remote learning situations because of the improvement of communication technologies.

To accommodate the changes of adult learners in the '90s, the planning of education and the selection of communication media must be thorough and efficient enough to meet the needs of today's learners.

Computer technology is one of the greatest innovations in the twentieth century. The application of such computers as CAI, CMI, and ICAL, electronic mail, electronic mail and bulletin board technique and computer conferencing technique are examples of computer-based technologies. Among these technologies, electronic mail and bulletin board technique
possesses many distinctive features which can be useful in the field of adult, vocational, technical education and training.

Adult Learning Characteristics

The following section will focus on the examination of various aspects of adult learners to consider in preparing a program that fits their distinctive characteristics and needs. They include: how adults learn; what their learning characteristics are; how they motivate themselves; and what keeps them from participating in learning.

Adult Learners

A review of literature on adult education (Brookfield, 1986; Knowles, 1990; Cranton, 1988; Knowles, 1975; Tough, 1979), shows that in general, adults possess the following characteristics:

1. Adults become involved in a learning situation voluntarily. They choose to learn. The implications behind this may be that they perceive a need to learn, and the subject they choose to learn will be closely related to their needs.

2. Most adult learners have an immediate goal. It may be job or personal oriented. They can decide what subject content is important to themselves.
3. Adults tend to be self-directed learners. Although this statement is true for most adults, some prefer to learn in a structured environment. Adults may sometimes be less motivated because of a new learning environment when returning to school. Under these situations, Knowles (1975) encourages teachers to act as facilitators to help adults organize their learning. Tough (1979) encouraged adults to use the concept of "planner" to help adults plan their learning.

4. Adults possess various life experiences. In a learning situation, they will learn best if the subject is related to their experiences.

5. Because of their life experiences, adults may have rigid values, opinions, or behaviors. In a learning situation, we should respect these personal traits.

6. One needs to be careful when planning instruction for older adult learners. In a formal, traditional classroom setting, the conditions of the environment—lighting, chairs, ventilation, duration of the class, etc. may affect the learner's performance. With electronic mail and bulletin board technique, learners can control and perform their learning under preferable conditions.
Adult learners have various personal characteristics, which may be influenced heavily by their experiences. Learning environments and learning programs must be planned out carefully to accommodate most of the adult learning characteristics.

**Why and How Adults Learn**

Other important issues in planning instruction are why adults want to learn and how they learn. Tough (1979) described six different purposes of education for the learners. They are:

1. Learning for "preparing for an occupation and then keeping up" (p.35).
2. Learning for "specific tasks and problems on the job" (p.36).
3. Learning for home and personal responsibilities (p.37). This category includes learning for sewing, home repairing, and painting.
4. Learning for "improving some broad area of competence" (p.38). This category includes subjects ranging from interpersonal improvement, i.e., leadership and fellowship to individual improvement, i.e., speaking and writing.
5. Learning for leisure or interest (p.38).
6. Learning because of "curiosity or a question about certain subject matters" (p.39). This may include
studying geography and customs or cultural differences between the nations before travel.

A similar synthesis provided by Denton (1982) includes the following reasons that adults learn:

1. to prepare for an occupational change or advancement
2. to seek social relationships
3. for learning's sake
4. for escaping boredom and seeking stimulation, and
5. to use knowledge to help a sector or sectors of society

From the reasons given by Tough (1979), and Denton (1982), they manifest that adult learning can be seen as a purposeful learning. It is hoped that adults can apply their knowledge from education to skills to enrich their personal life.

In planning a program appropriate for adults, we need to know not only their reasons for learning but also their styles of learning. In an adult learning situation, some may prefer teacher-centered instruction; some learner-centered methods; and some a combination of these two. Various learning styles of different adult learners may complicate the situation in the instructional process.

Dumn and Dumn (1977) provided a set of conditions to serve the adults' needs in the following areas: immediate environment, sociological, physical, and emotional. For immediate environment, the condition of learning new or
different tasks involves four environmental factors, which must be appropriate for students' learning habits: lighting, sound, temperature, and design. Sociological needs include working with peers, alone, in pairs, or in a group. The physical needs include perception strengths, i.e., the way they chose to process information, intake needs, i.e., eating and drinking during learning, time of day, and mobility. Finally, emotional needs include motivation, persistence, responsibility, and need for deadlines or working at a measured pace.

Canfield (1983) describes adult learning styles in terms of preferred conditions, content, mode, and expectancy score. The condition of learning consists of eight factors, namely peer work (teamwork), organization (logical and organized course work), goal setting, competition, instruction (good rapport between learners and the instructor), detail (requiring clear and specific instruction on the assignments or requirements), independence (working on their own) and authority (maintenance of order). Content refers to the properties of learning materials. In general, the content may be divided into the following categories: numeric (numbers), qualitative (words and language), inanimate (things), and people. Modes refer to the methods used to acquire new information. These methods include listening, reading, iconic methods (i.e., learning by seeing) and direct experience (i.e., hands on experience, drill, and practice). The expectancy score
is the quality of performance that students want of themselves in a learning situation.

Adults have various degrees of maturity which are reflected in the way they learn. In general, adults are considered self-directed and self-motivated. Understanding their learning style will help in developing activities appropriate for the way they learn.

Adults frequently encounter situations that are barriers to their learning. Cross (1981) identified three major categories: situational, e.g., family life and time conflict; dispositional, e.g., some adults prefer to learn things by doing, and if a teacher uses lecturing as the major instructional method, it probably will not appeal to them; and institutional, e.g., red tape and prerequisites. These three factors influence adults' motivation and willingness to participate. A good educational program should provide not only instructions that are designed according to adults' learning characteristics, but also the most user friendly conditions to promote as much learning as possible.

In conclusion, in the adult learner section, we discuss adult's learning characteristics, their learning styles, the reasons they learn and the barriers that prevent them from learning. Adults tend to be self-directed learners. However, because of various life experiences, degrees of maturity, and personalities, they develop their own distinctive learning
styles. The ways they learn and the conditions under which they prefer to learn vary. It is important to understand that facilitating adult learning is a complex process. The more we understand adults, the better learning programs we can prepare.

Summary

In this chapter, the review of related literature focused mainly on the following areas: electronic mail and bulletin board related issues such as advantages and disadvantages, how and what makes it work, its theoretical background, computer-mediated technologies in an instructional process, and adult learning characteristics.

Electronic mail and bulletin board technique has unlimited potential in facilitating learning in the field of adult, vocational, technical education and training. An important concept related to the use of various instructional devices is that technologies or methods are only means to aid or enhance the learning results. A thorough selection of the instructional strategies or media is paramount in the instructional process. Also, equal share of attention should be given to the recipients and users of these methods. Adults' learning characteristics, styles, and motivations should be considered along with the selection of instructional methods. Meaningful learning results can be achieved by careful organization between learners, instructional methods, and learning materials.
CHAPTER III

METHODOLOGY AND DESIGN OF THE STUDY

Introduction

This chapter contains an overview of the methods used to investigate the concern of participants using electronic mail and bulletin board technique as a learning medium. Following the overview is a discussion of the rationale for using a naturalistic inquiry and qualitative research method and sections addressing the choice of method, selection of research sample, data collection process, triangulation, data analysis process, credibility issue, and trustworthiness of the study.

Rationale for the Qualitative Research

In education, qualitative research is considered naturalistic, because the researcher places the events of interest in a real setting and he/she investigates "phenomena within and in relation to their naturally occurring context" (William and Raush, 1969). Qualitative researchers focus primarily on learning how people experience a particular event and studying the nature of their experiences. Therefore, qualitative researchers are characterized as the following: they do not manipulate the research setting (Patton, 1980);
they are considered to be the primary data gathering instruments (Lincoln and Guba, 1985); and they generally collect the data from those involved in natural behaviors, i.e., talking, visiting, and looking (Guba, 1978; Wolf, 1979a).

Since this study involved collecting data about concerns of participants using electronic mail and bulletin board technique in various learning environments--the home, classroom, and computer laboratories, the qualitative research method was selected for the following reasons:

1. It is non-manipulated, unobtrusive, and non-controlling, which help reveal the "real-world" situations of the program (Patton, 1990).

2. It uses inductive strategy to discover important facts, dimensions, and interrelationships about various events of the program (Bogdan and Biklen, 1992).

3. It helps this researcher look for interdependencies about individual events through a holistic point of view (Patton, 1990).

4. It helps this researcher collect thorough, descriptive, and vivid data to represent participants' personal perspectives and experiences about the program (Bogdan and Biklen, 1992).
5. It permits this researcher to get close to the participants, situations, and phenomena under study (Patton, 1990).

6. It permits this researcher to have flexibility in pursuing facts of emerging phenomena without the limitations of rigid research design (Patton, 1990).

Choice of Method

Four primary data collection methods were used in this study: questionnaire; standardized, open-ended interview; document analysis; and, participant observation. Each method is discussed below.

(A) Questionnaire

Questionnaires were used because, according to Gilley and Eggland (1989), the administration of them generates extensive information quickly. The questions included in the questionnaires administrated in this study were of three different types:

1. The first type of questions was constructed on the concept of "select and explain." Participants responded to the questions by choosing one of the pre-selected answers. Next, they explained why they made the choice(s). With this type of questioning, the researcher can understand the intents and meanings behind participants' choices. To permit
responses that might not be included in the pre-selected answers, an "other" item was included.

2. The second type of question was constructed in an open-ended style. According to Patton (1980), this type of question permits the researcher to understand the actual world seen by the respondents. She said further, "Using open-ended questions will enable the researcher to understand and capture the points of view through prior selection of questionnaire categories" (p.28). The responses to open-ended questions represent the most elementary form of qualitative data.

3. The third type of question was designed to obtain demographic information, past and present experiences about computers and communication software, and such factual information as participants' academic majors, employment status, and years in school.

Of these three types of questions, open-ended items were used frequently. They permitted this researcher a chance to learn how participants responded to certain circumstances occurring during their learning experience. However, there are limitations associated with the use of this type of questions. According to Patton (1980), limitations include: participants' writing skills, the effort required of the person completing the questionnaire, and the impossibility of probing or extending responses.
(B) Interview

The second data collection instrument used during this study was a standardized, open-ended interview. Interviewees were asked the same questions, which had been prepared in advance. Basically, this interview was a purposeful conversation (Morgan, 1988). Interviewees responded to the questions, providing their personal perspectives about the subject matter. As Patton (1980) points out, the purpose of qualitative interviewing is to understand how individuals view the program, learn common languages and values, and capture the complexities of their individual perceptions and experiences.

The advantages of using standardized, open-ended questions are (Patton, 1989, 1990; Gay, 1987):

1. They can help minimize variations in the questions posed to interviewees.
2. They are systematic, and there is no need to judge participants' opinions in the interview process.
3. They help the researcher organize and analyze data quickly.
4. They help the researcher obtain data that would not have been provided on a questionnaire by establishing a rapport with the interviewees.
5. They permit the researcher to explain the purpose of the interview and individual questions. Accurate and honest responses are expected through this method.
The disadvantages of using standardized, open-ended questions are (Patton, 1989, 1990; Gay, 1987):

1. The prepared questions will not permit the interviewer to pursue topics or issues that were not anticipated when the interview was written.

2. They are time consuming in two aspects--the time used to interview each interviewee and the time used to transcribe recorded responses for data analysis.

Several concerns were emphasized in developing the questions for the questionnaires and interview. They were:

1. the arrangement of the questions (for questionnaires). Enough space was provided with open-ended questions for participants to express their opinions.

2. the sequence of the questions. Related questions were grouped under a general title. This helped the researcher locate responses more quickly in the data analysis stage.

3. the print quality of the questionnaire. All questionnaires were developed from the researcher's personal computer. High-quality copies of them were produced to ensure easy readability.

For the interview, a recorder was used to tape participants' responses. The recorder was examined to ensure proper functioning. Also, extra tapes and batteries were
available to ensure completion of the interviewing process. A paper pad was also available in case some participants were preferred not to be taped.

(C) Document analysis

The documents collected for analysis during this study were the computer communication records from each participant. These records contained number of messages, date of communication, and contents of participants' communication in computer. They helped to reveal the participants' view of their experiences, which helped in understanding how they interacted with each other, what they did most, and when they interacted in electronic mail and bulletin board communication (Allport, 1982). Analysis of these communication documents helped this researcher understand participants' feelings toward the program and the use of electronic mail and bulletin board technique in learning.

(D) Participant observation

Participant observation was used in this study to obtain information related to participants' external behaviors associated with the program. Participants' learning environments observed included the home, classroom, and computer laboratory in the campus. Fieldnotes strategy was used to help document situations observed. According to Patton (1989), the purpose of collecting data through participant observation is to describe the setting that was observed, the
activities that occurred in that setting, the people who participated in those activities, and the implications that setting had on the participants' performance. Denzin (1989b) also pointed out, it is an omnibus field strategy which is best used simultaneously in conjunction with various instruments (i.e., documents and interviews) in the data collection process.

The advantages of using the participant observation method in collecting information are (Patton, 1980, 1990):

1. It permits the researcher to have a better understanding of the context of the program.
2. It provides the researcher firsthand experience. More information can be collected by detecting any possible clues which may lead to the discovery of more responses.
3. It permits the researcher to learn things that participants will not report in the questionnaires or interview.
4. It helps the researcher interpret the collected data.
5. It promotes more in-depth responses, because the researcher interacts with the participants and knows what "language" they use for communication.
6. It helps the researcher prepare better questions in probing more responses in the interview stage.
The drawbacks of using the participant observation in this study are:

1. It is time consuming recording and sorting what has been observed.
2. It may inconvenience a busy participant.
3. It may produce an uncomfortable feeling in the participants at the beginning of the class.
4. It may cause participants to behave differently, resulting in distorted data.

During this study, participants learned in an environment in which traditional (classroom instruction) and non-traditional (electronic mail and bulletin board technique) learning strategies were used simultaneously. They were required to attend class every other week throughout the quarter. Between class meetings, participants learned through the use of electronic mail and bulletin board technique from their home, business or the computer laboratories on the campus. This type of arrangement required this researcher to observe the behavior of various participants in various settings. By being presented in various settings, this researcher would benefit from the following two aspects:

(1) It permitted this researcher to feel and share participants' insights about the program.
(2) It permitted this researcher to capture and analyze those moments not reported by the participants or collected from other data collection instruments.

Selection of Research Sample

In this study the subjects selected were 8 participants enrolled in the course, EDSTDS 664--Development of Technical-Skill Training Materials, offered at Ohio State University Spring Quarter, 1992. A purposeful sampling method was chosen to define the interviewee population. Patton (1980) said that "purposeful sampling is used as a strategy when one wants to learn something and come to understand something about certain select cases without needing to generalize to all cases" (p.100). No attempt was made to generalize the findings of the entire population of electronic mail and bulletin board participants. The results of this study were only used to illustrate how the selected samples experienced the use of electronic mail and bulletin board technique as a learning tool and to explore what factors served as incentives and disincentives for using this type of technique.

Data Collection Process

Sociologist John Lofland (Patton, 1989) said there are four elements in collecting qualitative data. They are:
1. The qualitative methodologist must get close enough to the people and situation being studied to fully understand what occurs.

2. The qualitative methodologist must capture what occurs and is said.

3. The qualitative data should consist of much description of people, activities, and interactions.

4. The qualitative data should consist of direct quotations from people—both what they say and what they write.

To illustrate how this researcher employed various data collection instruments, the following information were organized according to the sequence of the four different stages in the data collection process. They were:

1. During the first stage, a questionnaire was administered during the second week to those who enrolled in EDSTDS 644—Development of Technical-Skill Training Materials. The main purpose of this questionnaire was to learn background information about participants before they used electronic mail and bulletin board technique. To ensure clear and meaningful responses in all questionnaires, this researcher traced vague responses to the respondents and asked for further clarification. Although this was a tedious process, the
researcher's effort and the relationship established with the participants helped in gathering further information during this study.

2. The second stage involved administering a second questionnaire during the fifth week to learn how participants felt after experiencing electronic mail and bulletin board technique in their learning process. The major purposes of this questionnaire were to learn whether there were any changes in their learning habits and what difficulties they experienced in using this type of technique. Participants' computer communication dialogues (first to fifth week) were also collected. They were asked whether they wanted to share their communication records with others in the electronic mail and bulletin board communication. Ethically, for those who decided to offer their dialogue, the content was not used in the study fully. The purpose of obtaining those records was to help this researcher understand the participants' true feelings toward the program. The portion used for the discussion was limited in the amount of messages produced in the discussion process, the information related to the communication media other than the computer, and the frequency they communicated.
3. In the third stage two methods were used to collect related information. They were the interview and the collection of the second half of the participants' computer communication record (sixth to tenth week). In the final week of the quarter this researcher interviewed participants to learn their overall feelings about using electronic mail and bulletin board technique in learning; the successes and frustrations they experienced during the quarter; what factors encouraged or hindered their use of this type of technique; and the advantages and disadvantages of using it in learning.

4. Finally, in the fourth stage the recorded tapes for the interview were transcribed, and the transcription was mailed to each participant for verification. A final questionnaire was constructed on the results of analysis of previous data collected. Each participant was asked to identify the most significant concerns of his/her using electronic mail and bulletin board technique in various learning environment issues, such as ideal time for giving and receiving feedback. The questionnaire was either delivered or mailed to each participant.
Since four data collection methods were used to obtain information for this study, each participant was asked to give permission to allow this researcher to use her/his information for summary purposes only. Participants were assured that their responses would remain confidential, with only the researcher having access to the questionnaire. When administering the questionnaires, this researcher assigned a number to the questionnaire for identification purposes, with only the researcher having a list that matched the numbers and participants' names.

The interviews, each one-hour long, were conducted on the campus during the last week of the quarter. Before each interview started, interviewees were asked whether their responses could be recorded and were told that the content of the interview would remain confidential. Also, they were told that the results of their responses would be transcribed and mailed to them for verification of content accuracy. This verification process was completed three weeks after the completion of the quarter.

The communication documents were downloaded to the researcher's personal computer for the purposes of storing information and sorting out communication patterns and frequencies. The content of the conversation remained confidential.
For the participant observation, fieldnotes were taken during each class meeting, and participants were asked to permit the researcher to conduct one-on-one observation during their free time. These fieldnotes were completed after each individual was observed.

**Triangulation**

According to Denzin (1978a), there are four types of triangulation which can be used in the data collection process of a qualitative research, namely, data, investigator, theory, and methodology. The type of triangulation used in this study was the methodological strategy, in which information was obtained through multiple data collection methods. The reasons for using this strategy were it can provide a detailed and comprehensive coverage of various aspects of a qualitative study. Also, it permits this researcher a chance to cover many aspects of the participants' internal and external behaviors; compensate for potential drawbacks associated with each individual data collection method; cross-examine the data collected from various methods; and prevent the accusations that this study's findings are simply an artifact of a single method, a single source, or a single researcher's bias (Patton, 1990).

The following discussion is an explanation of potential drawbacks of various methods (interview, participant
observation, communication documents, and questionnaires) and how the researcher can benefit from the use of triangulation in a qualitative study (Lincoln & Guba, 1985; Patton, 1990; Bogdan & Biklen, 1992).

A. Various methods and their potential drawbacks

1. Interview. There are two potential drawbacks in using the interview to obtain data. They are: (1) the responses of the participants (interviewees) may be affected by such external factors as time and place of the interview and the interviewer's interviewing skills; and (2) data collected from the interview focus only on the participant's perspectives or perceptions, i.e., the participants' thoughts and feelings about the subject. Information about participants' behaviors in the learning process can not be obtained through this method.

2. Participant observation. This method permits the researcher to capture participants' external reactions related to the study. However, participants' behaviors may be distorted by the presence of the researcher. Also, observation included data occurring outside the people being observed, with the observer not understanding what was occurring inside a person and the reason for the observed behaviors.
3. Communication documents. Participants' communication records can only be used to understand their perspectives or perceptions of certain events and frequency of interaction. These documents provided no explanation for participants' reactions. To understand what triggered the reactions, this researcher relied on information collected from the interview, observation, and questionnaire.

4. Questionnaires. The major drawbacks of using this method in collecting data are that only responses from the participants' perspectives can be obtained, and the conditions or reasons behind their responses will be unknown. Using such methods as the interview and observation will help compensate for the weakness of using this method.

B. Advantages for this researcher in using triangulation for data collection were (Patton, 1990):

1. to use different data sources to validate and cross check findings.
2. to increase validity and reliability because the strengths of one approach can compensate for the weakness of another.
3. to permit the use of different instruments to verify what was vague in previous data collection results.
In short, the above discussion illustrates the interrelationships between various methods used in collecting data for this study. As pointed out in an earlier section, qualitative research should involve comprehensively collecting data about the program. Using the concept of triangulation would not only help this researcher gain a better understanding of what was occurring inside and outside the participants, but also ensure that the data gathered through various instruments represent the facts. It is believed by this researcher that the more the researcher understands the actual situation, the more meaningful the results.

Data Analysis Process

All data collected in this study from various instruments were treated as a reflection of each individual's view of the empirical world. Patton (1980) pointed out that, "Qualitative data consist of detailed descriptions of situation, events, people, interactions, and observed behaviors; direct quotations from people about their experiences, attitudes, beliefs, and thoughts; and excerpts or entire passages from documents, correspondence, records, and case histories" (p.22).

Information collected through various instruments was analyzed during the data collection period. Reasons for doing this were that (Miles and Huberman, 1984):
1. It permitted this researcher to examine existing data back and forth and help decide directions for collecting new, more in-depth data.

2. It made analysis and on-going, live enterprise, which was linked to the energizing effects of fieldwork (p.49).

3. It helped this researcher detect possible blind spots in various learning events.

4. It helped prevent overwhelming data analysis task and reduce poor quality of the work produced by the researcher.

5. It helped collect data thoroughly about the program and its participants.

Coding strategy was used in analyzing data collected through various instruments. According to Miles and Huberman (1984), a code is an abbreviation or symbol applied to a segment of words (p.141). By using this type of strategy, it permitted this researcher to identify trends and patterns occurring in participants' learning process. Two types of coding strategies were adopted. Loflands' coding strategy (1971), which was developed to represent various phenomena occurred during an event. These codes include acts, activities, meanings, participation, relationships, and settings. Another type of coding strategy is developed by Bogdan and Biklen (1982). It includes the following codes: setting/context, definition of the situation, perspectives held
by subjects, subjects' ways of thinking about people and objects, process, event, strategy, relationship and social structure, and method.

Miles and Huberman (1984) indicated that the contents included in Loflands (1971) and Bogdan and Biklen (1982) coding strategy are a general accounting scheme for codes. Since these codes were developed to represent various conditions during data collection process in a general sense, they suggested that users may create a new code or break down the existing codes (creating sub-codes) to meet their needs. For example, in this study, 'Communication through computers' was under the code--'event.' A sub-code--'other media' was created to represent various communication strategies used to facilitate participants' communication other than the use of electronic mail and bulletin board technique.

Various folders was then created according to different codes used in analyzing data. This strategy is suggested by Bogdan and Biklen (1982) for the purpose of clumping, rearranging, and connecting data in a systematic way.

Several strategies were used to help draw and verify data analysis results (findings), including counting, noting patterns and themes, and clustering. To assess the quality of findings, the following methods were used. They included:
1. Checking for representativeness: For example, examinations were conducted to see whether an individual's responses were used too frequently.

2. Checking for researcher effects: Two researcher effects may occur in data collection process. They are the effects of the researcher on the side (i.e., the researcher's presence disrupts on-going social relationships) and the effects of the site on the researcher (i.e., frequent comments provided by an experienced users in the computer).

3. Triangulation: It refers to the use of various data collection methods to compensate the weakness of using one single instrument for collecting entire information related to the program and its participants. In this study, four data collection methods were used, namely, questionnaire, interview, document analysis, and participant observation.

4. Looking for negative cases: It refers to the search for instances and cases that do not fit within the patterns or trends).

The Credibility Issues

According to Patton (1990), there are several important issues in discussing the credibility of a qualitative study. These issues include the credibility of the researcher, the reliability of the data collection instruments, and the
validity of the research. The discussion of each issue is described below.

**Credibility of the Researcher**

Qualitative research relies mainly on a human (the researcher) to collect the necessary data for a study. As Patton (1989) pointed out, people are the primary data collection instruments in a study within the naturalistic setting. Thus, the person who uses various instruments in collecting and analyzing data in the research process must have adequate training and experience in conducting the study.

Information about the researcher is essential in a qualitative report. To meet this requirement, several issues were discussed, i.e., the researcher's experience and training, researcher's philosophy and predisposition in conducting the research, and participants' concerns in participating in the study.

**Researcher's Experience and Training**

To gain more field experience in using various methods of collecting qualitative data, this researcher participated in the class (EDSTDS 663--Organizing Technical and Skilled Training Program) offered Winter quarter, 1992, at the Ohio State University. The class was designed to provide students with hands-on experience in developing a lesson plan for using electronic mail and bulletin board technique as a learning tool in a traditional learning environment. Students were encouraged
to communicate with each other through the use of this type of technique. This researcher participated in this class with the following purposes: to experience how participants react to the introduction of a new learning tool; to gain more knowledge about the utilization of this type of technique; and to practice necessary skills in collecting data, such as writing fieldnotes, analyzing fieldnote contents, and conducting end class interview.

After ten weeks of intensive practice, this researcher gained more experience and knowledge in using various data collection methods--interview, participant observation and questionnaire--to collect qualitative data. These experiences provided this researcher much knowledge in the following areas:

1. maintaining objectivity in conducting a qualitative research,
2. establishing rapport with participants, resulting in involvement in their private conversations for gathering more in-depth information,
3. probing sensitive issues skillfully,
4. building trust between participants and the researcher, and
5. developing appropriate questions based on the previous responses collected from various data collection methods.
In addition to the knowledge and experience gained during this class (Winter, 1992), this researcher also learned research-related subjects, such as the development of questions for the questionnaire, interviewing, and various observation skills from other academic training and research projects.

Briefly, the three-month field experience in a natural setting provided this researcher with much experience in conducting a qualitative research. Practice in data collection and analysis helped this researcher conduct the research with fewer obstacles.

**Researcher's Philosophy in Conducting the Research**

This researcher's philosophy in conducting the research is that participants should be informed about what they were going to experience, how this researcher will implement various data collection methods, the purpose of the instruments, and the relation of the study to the participants. Thus, participants will have a concrete idea about what they are doing, and what they can contribute to the study.

The above approach (informing research samples about the coming research activities) may induce a potential drawback—the "Hawthorne Effect" in which participants' behaviors may somewhat be distorted by the introduction of various data collection instruments. The position taken by this researcher here was full disclosure. The reasons are that:
Whether participants should be told they are selected for a study in such a program is an ethical issue. This researcher believes that for fairness, participants should be offered a chance to express their opinions about their willingness to participate in a study. The request for gaining participants' permission to include them in the study occurred during the first week of the class.

People prefer being treated with fairness and honesty. A carefully planned introduction not only informed participants that they were selected for study but also permitted participants to understand that the primary purpose of the study was to obtain their opinions and concerns about using electronic mail and bulletin board technique in learning. In this study participants were told their responses would be confidential, with only the researcher having access to them. Also, it was emphasized that opinions and concerns provided by each participant would be used solely for research. What they said or wrote in the data collection instruments would not affect their course grade.

With the nature of qualitative research, researchers should use fairness, frankness, honesty, and sincerity to treat those selected in a study. This gives people an equal and
relaxed feeling that will help increase their willingness to provide detailed and meaningful responses to the questions asked in various data collection instruments.

**Researcher's Predisposition in conducting the research**

At the beginning of this study, this researcher favored the use of electronic mail and bulletin board technique in learning based on the previous field experience. However, various perceptions were developed as the quarter advanced. Two perceptions about using this type of technique in learning were that:

1. the match between learning environment and participant is a key factor in generating successful results.

2. electronic mail and bulletin board technique used in learning can only be useful when participants have a strong commitments to participate in the discussion.

These two aspects of using electronic mail and bulletin board technique in learning appeared to be contradicted by this researcher's previous perception that this type of technique can be successfully used in an instructional process as long as proper equipment and support (i.e., encouragement and technical help) are provided.

**Participants' concerns in participating the study**

According to Patton (1990), any personal and professional information that may affect data collection, analysis, and
interpretation must be reported to establish the researcher's credibility. In this study, participants expressed two major concerns about participating in the study: (1) the relationship between the instructor and this researcher and (2) the confidentiality of their responses to various research questions in the data collection instruments. Following is the discussion of these two major concerns and how this researcher handled their questions.

(1). the relationship between the researcher and the instructor.

Several participants were concerned about the presence of this researcher at the beginning of the class because they wanted to know whether this researcher's presence would have any influence on their grades at the end of the class. Some participants wondered whether this researcher was a secret observer and who would report what he observed in the class to the instructor. Responses were given immediately from this researcher to the participants to secure their feeling about his presence. The responses this researcher provided were that "I participate in the class only to collect necessary data for research. There will be no hidden purposes or negative influences upon my presence." Then, this researcher explained the
reason he had to participate in the class and what he would do in the following weeks.

(2). the confidentiality of participant's responses to various research questions.

Some participants asked this researcher how their responses would be used. It is natural for participants to ask this kind of question. Also, it is very important for the researcher to answer the question properly to build trust between the researcher and participants. To make participants feel comfortable about how this researcher would use their responses, the following explanations were given:

(a) Their responses gathered from various methods were stored in the researcher's personal computer with a secret code known only to the researcher assigned to the file.

(b) Participants were told that anytime they felt uncomfortable about their responses after they responded to a questionnaire or the interview, they could ask the researcher to delete the responses, thus omitting them in the report.
Reliability and Validity

Reliability is related to the data collection methods used in this study. Validity is related to the discussion of issues involved in conducting the research. The following is a discussion about those two issues:

A. Reliability

During the data collection process, three questionnaires and one interview were used per participant. Reliability of these methods was very important in determining whether they met the requirements of their original purpose. To ensure that questions in various questionnaires were effective, a pilot test was conducted. From the pilot test results, possible problem areas were identified and corrected. Because of the time limitation involved in the study, it was impossible for this researcher to conduct a pretest before the actual administration of those data collection instruments. This was considered a weakness of the study.

Interview questions were tested in the same manner as the questionnaires. Four people outside the study group were asked to participate in a pilot test interview. The simulated interview process was taped. During the playback of the tapes, particular attention was given to the following areas:

(a) the speed of asking the questions,
(b) the inflection when asking the questions,
(c) the clarity of the pronunciation when reading the questions,
(d) the sequence of the questions,
(e) transitional words used to ensure a smooth connection between questions, and
(f) the time needed to conduct the interview for each individual.

B. Validity

According to Patton (1990), validity in qualitative methods has a strong relation to the consistency, skill, competence, and motivation of the person doing the field work. Variations in data collection results may be produced due to personal fatigue, different training and skills, changes in the researcher, and the data collection methods.

In this study, this researcher tried to be enthusiastic when administrating various methods in the data collection process. However, this researcher acted cautiously when participating in a class meeting for the following reasons:

(1) Over involvement may blind a person's judgment to what is occurring in the field. It may also develop a bias about the subjects. The degree of sensitivity in detecting various phenomena occurring in the process can also be affected; and
(2) However, under involvement may result in not only collecting insufficient data but also overlooking events crucial to the study. Although there is no absolute answer to how involved the researcher should be, he/she should evaluate the situation by asking what the result would be if he/she acted in a certain way.

During this research experience, this researcher was asked by many participants on several occasions why he never expressed opinions in class or participated in any computer discussion. It is important that the researcher answers these questions regarding his behavior, so that participants will not think that the researcher lack of involvement in these areas indicated disinterest, thus affecting their willingness to provide more information in the questionnaire and interview. This researcher addressed their concerns by explaining the relationship between the person who conducts the research and the research subjects (the participants). Also, he introduced such concept as bias, over involvement, and under involvement to show the importance of objectivity in the research.

In conclusion, conducting qualitative research such as this study required a strong commitment from this researcher, especially when multiple data collection methods were employed. To prevent potential threats to the study because of its duration and the use of various data collection instruments,
several approaches were used to help this researcher stay in the class during the data collection process. These approaches were:

1. There was a time schedule for the administration of each data collection instrument.
2. The focus and the intent of each instrument were developed for the systematic data collection purpose.
3. Reminders about "Do's" and "Don'ts" in various events were collected to minimize the possible negative effects when going into the field.

Trustworthiness of the Study

According to Patton (1990), trustworthiness of a qualitative study is the extent to which its results can be trusted. Questions associated with this concept should be addressed such as: how and what the researcher did to persuade his/her audience that findings of a study worth paying attention to, and; what strategies did the researcher employed in a study process to ensure that the results of the study are dependable and accurate.

Lincoln and Guba (1985) suggested that there are four criteria in judging the degree of trustworthiness of a qualitative study. These four criteria include: credibility,
transferability, dependability, and confirmability. A discussion of each criterion is described below.

**Credibility**

Credibility can be defined as the power or quality of inspiring belief (Webster, 1992). According to Patton (1990), the credibility of qualitative research relies heavily on the researcher's credibility, because the researcher is the instrument of data collection and the center of the analytical process. Patton also said credible qualitative research should include a discussion of the following issues: techniques and methods used to ensure the integrity, validity, and accuracy of the findings.

The method of analyzing data collected during this study was based on the principle of cross-examination of different data collection results. Coding strategy was used to help organize data into various related clusters. For the assurance of data quality of findings, strategies such as, checking for representiveness, checking for researcher effects, triangulation, and looking for negative cases (looking for instances and cases that do not fit within the patterns or trends) were used.

Regarding the issue of this researcher's qualifications, a detailed report of experience and training of this researcher in conducting qualitative research was reported in the previous Credibility section.
Lincoln and Guba (1985) also suggested using prolonged engagement, persistent observation, and triangulation to enhance the credibility of a study. For prolonged engagement, this researcher stayed a full quarter to collect data, which permitted this researcher to learn the "culture" of the program and its participants and build trust with them. For persistent observation, this researcher used participant observation to identify characteristics and elements in events that are relevant to the research questions being pursued. According to Lincoln and Guba (1985), if prolonged engagement provides scope to a program, persistent observation provides depth and detail to individual event occurring in a program. Finally, this researcher used the methodological triangulation to verify the accuracy of data collected through various instruments, so that data analysis and its results (findings) would be found credible.

Transferability

According to Lincoln and Guba (1985), transferability is similar to the concept of external validity in a quantitative study. However, it is difficult for a qualitative researcher to specify the external validity due to the difficulty in making precise statements about how the results of the study can be applied. Lincoln and Guba further pointed out that the best way to ensure transferability in qualitative research is to provide detailed, essential descriptions for those interested in
conducting a similar research. To meet this requirement, various information such as research methods, selection of sample (purposeful sampling), data collection, and the data analysis process has been reported in previous sections to provide readers sufficient information about how this research was conducted. It is hoped that this information provides enough details to make transferability possible for some of the potential users.

Another issue related to the transferability is a generalization of this research's findings. There was no intention to make generalizations to other cases of using electronic mail and bulletin board technique in instruction and learning based on the findings of this study. Those potential users must determine whether the findings were useful to them and how appropriate the research environment was for their situation in the application of electronic mail and bulletin board technique. Patton (1990) explained that "research findings are most useful with regard to the particular setting from which those findings emerged, and the interpretation of findings is particular to those people who need and expect to use the information that has been generated by the research" (p.490).

**Dependability**

According to Guba (1981), using inquiry audit in evaluating the process and records is a way to recognize the
dependability of a qualitative study. To ensure there is sufficient information for future auditing, related materials such as the guidelines for the data collection instruments, participants' responses in questionnaires and interview, records of pilot tests, and fieldnotes taken from participant observation, are preserved and available for those interested in examining the research findings of this study.

**Confirmability**

According to Lincoln and Guba (1985), the major technique for building confirmability is the confirmability audit, which has a strong relationship with the auditing concept in establishing dependability.

Halpern (1983) suggested, for future auditing of a qualitative study, certain records are essential to preserve. These records include raw data, fieldnotes, researcher's personal notes, instrument development information. These records together with those materials listed in the last section will be kept for possible audit in future.
CHAPTER IV

GENERAL BACKGROUND INFORMATION ABOUT THE PROGRAM AND ITS PARTICIPANTS

Introduction

The major purpose of this chapter is to provide general background information about the program and its participants. This information concerns the followings: program descriptions, participants' characteristics, computer backgrounds, and learning backgrounds.

The program descriptions include an introduction to its purpose and activities. Participants' characteristics included such basic information as sex, age, and education. Computer backgrounds includes the description of personal feelings toward computers, personal experience with a computer, and personal computer communication experience. The participants' learning background includes their learning habits, styles, and motivations. This information was obtained from the first questionnaire used in this study. Sections related to each major theme of this chapter are presented in Table 2.
Table 2

Program Description, Individual Characteristics, Computer Background, and Learning Background Information

Program Description

* Purpose
* Electronic Mail and bulletin board learning
  Environment
* Program Activities

Individual Characteristics

* Sex
* Age
* Education

Computer Background Information

* Personal feelings toward computers
* Personal experience with computers
  - previous experience with computers
  - computer equipment
  - computer application and academic obligation
  - problems with using computers
  - computers and physical conditions
  - computer communication experience

Learning Background Information

* Motivation
* Learning Habits
* Preference in Learning Conditions
* Learning Problems

Program Descriptions

The class selected as the research information source was titled Development of Technical and Skill Training Materials (EDSTDS 664). It was offered at The Ohio State University during Spring Quarter, 1992. To provide information about the program's purpose, how the program was conducted, electronic
mail and bulletin board environment, and program activities are described below.

**Program Purpose**

The major purpose of the class was to teach participants how to develop high-quality instructional materials for technical- and skill-based employees. Participants in the class were required to fulfill various course assignments (i.e., case studies and small group discussion) to master the concepts and skills in developing a quality lesson plan at the end of the quarter.

The class had two major differences compared with traditional teaching and learning. Electronic mail and bulletin board technique was introduced to participants as a means of contacting and discussing questions with the instructor and their classmates. Another difference was that participants only needed to attend a classroom meeting every other week. For the other week, assignments were given through the computer, so they could use electronic mail and bulletin board to discuss and complete those assignments.

**Electronic Mail and Bulletin Board Learning Environment**

The Electronic mail and bulletin board learning environment in this class consists of two major areas. The conference room was used by small discussion groups. Dialogues were established between participants through the group interactions which helped develop and refine knowledge, skills,
attitudes, views, and opinions for discussion related to each weekly assignments. The results of the discussion were delivered to the instructor through computers. Weekly assignments were delivered to participants through the assignment board. Participants were encouraged to communicate with the instructor to clarify concepts associated with the assignments and gaining advice on being involved in discussions.

Program Activities

The program activities are reported according to their occurrences during three major periods of the quarter. The first major period (from the first to the third week) consisted of two main activities with two purposes: to help those who need proper computer equipment to participate in the discussion and to introduce the new learning approach, electronic mail and bulletin board technique. These activities are described as below:

A. Surveying participants' needs

At the beginning of the class four of eight participants reported that they already had a Magnus account and had used it for more than three months before they enrolled in the course. The four who had no Magnus account were assisted to obtain one with help from the instructor and Academic Computing Service (ACS) at the Ohio State University. Two reported that they had no personal computer at home, and two reported that they did
not have a modem with their personal computer (Modems were given to them after they were requested).

Each participant was issued one of two types of communication software. Procomm Plus was provided for the IBM/compatible users, and; Red Ryder software was furnished for the MAC users.

B. Introducing electronic mail and bulletin board technique

To help participants become acquainted with the application of electronic mail and bulletin board technique, a demonstration was provided to show participants how to log into the mainframe computer from a personal computer. Also, a tour of the computer laboratory was arranged and a demonstration was provided to show participants how to log into the mainframe through terminals. Participants were encouraged to use this approach to facilitate their learning and communicate with their classmates.

During the first two weeks, two case studies were assigned for participants to practice operating of the communication software. They were required to discuss the topics involved in the case studies. To help those who were less familiar or unfamiliar with operating the communication software and computer hardware, two helpers were selected from the participants to provide assistance in installing the software, connecting the hardware, and facilitating users of the campus computer laboratory in logging in through terminals.
The second major activity began the fourth week. Two small groups were formed, with each group consisting of four participants including a group leader. Many issues related to the construction of a high-quality lesson plan were delivered weekly to each individual through the computer.

The third major activity began the eighth week. Participants were required to develop an individual lesson plan based on the past discussions and practices. The timeline for the activities in each stage is presented in diagram 2.

**Diagram 2**

**Timeline for the Course Activities**

<table>
<thead>
<tr>
<th>Stage A (1-3 weeks)</th>
<th>Stage B (4th week)</th>
<th>Stage C (8th week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I--------------------</td>
<td>I-------------------</td>
<td>I-------------------</td>
</tr>
<tr>
<td>Surveying participants' needs</td>
<td>Forming small discussion groups</td>
<td>Individual lesson plan project</td>
</tr>
<tr>
<td>Introducing electronic mail and bulletin board technique (demonstration, a tour to the campus computer laboratory)</td>
<td>Various discussion topics were delivered through computers to each participant from the instructor.</td>
<td></td>
</tr>
</tbody>
</table>

Two case studies assigned

Two helpers assigned in the class.

The instructor played a multiple role throughout the quarter. The primary role of the instructor was to help participants understand the assignment and provide directions for the discussion. Participants could ask questions through
the computer, which were usually answered within twenty-four hours. The instructor also acted as a facilitator in the discussion process. Encouragement to alleviate participants' frustration in using electronic mail and bulletin board technique was given frequently.

Individual Characteristics and Background Information

Sex

In his section, individual's information (collected from the first questionnaire administered at the third week of the quarter) is presented according to their sex, related occupation, and with an code assigned by this researcher for the identification in future discussion. Of the eight individuals who participated in this study, two were females. One of the females (participant A) worked in a local bakery shop and taught part time in a local community college; the other (participant B) was a graduating senior at the Ohio State University and had been working at a local computer store for two years. Of the six males, two were full-time foreign students. One (participant C), a university lecturer from Malaysia, came here on sabbatical leave for professional advancement. Another (participant D) was a full-time doctoral student who was having his general test at the end of the quarter. Of the remaining four males, one (participant E) was a deputy chief of a local fire department and a part-time
undergraduate student; one was a service manager (participant F) at a local automobile dealership and taught part time at a local community college; one (participant G) was a full-time dental laboratory instructor and a graduate student; and the last person (participant H) was an undergraduate full-time student who had taught auto mechanics at a vocational school.

**Age**

The participants' ages ranged from twenty-four to forty-nine, with eighty percent between the ages of 20 to 45 and two over 45. The reason for gathering this information was to provide the readers a better understanding of the participants' age group in the study.

**Education**

Of the eight participants, three were undergraduate students with majors in Training and Development, Vocational Education, and Trade and Industrial Education, respectively. Three were master students, with two majoring in Training and Development and one in Vocational Education. One was a doctoral student in the area of Training and Development and had a master's degree in Vocational Education. Finally, there was a non-degree student who signed up the class for learning purposes only.

In summary, although there were only eight participants in the class, they had various cultural and educational backgrounds, ages, and work experiences. There were two reasons
for collecting this information: to help this researcher gain basic information related to each individual and to use the information as a reference when analyzing data collected in the later stage. The summary information about individuals' background information is presented in Table 3.

Table 3
Sex, Age, and Educational Data of the Students

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of females</th>
<th>Number of males</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>30-40</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>40-50</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Education (current status)
- Undergraduate: 1, 2
- Master's degree: 3
- Doctoral degree: 1
- Non-degree: 1
- Total: 2, 6

Computer Background Information

To understand the participants' computer background, a special section in the first questionnaire concerned personal feelings in working with the computer, participants' experiences with the computer, and their experiences in computer communication. A discussion of each category is described below.
Personal Feelings About Computers

The main purpose of this section is to obtain information regarding individuals' feeling about using the computer, because according to Mason (1988), their feelings about the computer can influence their willingness to use them as a learning tool.

The first major concern was to learn whether participants feared working with the computer. Of the eight participants, only one said that correcting errors occurring during the computer's operation scared him. The remaining respondents said they had no problem regarding this aspect. However, when asked what they thought about working with a computer, four (50%) said they thought computers were impersonal. Their main reason for feeling this way was that personal computers are not interactive, so they often feel they are dealing with something "cold." A summary of participants' feeling toward computers is presented in Table 4.

Table 4

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaring</td>
<td>1</td>
<td>7</td>
<td>1. system error</td>
</tr>
<tr>
<td>Impersonal</td>
<td>4</td>
<td>4</td>
<td>1. not interactive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. &quot;cold&quot;</td>
</tr>
</tbody>
</table>
Personal Experience with Computers

To further understand individuals' experiences with computers, a series of questions was designed to gather information in the following area: years of computer experience, personal computer equipment, experience in computer application and academic requirement, problems associated with using computers, and individuals' physical conditions regarding the use of the computer.

Previous Experience with Computers

Participants were asked how much experience they had in using the computer before enrolling in this course. Of the eight participants, one reported having no experience, five reported having experience ranging from one to three years, one had experience from four to six years, and one had more than six years' experience.

Computer Equipment

An ideal situation for using electronic mail and bulletin board technique in learning is for participants to have the proper computer equipment at home, i.e., modem and printer, so they can benefit from some features carried by this type of technique, i.e., a more flexible learning time and space. Information obtained from the participants showed that:

1. Six (75%) participants had their personal computer at home. Four said that they had a modem connected with their computer. Five said that they could use a computer with a
modem either in their workplace or a friend's place. The computers used by these six persons were IBM (1 person), MAC (1 person), and IBM/compatible (4 persons).

(2) Two (25%) participants said they did not have a computer at home. They explained that whenever they needed a computer for school work, they normally used one in campus laboratories or go to a friend's house. They said that it would be ideal and wonderful, especially for this class, if they could have a personal computer at home.

Computer Application and Academic Obligation

To learn participants' experience in using computers for academic purpose, the first question asked was whether participants had any experience in taking a computer-driven course before. Four said "Yes" and four said "No." However, when asked whether they had used computers to help fulfill part of their academic obligations, i.e., typing papers, six participants said they had used computers frequently to do their course assignments. The third question asked was what type of software they used to complete their academic assignments. Word processing was the software used most frequently by the participants.

Problems Associated with Using Computers

To further understand participants' experiences with the computer, this researcher asked what types of problems participants experienced most in using the computer. Five said
they had problems in various areas, including typing accuracy and speed; the ability of handling computer system errors, the knowledge of computer language, and applications and commands. Although some of the participants had problems with computers, this did not mean that they would not use computer. They appreciated having computers helped them. Their reasons included the following: they can make life easier; they can help them become more organized and create neater output; they make them more knowledgeable, and efficient; and they have a huge capacity for storing and organizing information and providing quick access to the data bank. All participants said they were interested in learning how to do new things by using computers. All considered computers a "must" in modern life.

Computers Associated with Physical Conditions

Computers have merits in facilitating the processing of information associated with our daily live and fulfilling our academic and/or work requirements. However, one of the important issues associated with using a computer is related to the users' physical conditions. When participants were asked whether they were aware of any physical conditions they might have that would affect their using a computer, four said "Yes". These conditions included poor vision, high blood pressure, lower back pain, bifocal problems, and wrist pain.
**Computer Communication Experience**

The purpose of this section is to learn individuals' experiences in using a computer to communicate with their friends and colleagues before enrolling in this class.

When asked whether participants have had experience in a major computer communication activity, three said "Yes." Of these, two gained their experience from taking classes that required computer communication and one belonged to a nationwide computer service network. All three said they used a computer to communicate with their friends locally and nationally through the electronic mail service.

In summary, three major issues are discussed regarding computer background information. The first are personal feelings about the computer. Most participants (7 people, 87.5%) said that they have no problem using computers. However, four said that computers made them feel somewhat impersonal, and they considered them not interactive and "cold." The second issue is related to participants' experiences with computers. Most had experiences ranging from one to six or more years. Six participants said that they have a personal computer at home. Four said that they had experience in taking a computer-driven class. Six said they used computers to help fulfill their academic obligations. The last issue concerns whether participants have experience in using computers to communicate with others. Three said they had experience in using electronic
mail and had participated in a computer communication activity. Information about participants' computer background provides this researcher knowledge in understanding their pre-class computer experience, the number of computers owned by the participants, and their history of using the computer. A summary of participants' computer background information is presented in table 5.

<table>
<thead>
<tr>
<th>Computer Experience</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>0--------1 year</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1--------3 years</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4--------6 years</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6 or more years</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

- Personal computer at home: 6 (75%) 2 (25%)
- Personal computer with modem: 3 (50%) 3 (50%)
- Academic requirement (Computer-driven course): 4 (50%) 4 (50%)
- Academic obligation (using computer to do papers, projects, etc.): 6 (75%) 2 (25%)
- Computer-related physical problem: 4 (50%) 4 (50%)
- Computer communication experience: 3 (37%) 5 (63%)
- Magnus account: 4 (50%) 4 (50%)

Learning Background Information

Individuals have their own learning preferences and styles, especially in an adult learning situation. To gain understandings about participants' learning conditions,
questions were asked concerning their general learning background, with special emphasis on the following areas: participants' motivations for enrolling in the class, their learning habits (daily study time and willingness in collaborative learning), and their preferences of learning conditions (environment and style), and personal learning problems.

Motivations

There is always a reason for each individual's choice in enrolling in a class. Reasons for participants being motivated to sign up for this class were organized into three groups. The first group (four participants) was to learn how to construct a good lesson plan- the major focus of the class. The second group (two participants) was to learn the subject to improve their teaching ability and meet their job requirements. The third group (two participants) was to learn to use electronic mail and bulletin board technique in learning, because it is the trend of the future.

Learning Habits

This section includes information about participants' study time and their opinions of and willingness in collaborative learning. The main purpose of asking what time of the day each individual studied was to see whether there were any differences in learning before and after using electronic mail and bulletin board technique. The purpose of collecting
information about collaborative learning was to learn whether participants had experience in collaborative learning and whether they were willing to devote their energy to learn in a group learning situation. Discussions about participants' study time and willingness in collaborative learning are described below.

A. Study time

Concerning the study time, most participants had a different work schedule. This resulted in a wide range of studying time over a twenty-four hour period. To learn what time of the day participants studied most frequently, they were asked to check the appropriate time period on the questionnaire. The results of the questionnaire (provided by four full-time and four part-time participants) are described below. Since the four full-time participants had more time to study compared with the four part-time participants, their study time was reported mostly in 8 a.m. to 12 p.m. and 8 p.m. to 12 a.m. The time the part-time students studied was mostly in the evening between 8 p.m. and 12 p.m.. From the above information, full-time participants appeared to be more flexible in selecting different times of the day to study. Information about whether the introduction of electronic mail and bulletin board technique creates any changes in the study time among participants will be collected at a later stage. The
distribution of study time used by the participants is summarized in Table 6.

Table 6

<table>
<thead>
<tr>
<th>Time of Day Spent on Studying</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m. -- 12:00 p.m.</td>
<td>3</td>
</tr>
<tr>
<td>12:00 p.m. -- 4:00 p.m.</td>
<td>1</td>
</tr>
<tr>
<td>4:00 p.m. -- 8:00 p.m.</td>
<td>2</td>
</tr>
<tr>
<td>8:00 p.m. -- 12:00 a.m.</td>
<td>5</td>
</tr>
<tr>
<td>12:00 a.m. -- 4:00 a.m.</td>
<td>2</td>
</tr>
<tr>
<td>4:00 a.m. -- 8:00 a.m.</td>
<td>1</td>
</tr>
</tbody>
</table>

B. Collaborative Learning

A major requirement of this class was that participants interact with each other and turn in their discussion results as a group. This involved the concept of teamwork and collaborative experience in working with colleagues. When asked whether participants had experienced collaborative learning in other class before, seven said that they had. When asked their feelings about working with classmates, five said that they enjoyed the experience. The reasons they liked collaborative learning were: it can help generate rich ideas because of their different backgrounds (i.e., work, cultural, and educational experiences); it permits exchanging ideas quickly and learning things easily; it permits sharing visions and viewpoints with others; it can promote cooperation among group members; and it promotes better learning results. However, there were negative opinions about collaborative learning. Two
participants said that from their past experiences someone was always needed to motivate the group to become involved and complete the assignments. Some lacked the commitment and motivation to do their share, which made them less enthusiastic in participating in collaborative types of learning activities.

Preferences in Learning conditions

Participants' preferences in learning conditions are discussed in this section. These conditions include learning environments and learning styles. A discussion of each condition is described below.

Preferences of Learning Environments

The learning environments described here were structured and non-structured. In the structured environment, all instructional materials, pace, and content had been pre-decided by the instructor. With the non-structured environment, students had more options, i.e., deciding their learning speed and the content.

When asked what type of learning environment participants preferred, three selected the structured one. Their reasons were that it is less confusing, easier to follow, and easier in getting advice and sharing experiences. Two participants chose the non-structured environment. They said it permits the generalization of more ideas, more creativity, easy flow of ideas, and more enjoyment and freedom. The rest of the group
(three participants) said they had no preference regarding the structured or non-structured learning environment, and that they could learn under either. The responses about participants' preferences in various learning structures were synthesized in Table 7.

Table 7

<table>
<thead>
<tr>
<th>Learning Environment</th>
<th>Response</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structured</td>
<td>3</td>
<td>* less confusing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* easier to follow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* better chance in sharing learning experiences</td>
</tr>
<tr>
<td>Non-structured</td>
<td>2</td>
<td>* flexible, enjoyable, and more creative</td>
</tr>
<tr>
<td>Both</td>
<td>3</td>
<td>* These two learning environment have their own advantages and disadvantages.</td>
</tr>
</tbody>
</table>

Preferences of Learning Styles

Since each individual may have more than one learning style, participants were asked to indicate their preferences. Of the seven selected learning styles, demonstration and reading materials received the most responses. These choices reveal that adult learners prefer having hands-on experience and learning something concrete in their learning process, i.e., reading materials. The responses of the participants' learning preferences are summarized in Table 8.
Personal learning Problems

After identifying individuals' preferred learning environments and styles, this researcher was interested in studying participants' learning problems. Among the 14 problems listed, the four most frequent were reading for meaning (7 responses), dealing with time constraints (6 responses), dealing with exam anxiety (5 responses), and communicating with professors when help is needed (5 responses). The responses for this question are summarized in Table 9.

Table 8
Preference in Learning Style

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>3 (14%)</td>
</tr>
<tr>
<td>Demonstration</td>
<td>7 (33%)</td>
</tr>
<tr>
<td>Reading Materials</td>
<td>4 (19%)</td>
</tr>
<tr>
<td>Simulation/Role play</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Group project</td>
<td>3 (14%)</td>
</tr>
<tr>
<td>Question/Answer</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Computer conferencing</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>21 (100%)</td>
</tr>
</tbody>
</table>
One potential advantage of communicating with others through the computer is that it can reduce the number of pressures, i.e., fear in making mistakes during the conversation. Since all participants had experience about traditional method of learning, they interacted with their classmates frequently through live conversation. To learn whether participants had any problem speaking in front of a group, participants were asked to express their feelings about it. The results showed that of the eight participants, 5 (62.5%) said they fear public speaking. These participants said the reasons for their fear were that they were afraid of making a fool of themselves, i.e., stuttering or forgetting what they wanted to say; they felt shy in public; they were afraid that their suggestions or ideas would not be accepted; and they felt nervous all the time.

In conclusion, much background information about the research subjects (participants) and the program were reported.

<table>
<thead>
<tr>
<th>Learning Problems</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading for meaning</td>
<td>7</td>
</tr>
<tr>
<td>Dealing with time constraints</td>
<td>6</td>
</tr>
<tr>
<td>Dealing with exam anxiety</td>
<td>5</td>
</tr>
<tr>
<td>Communicating with the professor</td>
<td>5</td>
</tr>
<tr>
<td>Using library facilities</td>
<td>4</td>
</tr>
<tr>
<td>Asking questions</td>
<td>4</td>
</tr>
<tr>
<td>Deciding when to study</td>
<td>3</td>
</tr>
<tr>
<td>Sustaining motivation</td>
<td>3</td>
</tr>
<tr>
<td>Listening effectively</td>
<td>3</td>
</tr>
<tr>
<td>Taking notes during the class lecture</td>
<td>3</td>
</tr>
<tr>
<td>Determining the most effective place to study</td>
<td>0</td>
</tr>
</tbody>
</table>
in this chapter. Program information, participants' learning characteristics, background information (i.e., sex, age and academic majors), and computer background information were obtained through the first questionnaire administered at the beginning of the course. This information serves two purposes—to provide readers a detailed description about the participants of this program and to provide this researcher information in analyzing data collected from the participants in a later stage.
CHAPTER V

PARTICIPANTS' REACTIONS ON USING ELECTRONIC MAIL AND BULLETIN BOARD TECHNIQUE DURING THE MIDDLE OF THE LEARNING PROCESS

Introduction

The purpose of this chapter is to report the results of the second questionnaire administered during the sixth week of Spring Quarter, 1992. The questionnaire was administered to obtain information about how the participants felt about using electronic mail and bulletin board technique during the middle of their learning process. From the first through the fifth week, class activities requiring the use of this type of technique included two case studies and two group assignments. These assignments provided participants with many opportunities to use the communication software, become acquainted with each other, and to develop a better understanding of the instruction strategy. The following discussion includes the opinions of participants on what they liked most and least about electronic mail and bulletin board technique; technical problems experienced in the learning process; and communication issues of the technique. A discussion of each topic is described on the following sections.
What Participants Liked Most and Least About Using Electronic Mail and bulletin board Technique

One objective of this study was to identify what participants liked most and least about using electronic mail and bulletin board technique to learn new information. From their "liked most" responses, the three most favored opinions were:

(1) learning from other participants' perspectives

Most participants (7) indicated the enjoyment of learning course content from different individuals. They enjoyed the interaction which occurred during the discussion and they could exchange various opinions freely and extensively through the computer.

(2) less constraints compared with the traditional learning method

Participants (7) thought the flexibility in learning time and location gave them more time in preparing the learning subject, which produced a more meaningful discussion. All participants agreed that this feature permitted them to participate in learning without creating much conflict with their job or class schedule.

(3) flexible learning environment.

Most participants (6) appreciated the convenience of being able to learn under a preferred condition which could accommodate each individual's learning habits.
Participants did not have to readjust themselves to various learning environments. They could learn at home which they considered the most ideal environment.

For the "liked least" responses, the three items identified were:

(1) too much time to reach a group consensus

For reaching a group consensus participants cited two reasons affecting the process: the time delay between sending and receiving messages and participants' various backgrounds in their academic majors and their job experiences. Various opinions in the discussion process resulted in a much longer time for participants to agree on certain issues. This concern emphasizes that it is important to design an efficient way to reach a group consensus, especially when participants have different work experiences and cultural backgrounds.

(2) too much forwarded information

According to participants' communication records, much information was repeatedly sent between participants because of the "forward to" feature (it includes previous related information when sending out a new message) in the communication software (Procomm Plus and Red Ryder). This function undoubtedly has positive value in helping the receiver recognize the intent of the message. However, some thought it should be limited to those messages that
required using the function. Some participants used this function in almost all messages, which could make other participants become less patient in sorting out information. Another reason contributing to this situation was that some participants received information that was unrelated to them. This was created by those who used the "send to all" function frequently. A check from this researcher with participants who used this function revealed that they thought it is easier, because they do not have to type in each individual's computer address, which they considered troublesome.

(3) too time consuming in receiving feedback.

Regarding this issue, some felt it took them at least twelve hours to receive comments from others. For time efficiency, it was unsatisfactory.

The results of opinions on the liked most and least questions are summarized in Table 10 and Table 11.

Table 10

<table>
<thead>
<tr>
<th>What Participants Liked Most about Using Electronic Mail and Bulletin board Technique in Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Response</td>
</tr>
<tr>
<td>Learning from other people's perspectives</td>
</tr>
<tr>
<td>Fewer time constraints in learning</td>
</tr>
<tr>
<td>Flexible learning environment</td>
</tr>
<tr>
<td>Being able to express opinions freely</td>
</tr>
<tr>
<td>Getting information from the instructor</td>
</tr>
<tr>
<td>Test preparation</td>
</tr>
<tr>
<td>Getting to know someone better</td>
</tr>
</tbody>
</table>
Table 11

What Participants Liked Least about Using Electronic Mail and Bulletin Board Technique in Learning

<table>
<thead>
<tr>
<th></th>
<th>No. of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too much time to reach a group consensus</td>
<td>6</td>
</tr>
<tr>
<td>Too time consuming in receiving feedback</td>
<td>4</td>
</tr>
<tr>
<td>Too much information</td>
<td>4</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
</tr>
<tr>
<td>Too much work for little reward</td>
<td>1</td>
</tr>
<tr>
<td>Poor writing and typing ability</td>
<td>1</td>
</tr>
<tr>
<td>Not enough time to think about appropriate responses</td>
<td>0</td>
</tr>
</tbody>
</table>

Problems Experienced in the Learning Process

Electronic mail and bulletin board technique was new to most participants (5) in this study. During the first four weeks of class, most worked hard to overcome some technical problems due to their unfamiliarity with the technique and communication software. According to some participants' responses, they were busy in setting up their computer equipment, i.e., connecting the modem and the computer, loading the communication software, seeking help from the mainframe computer service desk, and learning the application of the communication software.

Because of the time constraints of the university's quarter system, there was a limitation in finding sufficient time to train participants thoroughly in understanding the application of electronic mail and bulletin board technique in
learning. To help participants understand this type of technique quicker, a brief demonstration about the basic operation skills and introduction of it were provided at the beginning of class. Other sources of helps were also provided including using helpers in the class, introducing the Academic Computing Service, and having on-line assistance from the instructor.

Although various help sources were provided, less experienced participants still felt uncomfortable applying electronic mail and bulletin board technique in learning. When asked what type of training was necessary for them to use this type of technique, five said they wished they had individual instruction before the beginning of the class, or at least group instruction to gain hands-on experience in communicating with others through the computers. Following is an example demonstrating the need to provide pre-class instruction on using this type of learning technique. Participant E had his computer equipment at his office. The phone line he used to dial into the mainframe computer was shared by his colleagues. At the beginning of the class, he tried various methods to log in the mainframe computer, including changing phone lines and loading communication software into a portable computer. As he tried repeatedly and unsuccessfully to log into the mainframe computer and participate in the discussion, he became increasingly frustrated. After further examination of the
communication software during the fourth week, the problem was solved. The reason for the problem was that one of the dialing sequences in the communication software did not match the participant's office phone line requirement. Although problems like this can be avoided by changing the selection of the dialing sequence, the participant said the feeling of falling behind the class was frustrating.

Another problem not seen in the class but in other similar electronic mail and bulletin board situations is the location of the equipment and the accessibility of the mainframe computer. According to an electronic mail and bulletin board technical consultant at the Ohio State University, some users may experience difficulty in logging into the mainframe computer because of the phone line quality in certain Central Ohio areas. Problems such as these need to be introduced to the participants ahead of time to prevent possible frustrations resulting from unexpected technical difficulties. If similar situations occurred, solutions should be planned ahead, so participants will not have too much frustration which could possibly hamper their motivation.

Participants' Impression of Using Electronic Mail and Bulletin Board Technique in Learning

Because of the unfamiliarity in using electronic mail and bulletin board technique, participants' reactions about this
type of technique were generally mixed in the middle of the quarter. Five participants felt that they had a good impression of using it. They said it can help them make more contacts with other participants and provide a new method of and more flexible time schedule for studying. These participants felt that they had more fun than in other classes. However, three who were more experienced in using the computer had mixed feelings about using this type of technique, because they felt that the participation rate was low, and felt like they were "signing alone." Participant F, an experienced one in using this type of technique, said:

"Normally, I will try to check in twice a day. Once in the morning before I left to work and once in the evening after I got home. Frequently, I felt disappointed, because there was nothing in the computer. I always try to respond to other participants right after I read the messages. I guess that some of the participants are just not as enthusiastic as I hoped."

Participant A expressed that:

"Sometimes I do feel tired of being a 'locomotive.' I have been tried to encourage people to participate by using various channels such as using computers or making phone calls. But it seems to me that no matter how hard I try, there is always something missing -- the action of participation".
Communication Issues

Electronic mail and bulletin board technique adopted in this class was expected to facilitate participants' learning besides the traditional classroom lecturing method. Thus, this researcher was interested in learning how this type of technique aided participants in fulfilling their communication needs. Two communication-related issues such as participants' preferences between it and conventional communication methods and the capability of this type of technique were included. A discussion of each issue is described below:

A. Participants' preferences in various communication methods

To learn how electronic mail and bulletin board technique can facilitate communication compared with conventional communication methods, participants were asked to compare it with conventional communication methods (i.e., mail service, telephone calls, and face-to-face communication) in the following areas: intimacy of feedback, speed of transmitting messages, and content organization. The results revealed that all participants agreed this type of technique could be more useful than the mail service in increasing the speed of sending and receiving messages. Four said it was good in presenting information in an organized way compared with the telephone method. Seven said it is better than face-to-face communication, because it permitted more time for them to perform more in-depth thinking and
data gathering before responding to a question. A summary of the result of this comparison is presented in Table 12.

Table 12
Comparisons Between Electronic Mail and Bulletin Board Technique and Other Traditional Communication Methods

<table>
<thead>
<tr>
<th>Electronic Mail and bulletin board Technique vs. various methods</th>
<th>Intimacy of Feedback</th>
<th>Speed in sending and receiving messages</th>
<th>Content Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mail</td>
<td>N</td>
<td>P</td>
<td>E</td>
</tr>
<tr>
<td>Telephone</td>
<td>N</td>
<td>N</td>
<td>P</td>
</tr>
<tr>
<td>Face-to-face communication</td>
<td>N</td>
<td>N</td>
<td>P</td>
</tr>
</tbody>
</table>

N= Negative, P= Positive, E= Equal

B. The Capability of Electronic Mail and Bulletin Board Technique

To determine the capability of electronic mail and bulletin board technique in facilitating learning, participants were asked to identify their level of satisfaction (ranging from very satisfactory to very unsatisfactory) with a pool of specific communication issues. These issues included giving and receiving information, problem solving, negotiating, decision making, generating ideas, perusing, asking questions, resolving disagreements, getting to know someone, giving or receiving instructions, maintaining friendly relations, and exchanging
opinions. The results revealed that 50 responses out of 88 showed the level of satisfaction of the capability of electronic mail and bulletin board technique was satisfactory or very satisfactory; twenty-eight responses judged the capability of this type of technique unsatisfactory or very unsatisfactory, and twenty-two responses indicated they had no opinion over this issue.

A description of the capability issue of using electronic mail and bulletin board technique in learning is reported as follows:

1. Most participants gave a positive rating on the item of giving and receiving information and instruction.

2. However, when asked to select the level of satisfaction concerning the technique in following activities—negotiating, decision making, persuading, and resolving disagreement, most participants said they were dissatisfied with the results produced by this type of technique. They said they spent too much time reaching a consensus. As participant G responded, "It seems to me that the discussion just went on and on. I started to feel boring and wonder that do we really have a chance to decide what we should do with these disagreements."

3. Most participants (6) agreed that using this type of technique can help generate more ideas compared with traditional communication techniques.
4. Also, six participants agreed that this type of technique provided them more opportunities in getting to know each other, giving and receiving instructions, maintaining friendly relations, and exchanging opinions about the subject.

The participants' responses were summarized in Table 13.

| Levels of Satisfaction About Various Capabilities of the Electronic Mail and bulletin board Technique |
|--------------------------------------------------|--------------------------------------------------|
| a -- very unsatisfactory                        | b -- unsatisfactory                              |
| c -- medium                                      | d -- satisfactory                                |
| e -- very satisfactory                           |                                                  |

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giving or receiving information</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Negotiation ability</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Decision making</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Generating ideas</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Persuasion</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Asking questions</td>
<td>1</td>
<td></td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Resolving disagreements</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Getting to know someone</td>
<td>1</td>
<td>1</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Giving or receiving instructions</td>
<td>1</td>
<td>1</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Maintaining friendly relationships</td>
<td>1</td>
<td>2</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Exchanging opinions</td>
<td>1</td>
<td>1</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Sub-total: 6 19 15 40 8
Total: 88 responses

In conclusion, most participants were generally satisfied with using electronic mail and bulletin board technique in learning and communicating. Frustrations caused by such things as technical difficulties and unfamiliar applications of
communication software can be resolved, as suggested by some participants through pre-class training and hands-on practice.

From this researcher's observation, the frequency of interactions was improved gradually. However, several participants were frustrated by the infrequent participation from a few in the class. Motivation in participating in an electronic conference plays a crucial role if interactive discussion and self-directed learning are to occur.

In the next chapter, the discussion will focus on more in-depth descriptions of how participants react to various types of problems experienced in electronic mail and bulletin board learning situation, according to the following four environments: physical, school, human, and learning.
CHAPTER VI

MAJOR CONCERNS OF USING ELECTRONIC MAIL AND BULLETIN BOARD TECHNIQUE IN LEARNING

Introduction

The main purpose of this chapter is to provide a description of participants' concerns and experiences in and factors that influence their using of electronic mail and bulletin board technique in the learning process. The information described in this chapter was synthesized from participants' computer communication records (whole quarter), their responses during the interview (at the final week), and observation data (whole quarter) in conjunction with the results from the first two questionnaires (at the third and fifth week respectively). The discussion will focus primarily on five areas: physical environment, school environment, human environment, and learning environment (see Table 14). These categories and their related themes are discussed as follows.

Physical Environment

This section, "Physical Environment," describes the technical aspects of the hardware and software operation related to the use of electronic mail and bulletin board
Major themes of this category include sources for resolving technical problems and setup of equipment.

Table 14

Physical, School, Human, and Learning Environments and Overall Opinions About Using Electronic Mail and Bulletin Board Technique in Learning

**Physical Environment**
- * sources for resolving technical problems
- * setup of equipment

**School Environment**
- * arrangement of class assignments
- * participants' opinions of applying electronic mail and bulletin board technique to future classes
- * participants' desires of applying electronic mail and bulletin board technique in the future

**Human Environment**
- * communication through computers
  - social contact
  - other media used to facilitate communication other than electronic mail and bulletin board technique
  - sources used to reach a group consensus
- * personal concerns in sending and receiving messages
  - asking something or commenting in the computer
  - preparation for responses
- * concerns in using electronic mail and bulletin board technique at work
- * concerns in receiving feedback
  - speed of feedback
  - reactions about no responses
- * effects of using electronic mail and bulletin board technique
  - participants' impressions about using electronic mail and bulletin board technique
  - changes due to using electronic mail and bulletin board technique
  - quality of responses

**Learning Environment**
- * frustrations and successes in using electronic mail and bulletin board technique in learning
- * factors that encouraged and hindered using electronic mail and bulletin board technique in learning
- * advantages and disadvantages of using electronic conferencing technique
- * overall opinions of using the electronic mail and bulletin board technique
Sources for Resolving Technical Problems

Since more than half the participants (5) in this class had no previous experience using any electronic mail and bulletin board technique in learning, it was essential for this researcher to learn what resources participants used to help themselves overcome technical problems related to using this type of technique in their learning process. Overall, they used three sources. They were:

A. Instant On-Screen Instruction from Academic Computing Service (ACS)

According to participants' responses, the Academic Computing Service was the source used most frequently, because it provided on-screen instruction whenever they made mistakes. Some participants indicated this service was especially useful when errors occurred during sending and editing messages. For example, participant H said:

On the computer screen, ACS, whenever detects an error made by the user, will provide information about how to correct the problem. Also a telephone number is given if the users have further questions about the problem. I call and try to get help all the time. Also, whenever you made a mistake, ACS will provide an instant help on the screen to remind you how to follow the procedure. I think it is really time efficient and helpful.

B. The Instructor

The second most frequently used source of help was the instructor. This is important information for instructor(s)
who intend to adopt electronic mail and bulletin board technique as an learning and instructional tool, because students tend to seek their instructor's help with academic difficulties, i.e., clarifying concepts about the subject and discussing issues related to the subject's topics. The instructor should possess not only subject knowledge but also technical expertise to help participants solve related difficulties.

C. Communication Software Manual

The third most frequently used source of help was the software operation manual (Procomm Plus or Red Ryder). However, some participants (3) felt that the manual was not written well enough to provide the necessary help in using the communication software. For example, participant A said:

The manual was written in a way that only experienced computer users can understand the content. They (the ACS-- communication software and operation manual were provided by this department) should provide us a simpler version which should be easy to follow and have solutions for technical problems.

Participant B said:

... The more I refer to the manual, the deeper frustration I felt. It seems to me that even with the manual in hand, I still need to use the trial-and-error method to find out what are the exact meanings by some of the explanations in the manual.
Participants, with or without experience, tended to panic, by nature, when first using electronic mail and bulletin board technique because of the unfamiliarity of it. Mainframe computer system experts (i.e., ACS consultants), the instructor, and a well-written operation manual are valuable sources of technical assistance for electronic mail and bulletin board participants. Clear instruction in using this type of technique and identifying sources of help should be provided at the beginning of the course to help participants learn it quickly, and hopefully, create a less stressful learning environment for them.

Equipment Setup

The major purpose of this section is to describe participants' preferences about the location and arrangement of computer equipment for participating in an electronic mail and bulletin board learning event. In discussing the preferences, two groups were identified in this section. Group I (six participants) had their computer at home and were able to participate from a remote area. Group II (two participants) had no computer at home and had to use school terminals. Following is a discussion of the participants' preferences in setting up their computer equipment for an electronic conference.

(A) Group I (those who had a computer at home)

Participants in this group said their major concerns in arranging their computer equipment were the facilities
(i.e., lighting, monitors, and type of chair), and the privacy. The following responses show some of their concerns. Participant G said:

I have been using a computer for many years. After all these years, I develop my own preference in the environment where I have to perform learning. For example, the chair I am sitting on right now is adjustable in height and it has five legs instead of the common four ones. The computer monitor is tilted to an angle that I feel comfortable to read the screen and a special protection glass is added on to the screen to prevent possible harmful radiation.

Participant B said:

. . . I prefer to study at home is because of the private, quiet atmosphere, especially when thinking is involved in the learning process such as this class.

Participants considered that it is more convenient to participate in learning from home than the traditional classroom. Although the home was the preferred environment, some participants were concerned about the area's phone line quality and the number of telephone lines in a house. A discussion of each concern is described below:

1. The area's phone line quality

Participants who had computer at home could communicate with each other from various locations. The information produced in the computer was transmitted by a modem through local telephone lines to the mainframe
computer. Because of this, the quality of message transmission was affected by the excellence of the local telephone company plant and its respective telephone lines. Some telephone company plants and their respective telephone lines induced much interference during the transmission process. Telephone-line-related problems, such as incomplete messages and unidentifiable symbols on the computer screen, were reported frequently during the study. They created problems for some participants. Participant A said:

I just do not know why I always receive something with broken pieces of information. If the condition is not bad on the screen I can guess the meaning of the content. But sometimes, I have to try really hard to put those pieces together. I am afraid that I make a wrong guess and provide a totally unrelated response.

Participant C said:

Sometimes when I tried to send my messages out, I could only have part of the content sent. This kind of problem happened not just only once. It happened in this building, my mom's place and my own home.

2. Number of telephone lines

An interesting issue in the participants' responses regarded the number of telephone lines per household. They wondered how they could use the telephone efficiently, especially if their families had only one line. Basically, using electronic mail and bulletin
board technique provided them such advantages as flexible learning time and easier access in making contact with their classmates and receiving advice from the instructor. However, they wondered whether they could use their telephone an entire evening without receiving complaints from family members. Participant D said:

Each time before I log into the mainframe computer, I have to make a announcement probably an hour ahead so my children and wife can take care of their business if the phone is needed. I felt very inconvenient. My families felt the same way, too. But, the question is that I cannot wait until everyone goes to bed and use the computer, because I have a job and I have to be in the office early in the morning.

A solution suggested by some experienced participants was to log in, unload the information into a word processing software, and free the phone line. This suggestion may seem ideal. However, it would be ineffective in the following situations: (1) a simultaneous conversation between two participants (the communication software used in this class permits this) and (2) the person's learning style or study habits are different and he/she prefers to work only on the computer screen to maintain continuity in thinking.
(B) Group II

Participants in this group used the school's computer laboratory terminals connected directly with the mainframe computer. This resulted in providing participants with much less interference, so that messages could appear clearly on the screen. They did not have to be as concerned about the area or the phone line quality as those in Group I who participated in learning from a remote area (i.e., home).

A major concern of this group was the condition of the learning environment which included the following four issues: the availability of the computer laboratory, quietness of the learning environment, facilities inside the laboratory, and privacy. A discussion of each issue is described below.

Regarding the availability of the computer laboratory in the campus area, each laboratory has its own time schedule for public use depending on the classes' needs. Nevertheless, some participants experienced a few unexpected schedule changes. Participant H who lived twenty minutes from the campus said:

The schedule change from computer laboratory sometimes really messed up my own schedule. Although I can go to other computer laboratory, I felt uncomfortable because of the unfamiliar feeling about different laboratory's environments.
For the quietness issue, participants can use terminals in computer laboratories at the Ohio State University with less restriction (i.e., quietness) compared to studying in a library, because most are open to students. However, those laboratories are noisy due to the hardware operation (i.e., keyboard and printer) and students' discussion about computer-related projects. Thus, it is difficult to demand a quiet learning environment. To avoid excessive outside interference, some participants in this class sat in a corner or in the first row of the room.

The facilities issue raised concerns regarding lighting, chairs, workspace, and position of the monitor. Five participants (mainly those who had no computer (2 participants), and full-time students (3 participants)) said it was difficult for them to find a laboratory which could satisfy their personal needs. They added:

1. Lighting in the laboratories was generally insufficient. All participants reported they had experienced eye fatigue due to this.

2. Chairs were too hard to sit on for more than one hour. They reported that the chairs were not designed to fit the contour of the human body and cushions were uncomfortable.
3. The workspace between each terminal was too small to permit them to move around. They said the limited space made them feel uncomfortable while getting in and out of their chairs. The users frequently had to push their chairs out before they could stand up, creating noise.

4. For the monitor position, there was a problem for those who wore bifocal glasses. Generally, the terminals in computer laboratories were displayed in front of users. Bifocal wearers had to look at the screen at a certain angle. Participant G said he had to move his head so frequently to see the screen better that he became tired. He suggested improving the positioning of the monitors in those computer laboratories.

Finally, there is the privacy issue. Whether this issue is important or not depends on the user's feelings. Participant H said he does not like the feeling of being watched by other people who share the same laboratory, especially those who pass behind him. A well designed computer table could improve this situation for those who wear glasses and provide the computer user(s) more privacy. For example, the monitor can be placed underneath the table and angled at 45 degrees toward the user.

The above facts suggest that its participants in this class would only go to a particular computer laboratory when
necessary. As explained by participant H about why proper laboratory conditions are important for electronic mail and bulletin board participants, he said:

The reason I like this computer laboratory is that it is a lot more quiet. Personally, I preferred to stay in an environment that can provide me sufficient work space, fresh air, and a quiet atmosphere. I always sit in front of the blackboard and the very left chair. It gives me more privacy and less interference compared with sitting in other places of this laboratory. I do not want to see people walk in and out. As where I am sitting now, I can be more concentrated, get the job done quicker, and the quality of my output will be better.

The issues discussed above are also applicable to those who had computers at home. From this researcher's observation, participants with or without a computer at home worked on their class assignments at computer laboratories whenever possible.

In conclusion, two major topics were discussed in the "Physical Environment" category. The first is the identification of sources for solving technical problems when utilizing electronic mail and bulletin board technique in learning. The three most frequently used sources are the mainframe computer system service provided by the Academic Computing Service (ACS), the class instructor, and the software's operation manual. The second topic relates to the arrangement of equipment. Discussions focused on two groups: those who had a computer at home and those who had to use
school's computer laboratory terminals. Conditions of the laboratory environment such as lighting, ventilation, chair, and position of the monitor were discussed. The availability of computer laboratory and arrangement of equipment were also discussed to help those interested in adapting this type of technique for instruction to understand the importance of providing proper laboratory environments for users of a school's computer. A summary of participants' concerns about the physical environment are presented in Table 15.

Table 15

Participants' Concerns About the Physical Environment

| A. Most frequently used sources for resolving technical problems | * Academic Computing Service
| * Instructor
| * Software manual

| B. Equipment setup | Concerns:
| a. At home | * Area's phone line quality
| * No. of telephone lines
| b. In computer laboratories on campus | * Availability of laboratories
| * Quietness of the learning environment
| * The facilities
| a. lighting
| b. chairs
| c. workspace
| * Privacy
School Environment

The major topics discussed in this category are the arrangement of the class assignments, participants' opinions of applying electronic mail and bulletin board technique in future classes, and ideal conditions for the application of this type of technique in the future.

Before discussing these topics, it is important to emphasize that participants in the class experienced instruction by attending regular class meetings and participating in electronic mail and bulletin board discussion. Opinions reflected here can only be applied to similar situations. Also, the school environment represents the learning conditions provided by the particular school and the class instructor.

Arrangement of Class Assignments

Major assignments to increase participants' interaction in this class were case studies, and small group projects. The reasons for doing this were to permit participants to learn the subject matter step-by-step and to relate the learning units to one another through collaborative learning.

To learn participants' opinions about whether these class assignments were appropriate with the use of electronic mail and bulletin board technique, an examination was conducted. The results are described below.
Many participants (6) supported the idea of using electronic mail and bulletin board technique with class assignments. They said the assignments provided them hands-on experience in learning the subject (how to develop a lesson plan). Followings are representatives of their comments:

Participant B said:

It is a good way to help thoughts develop. It made me open my eyes about some of the possible ideas as well as concepts that I can apply in where I teach.

Participant D stated:

I am totally overwhelmed by this type of learning method. I wish I could have this on the past and in the future. It really allows users to produce a good amount of input and maintain a good quality of content as well.

Participant G enjoyed gaining much information about the subject through this technique. He said:

The assignments and electronic mail and bulletin board technique help me gain knowledge from everybody. I can have a chance to see a wide spectrum of individuals' perspectives from different fields related to their minds.

Participant F said:

The group interaction required by those assignments was a great help. It helped me not only in the area of obtaining huge amount of information by also gave me a chance to establish good relationships and gained understanding about other participants.
Although many participants enjoyed their experience of using electronic mail and bulletin board technique in learning, two concerns were raised about the arrangement of the class assignments. One was other individuals' subject matter expertise; the other was the use of small groups in discussion. For the individuals' subject matter expertise, observation of the class immediately following the first case study showed that many participants did not understand the concepts behind the case study and the background information related to it. Confusion and questions emerged promptly. A conversation cited from this researcher's fieldnotes and related to the dialogue between two participants in the class showed how desperate one person was. The person who was confused about an assignment said to the other person:

Oh! No! Will this be a tough class? I have no idea at all about those concepts (in an assignment). Do you have any idea? I am really frustrated. From my academic background, I never heard about this kind of idea. I might have to drop the class if next assignment still gives me a similar feeling like this one. To be honest with you, this case study made me feel that I am stupid.

This dialogue reveals two important issues essential to the success of using assignments in an electronic mail and bulletin board learning event. First, an assignment should include related references about the subject to help participants understand the meaning of important concepts. Secondly, when giving assignments, instructor(s) should consider whether the
participants have adequate knowledge about the assignment. In other words, instructor(s) must be more sensitive to learner's background.

The second major concern was the involvement of small groups in discussion. Participants were divided into two small groups. Each group was required to enter its discussion in the computer. An examination of those participants' computer dialogues revealed two phenomena. The first was a lengthy discussion due to participants' various academic backgrounds. The second was the scarcity of those who participated frequently in the discussion. This latter phenomenon may explain why there were complaints about some participants' lack of commitment to participate in the class.

In short, participants had various opinions of class assignments used in electronic mail and bulletin board learning situation. Basically, most participants accepted using various types of assignments to relate all the learning units. They enjoyed the quantity and quality of their output resulting from using this type of technique. However, there were some drawbacks due to the participants' various backgrounds which generated many different opinions about the topics during the discussion process. They felt that background differences resulted in tedious discussions, as in this case, and achieved nothing.
When planning instruction through electronic mail and bulletin board technique, knowledge of participants' backgrounds are important, so the content and degree of difficulty of the assignment can be appropriate for their subject-related knowledge. Also, academic level of students must be considered (undergraduate vs. graduate). Hopefully, this will motivate students to participate frequently in the discussion, so they can benefit greatly from group interactions and their team efforts.

**Participants' Opinions of Applying Electronic Mail and Bulletin Board Technique to Future Classes**

The main purpose of this section is to learn how participants felt about the future application of electronic mail and bulletin board technique in such a traditional teaching and learning environment as that at this university. They were asked to express their opinions, and the results of their responses were organized into two major groups: "Way-to-Go" and "Conditional."

In the "Way-to-Go" group, participants (3) preferred to see more applications of electronic mail and bulletin board technique used in the traditional learning environment for the following reasons: a. its ability to carry extensive information; b. its ability to provide ample opportunity for them to interact with each other; c. its ability to permit repeated examination of ideas; d. its accessibility to reach
other participants. They said the learning results will be productive and meaningful. Following are examples from some participants. Participant F said:

I think it could be a very meaningful tool for the non-traditional students. I think there is a possibility for all participants to interact together at the same time. You can examine ideas as many times as you want. With the normal classroom meeting, you probably can do it in a few occasions.

Participant E said:

I experienced more accomplishment that I achieved than in any other classes I took before. It can cover the contents of the learning materials better and it is more efficient in getting ideas across.

For the "Conditional" group, participants' (5) opinions can be divided into two sub-groups: "It-All-Depends" (3) and "Prerequisite" (2). Participants in these two sub-groups recognized what electronic mail and bulletin board technique can do for them, i.e., eliminate time traveling to school and provide a less stressful learning environment. However, they also had various concerns about using this type of technique in a traditional learning environment. A discussion of each sub-group's concerns is described below.

The "It-All-Depends" group (three participants) was concerned about the match between electronic mail and bulletin board technique and the subject content. In discussing this issue, there are three major learning domains for planning instruction: Cognitive, Affective, and Psychomotor (Cranton,
1989). It is important to understand the distinctions between these domains, so proper instructional methods can be selected. Following is the discussion of the domains, the application of electronic mail and bulletin board technique to them, and participants' concerns.

A. Cognitive Domain

According to Bloom's Taxonomy, the Cognitive domain includes the following levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. Learning in this domain requires mastery of the content at each level before proceeding to the next. Electronic mail and bulletin board technique is extremely useful at the first two levels when extensive information is required to help participants learn the basic concepts of the subject. Once basic knowledge is learned, the application, analysis, synthesis, and evaluation can be performed through the use of the computer.

B. Affective Domain

The Affective domain includes receiving, responding to, valuing, and organizing learning to become characterized which means a person has adopted and acted regarding intention of the belief or value. Electronic mail and bulletin board technique can easily be adopted here. Most of the class's activities required participants to interact and
generate and synthesize ideas. This type of technique worked satisfactorily in achieving the goals.

C. Psychomotor Domain

For the Psychomotor domain, physical and psychological involvement are required in performing learning activities. Some events related to this domain are gross body movements (i.e., jumping), finely body movements (i.e., playing tennis), non-verbal communication (i.e., facial expressions) and speech (i.e., pronunciation of sounds).

Some participants expressed their concerns which are associated with non-verbal communication. Their main concerns in the process of communication from this researcher's speculation included: the intimacy of feedback, the needs for socialization, and the impersonality.

Following are examples of their concerns. Participant A said:

... Well, it is good to have this kind of technique available. But sometimes, I feel there is something missing. It is the intimacy of talking experienced in a face-to face conversation situation. I can judge people's feeling by telling from their body reactions. But from the computer screen, what can you tell. All I see is characters. I have to guess what are the true meanings behind those words. It is tough to figure out people's feeling with this kind of learning method.
Participant B said:

It is no way for me to learn purely from computer screen. I believe there are many people who want to attend school to fulfill their **social desire**. Learning is not just a pure knowledge acquisition process. It is also a chance to acquire life experience that can not be covered by the textbook.

Participant C said:

Learning through computers is somewhat uncomfortable to me. You have to be very careful about what you say. Over the class learning situation, you can throw out ideas to each other so easily. The degree of guessing meanings behind words is low and you can check immediately about confusing issues in a face to face communication situation. I think I can work better with people in a group and do discussion in a face to face manner. I pretty much **read people eyes and voices** when communicating.

Briefly, when an instructor decides to use electronic mail and bulletin board technique as an instructional delivery strategy, several issues should be considered. First, the compatibility between the subject content and this type of technique should be evaluated carefully. Second, the course requirements (i.e., assignments and group project) should be planned scrupulously to be compatible with students' learning background. Last, but not least, an overall evaluation should be conducted to determine what to include in a course content.

With the "Prerequisite" group, the major concern was the compatibility between participants in motivation and knowledge using computers and electronic mail and bulletin board.
technique. Students have various backgrounds and academic goals. It is difficult for an instructor to quickly know which students have a strong learning desire and which do not, in such a class as this one which meets only once every two weeks. A more in-depth discussion of the motivation issue will be described in a later section of this chapter. Regarding the issue of knowledge in operating computers and using this type of technique, there are many ways (i.e., individual instruction) to help improve an individual's ability in performing the tasks. However, to help participants master the use of electronic mail and bulletin board technique in learning within a ten-week quarter system such as that at this school, the key concern is time. Will students have enough time to learn two subjects in the course? Even if it is possible, must participants spend twice the amount of time studying? Following is an example that shows how participant A experienced difficulty. He said:

At the first, I was fascinated by this kind of learning method. I spent a lot of time to explore this new tool. .......
Suddenly, I realized that I was behind the course subject learning and there was not much time left for me to catch up, either.

Using electronic mail and bulletin board technique will probably be new to most participants in a traditional school environment. Thus, they may mistakenly think the purpose of the
class is to help one learn this type of technique and overlook the main reason for using it.

Briefly, all participants who use electronic mail and bulletin board technique in learning should have some level of skill in its use. If not, such as in this class, participants' participation rate and ability to provide quality information in the discussion are affected. Participant F experienced in using this type of technique had the following comment. He said:

I could not see how it can be used up to the results I expected. Some participants in our class are first time user. With a class schedule like this, there is absolutely no way for less experienced or no experience users to master the operation procedure and expect them to contribute 100% without worrying about some problems due to the technical difficulties.

In conclusion, participants expressed the pros and cons in the future application of electronic mail and bulletin board technique in learning. Several important issues are identified as-- the match between this type of technique and the subject content, student's ability and knowledge in using it, and time limitation in a quarter-system school. A summary of participants' opinions of using this type of technique in future classes is presented in table 16.
Table 16

Participants' Opinions of Applying Electronic Mail and Bulletin Board Technique to Future classes

<table>
<thead>
<tr>
<th>Groups</th>
<th>Opinions</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Way-To-Go</td>
<td>* liked to see more applications of electronic mail and bulletin board technique in the future</td>
</tr>
<tr>
<td>* Conditional</td>
<td></td>
</tr>
<tr>
<td>a. It-All-depends</td>
<td>* concerned about the match between electronic mail and bulletin board technique and the subject content</td>
</tr>
<tr>
<td>b. Prerequisite</td>
<td>* concerned about the compatibility between participants in following two aspects: 1. motivation 2. skill in operating computers and using electronic mail and bulletin board technique</td>
</tr>
</tbody>
</table>

Participants' Desires of Applying Electronic Mail and Bulletin Board Technique in the Future

To learn participants' most preferred situations in the future application of electronic mail and bulletin board technique in learning, they were asked: what situations you would like to see the most in the future application of this type of technique? Their opinions are described below. Almost
all participants showed a strong preference in receiving individual instruction before actually using this type of technique. The following statements reflected it:

I think if we can have an individual instruction about how to use the technique at the beginning of the class, it can help us get on the task sooner and become more involved in the discussion.

I think that individualized instruction and training on the use of the system would greatly enhance the comfort level of many students, and these improve both the quantity and quality of the outputs.

Individual instruction will be a wonderful idea. At the beginning of the class, I did feel intimidated by electronic mail and bulletin board technique and I almost dropped the class because of the technical problems I ran into.

The individual instruction would not just help individuals to master their skills quicker but also it would help eliminate the frustration due to unfamiliar feeling and insufficient knowledge about electronic mail and bulletin board technique.

In addition to individualized instruction, there were other suggestions for future use of electronic mail and bulletin board technique. They included the following:

1. We should build success one step-by-step. Class activities should be interrelated and arranged from simple to complex.
2. Since we are using the computer to communicate frequently, such instructional materials as handouts and articles should be delivered through it.

3. More involvement from participants should be stimulated. We can increase interaction between participants by asking more questions and offering more incentives.

4. A class about using electronic mail and bulletin board technique should be offered. Students can learn the skill before they actually sign up for a class in which it is adopted as an instruction and learning tool.

5. Using electronic mail and bulletin board technique in learning requires the involvement of school administration, so we can have more available facilities for its application.

6. A combination of the traditional learning method (i.e., classroom meeting) and electronic mail and bulletin board technique is preferred. The combination serves a dual purpose: social contact and the convenience of flexible learning time and schedule.

Briefly, using electronic mail and bulletin board technique in learning has unlimited possibilities. However, if this type of technique is to be used effectively, users should receive adequate training in using the hardware and communication software. By providing individualized instruction
about how to use this type of technique in learning, participants can benefit in the following areas:

1. frustrations due to unfamiliarity with the operating procedure can be minimized;
2. participants' motivation can then be stimulated; and
3. interaction between participants will be increased, so they can achieve a higher level of success in the learning process.

Human Environment

The key purpose of this section is to learn participants' feelings of using electronic mail and bulletin board technique in their learning process. Major topics include participants' reaction of communicating through computers, concerns in sending and receiving messages, concerns in receiving feedback, concerns in using this type of technique at work, concerns in receiving feedback, and effects after using it.

Communication through Computers

Electronic mail and bulletin board technique was used in this class as an instructional and learning tool. An analysis of participants' computer communication dialogues showed that most participants used it not only to learning the subject but also to serve their needs in many other areas, i.e., making social contact and seeking help with academic work. To learn how participants felt about using it in communication, the
following issues are examined: social contact, additional sources used to facilitate communication, and sources used to reach a group consensus.

**Social Contact**

Generally, participants appreciated the convenience and low cost of using electronic mail and bulletin board technique in the communication. They benefited the most in the following aspects: First, it eliminates the geographical barriers existing between users. They can reach their friends easily and quickly-- even those in foreign countries. Several participants said they used the technique to contact their friends frequently. Second, it can reduce the cost in making long distance phone calls. The following are some of their responses.

I think the convenience of electronic mail and bulletin board technique is a plus because I can use it anytime during the day. I can contact my friends without the limitation of time. To make it more distinctive, I have several friends and families live in the West Coast. Due to the time lag and the distance existed, the cost for a long distance phone call is expensive to me. Because of these reasons, I can not contact my families and friends very often. With the use of this technique, it helps me reach my families and friends easily.

I have several friends who have the account in the university. I would like to keep in touch with them. From my experience, sometimes, when you meet someone here on the campus and they will ask you whether you have a Magnus account so they can reach you.
There were some participants who said "NO" in using electronic mail and bulletin board technique to contact their friends. Their reasons were:

1. No equipment

This was a concern of those who had no computers at home. Participant C said:

I would certainly be happy to use electronic mail and bulletin board technique. However, I have no computer and modem at home. If I have to use them, I have to come to school and use those terminals at the computer laboratories. But, I do not think I will do it because it is not efficient for my time.

Participant E said:

Coming to the campus and use those terminals in the laboratory are fine to me. But, will that make any sense? I mean you talk about time flexibility and if I do this, it is wasting my time. I would rather take an easy way-- making a phone call.

2. Not time efficient

This type of technique could not fulfill people's desire in having immediate feedback. It took a person too much time to receive responses, because there was no live conversation available.

3. Impersonality

This type of technique lacks the ability to show people's feelings. Although the sender can express much on the computer screen, the intimacy of conversation (i.e., smiles and sincere attitudes) cannot be fully shown.
In short, participants had various opinions about using electronic mail and bulletin board technique for social contact. Some appreciated the capacity possessed by this type of technique. Concerns included how much money it will cost to obtain proper equipment, how close it can bring people together, and how much it can help users express their emotional reactions while communicating.

Other Media Used to Facilitate Communication Other Than Electronic Mail and Bulletin Board Technique

Most participants (5) indicated that they used electronic mail and bulletin board technique mainly for discussing the course assignments. They agreed that it was a very productive way to generate ideas. However, many said they also used other approaches, i.e., the telephone or personal meetings, to contact each other.

To learn participants' preferences in selecting different means for communication, they were asked during the final interview what communication media (telephone, face-to-face communication, and mail service) were preferred the most other than electronic mail and bulletin board technique. The results of their responses revealed that face-to-face communication was the most preferred method to contact classmates. The telephone was the second choice, but most frequently used method. The postal mail service was considered slow and only used when the content of the information was enormous and the time limited.
It needs to be mentioned that these participants' choices may have been affected by their living in the Central Ohio area and by there being a regular class meeting every other week throughout the quarter. Participants' opinions about their selections may provide the course organizer, designer, or instructor a reference when electronic mail and bulletin board technique is adopted under similar circumstances.

Those who chose face-to-face communication as the most preferred medium in facilitating their learning felt it gave them a more comfortable feeling during the communication process. They could also have their questions answered and meaning comprehended more clearly. The following are some of their responses:

I guess I like the personal touch in a face-to-face communication situation. Computers are somewhat impersonal. It is not the same as having a conversation with someone where both are in the same point in time and there is active dialogue going on. Dialogue many times triggers things in my own mind and I wouldn't have thought of it if I were by myself in front of a computer.

From my experience, in this class, we have done many conversations through the computers. Sometimes, we have to rely on the face-to-face contact. It simply took too much time to reach agreement on certain issues. Face-to-face communication gives me chances to study people's reactions not just psychologically but also physically, especially, the latter one.

Face-to-face communication gives me a warm feeling. People's smile, body
movement, i.e., raising eyebrow can be sensed immediately. You know that there is a difference when you put a person's voice and his/her body movement together. That can really help you a lot on determining what is the real meaning they try to pass to you.

Telephone conversation was selected as the second most preferred medium, but it was used most frequently. Participants enjoyed the time efficiency of the telephone. All said they had used the telephone to contact their classmates about assignments or for clarification about the discussion topics. None used mail service to communicate with each other since they lived within Central Ohio.

As shown in the above discussions, the media most preferred to facilitate electronic mail and bulletin board technique are face-to-face communication and telephone conversation. For those who are interested in using this type of technique for instruction, the following suggestions may be helpful:

1. More office hours should be scheduled to fulfill participants' psychological needs, i.e., personal touch and a warm feeling, while conversing with others.

2. A telephone help line should be available for large classes to provide answers quickly for participants.

By doing so, instructors can also eliminate the potential information overload problem while busily trying to answer many questions through the computer.
To conclude, traditional classroom teaching--the oldest but most frequently used method of instruction--may be partially replaced with electronic mail and bulletin board technique. Using this type of technique may help reduce the administration's expenses (i.e., lower the cost of building many classrooms). Also, it provides participants flexibility in their learning schedule. A combination of this type of technique, classroom instruction, and a telephone help line permits participants to perform their learning in a more comfortable and convenient environment. Each of these elements has its merits in facilitating learning. For example, electronic mail and bulletin board technique provides participants opportunity attending a learning event with a more flexible learning schedule and less time conflict with their work. Classroom instruction in a traditional environment can help satisfy some needs of participants who want to socialize with people and receive instruction through face-to-face communication. A telephone help line will permit them to receive advice more quickly, either in the academic subjects or in solutions for resolving technical problems of the technique.

Sources Used to Reach a Group Consensus

Examinations were conducted to learn how participants performed in reaching a group consensus by using electronic mail and bulletin board technique in learning. The results showed that telephone and personal meeting were used the most.
In general, participants were dissatisfied with using this type of technique in reaching a group consensus because of the following reasons:

1. New topics and ideas were presented continually during discussion, which prolonged the discussion time and caused participants to deviate from the current topics.

2. Some participants acted as observers. They either did not contribute or did not participate as frequently as they should have. Since some assignments and case studies required group work, the absence of some participants' input in the discussion prevented other members from completing their work.

3. There was a lengthy discussion after new assignments or case studies delivered. The following are some reflections about this phenomenon:

   Hi! Fellows, are you there? The project is due on Thursday and now is Tuesday. Do you think we can come up with something about this assignment or we should call in and ask for a permission to turn in our result next week? I have many problems on this one. I do not know why they just do not care. I hate to be a group leader. It seems to me that people just take advantage of me and without their input, how can I wrap up the discussion results?

   Well, (name), forget what we should put in the project. There was just not enough input from others. How about we discuss this again after next Tuesday's class meeting? Everyone will be there and we can sit down and get the project finished easier.
The above examples reveal that participants had used media (telephone and personal meetings) besides electronic mail and bulletin board technique to contact their classmates. Using various communication media has dual purposes in the communication process: it serves as a means of reaching other participants and having things done more quickly. The cost of making a phone call or meeting someone in the campus area was not a problem for them. However, to take full advantage of using this type of technique, there must be some rules for reaching a consensus sooner on the discussion subjects. Also, during the discussion with free flowing interaction effective use of time is critical for the completion of their assignments on time.

One effective way to help participants reach a consensus or make group decisions promptly is to have a live, simultaneous group conversation available in electronic mail and bulletin board technique. As participant F said:

I do not think Magnus is the right way to go. Electronic mail and bulletin board technique is good in a way, especially for the non-traditional students who can not be on the campus all the time. It does allow us to interact more often but it is not a direct link among people as live conference does. There is a lot of time lag. It is about half as fast as telephone call or the same as mail service. You get the message back the next day or two or never. There is no continuity existed in the discussion. As far as reaching group consensus, or group decision, you can have many input and discussions about the possible
alternatives related to the contents you want to put in the assignment. But, how much time should we spend on doing this? The problem of sending message is that we always lost the continuity of thoughts and time that make us even spend more energy and the results were no much difference as face to face communication. If we can have an appropriate technique and have a "live" interaction, it will be more ideal.

In short, two essentials deserve close attention if a group consensus is required in the learning process. They are:
1. total involvement from participants
2. a proper means for participants to shorten their time spent in the communication process.

Lack of either of the two will delay the process of discussion, result in much work trying to motivate people, and affect other participants' motivation in participating.

Personal Concerns in Sending and Receiving Messages

In this section, the major purpose is to discuss participants' concerns in using electronic mail and bulletin board technique to send and receive messages. From an examination of various data collected previously, two concerns were identified. The first concern is in asking something or commenting in the computer. The second concern is in providing responses. A discussion of each concern is described below.

Concern in Asking something or Commenting in the Computer

Participants' attitudes toward this issue had two variations: Group A participants (4) thought they did not have problems asking questions or expressing opinions through the
computer; Group B participants (4) had problems in doing so. A discussion of each group's concerns is described below.

Those in Group A considered asking something or commenting something in the computer was the same as doing them in a classroom situation. They appreciated having more opportunities to ask questions, receive answers, and express opinions through computers, because they had more time to prepare what they wanted to ask or comment.

Participants in Group B were reluctant to enter their words in the computer. The following statements show participants' concerns:

Because of my slow typing ability, I tried to hurry up every time I typed, but this just compounds everything. I am a little reluctant to put down a lot of information. It is difficult for me to read while I am typing. You do not know how far they are. You have no idea when to quit. You can get a lot of voices from talking to people, but you miss those in the computer.

I do not want to put some simple questions in the computer so people can see it. My experience told me that if there is something personal, I will never put it in writing.

When I have a problem in the learning subject, I felt that should I ask this or I am too far behind to ask. I did not want to make people feel that I am complete idiot if I ask the questions if that is not related to the current topic.
Oh! Yes! I did. If I feel confused about the course, I do not want to send messages to people and let them know that I am confused unless I felt comfortable with the person. I do not want to ask questions in the computer because some might say that it is not important. I do not want to see this kind of comments. If you say something stupid in front of the people they might forget later most of the time. But, if you do that in the computer, they will remember because it is on there forever. It has permanent kind of record.

From the above comments, participants' reasons for not wanting to ask questions or say something in the computer can be organized in the following categories:

1. Typing ability.

Some people felt that when asking or expressing something on the computer, the contents must be clear. Although a short sentence can be effective, longer sentences are sometimes needed when explaining or discussing concepts. Under this situation, if a person has a slow typing speed, it may prevent him/her from asking questions or expressing opinions frequently in the computer.

2. Fear of being considered a less knowledgeable person

This is the phenomenon that occurred in almost all the learning events. Expressions of encouragement, such as "feel free to ask questions" and "stop me anytime if you have a question" were often heard in the classroom. However, those who do not like to ask questions probably
will not. How to make those people feel comfortable in asking questions and expressing opinions freely in a computer is an important key to increasing the interaction between participants.

To help change some participants' unwillingness to ask questions and express opinions in the computer requires a combined effort of other participants and the instructor. Encouragement from peers sometimes has a greater effect than that of the instructor. Also, participants should understand that frequent interactions which permit words and thoughts to flow freely is one of the fundamental elements in the successful use of electronic mail and bulletin board technique in learning.

**Preparation for Responses**

Participants in this class were required to interact with each other through computers. However, the degree of their interaction was affected by the following factors: typing errors, approaches for handling messages, and the pressures due to the amount of information provided or received. A discussion of each factor is described below.

**Typing Errors.**

Words on the computer screen serve as a bridge to connect people. Participants' feelings and opinions are transmitted in sentences. An unintended mistake due to a
typing error may create misunderstanding and hamper the speed of exchanging information.

Participants generally felt that typing errors would have little effect on their communication with others. However, to ensure that the content of the intended responses represented the sender's intention, participants checked the content for any possible misunderstandings. If mistakes were found, they used the editing function in the communication software to correct them. Some participants said that because of their unfamiliarity with the communication software, they felt inconvenienced when typing errors occurred. The following examples show their concerns:

I want to do everything right. However, I do not know how to do the editing. If I have a typing problem, I just had to let the message go, because I do not know how to correct it. However, before I let the message out, if there is something that might mislead people into a wrong direction, I will try to retype it again.

Normally, I will go back and check it over before I send it out. About the software we are using now, sometimes I cannot make correction and I have to log out and log in again. For example, when trying to type a person's computer address, if I made a mistake, I have to do it all over. When worse comes to worse, I just have to retype the whole contents.

To help participants use electronic mail and bulletin board technique successfully, the basics of using the
communication software should be taught first. Pre-class training or help sources (i.e., telephone help line and helpers) should be provided to minimize possible frustrations due to unfamiliarity with the software.

Handling Messages.

In discussing this issue, participants were asked to describe their methods of handling messages in their computer file.

According to their responses, their primary concern in handling the messages was the nature of the information. Generally, two strategies were used in managing messages: respond later and respond immediately. Participants responded later if the information required more in-depth responses. They read the information first and did one of the following three things-- took notes, made a printout, or downloaded the information into a word processing software. Then they set those messages aside until further research or thinking had been performed. According to some participants' responses (less experienced users of this type of technique), the first two approaches (took notes and made a printout) were used the most frequently. This may have something to do with their experience in copying information from the communication software into the word processing software.
Participants responded immediately when there is no requirement for further research.

The following are representative of these participants' remarks on how they handled messages in the computer:

... That depends on what kind of message I received. Some I can answer with little or no preparation. Most of them I need to organize my thoughts. I can not reply on the spot. I need to read the message a few times first. I definitely have to see it in print first. It is too difficult for me to keep track of what I just read when the computer is scrolling information off the screen that I can not refer to some of the previous ideas.

Because of the long distance phone call (this participant lived just outside the city of Columbus, and he had to pay long distance rate if he had to call Columbus). What I will do is to read the message first and jot down the key ideas or main points of the message. Then, I will write my responses all out and then get back to the computer and type them in. This will help me save time and money.

From the above examples, two important conditions must exist in using electronic mail and bulletin board technique in learning. First, the communication software should be user friendly. Negative comments related to the communication software were heard frequently in this class. These comments included inflexibility in editing, inability to correct such accidental errors as hitting a wrong key and causing disappearance of the data on the
screen, and inability to move the screen upward. For application purposes, an evaluation should be conducted prior to using this type of technique to determine whether the software is user friendly. Second, a toll-free number should be provided to those who must make a long distance phone call to log in the mainframe computer. Hopefully, these will increase participants' willingness to participate in the learning process.

**Pressures Related to the Amount of Information Provided or Received.**

Participants in an electronic conference rely on interactions to exchange their opinions and thoughts in the computer. Due to the individual differences i.e., personality and background knowledge, the amount of information provided when responding to someone may vary from person to person. Because of the above reasons, this researcher was interested in learning whether the amount of information received imposed a burden and pressure on the receiver. A discussion of this issue is described below.

Two participants who worried about the quantity of their responses provided the following reasons:

1. the speed in typing messages. As participant H said:

   ". . . I know my typing ability has a lot to do with the amount of information I put in the computer. Although I never received any complaints, I still felt
uncomfortable if a person sent me two
two pages of information and I only responded
to it with a few sentences because I type
slow.

2. pressure from being assigned as a group discussion
leader. Participant A said:

I felt pressure all the time, because I
was assigned as a group leader in this
class. If my group members sent me
something and I couldn't give them the
same equal amount of information back, I
will feel really embarrassed.

Most participants (6) were not concerned about whether
they could match the amount of information sent by others. They
felt that what was important was what they provided in the
discussion. This brings up another issue in the application of
electronic mail and bulletin board technique in learning: what
criteria participants used to evaluate the quality of their
contributions to the class. It will be discussed in a later
section.

In short, electronic mail and bulletin board participants
in a class come from various backgrounds and possess different
work experiences. Their knowledge of the learning subject plus
their working experience may have a strong association with how
much input they can provide in the discussion. The instructor
has first-hand information about participants' backgrounds,
which he/she should use to modify activities to accommodate
their background differences. When forming discussion groups,
participants' background knowledge about the subjects and their
work experiences should be considered. The same idea can be
applied to the arrangement of graduate and undergraduate
participants in a group. An appropriate placement of different
levels (work experiences, years of schooling, and computer
skills) of participants within each group should be used in
achieving positive learning results and feelings in the
application of this type of technique. Also, proper
encouragement should be provided to minimize anxiety of
undergraduates resulting from feelings of inferiority compared
with their graduate-level counterparts in using this new
learning method.

Concerns in Using Electronic Mail and Bulletin Board Technique
at Work

Five participants (three full-time students, one full-time
student who worked part-time, and one non-degree student)
reported that they had access to a computer and modem at their
workplace to participate in the electronic conference. However,
they rejected the idea of doing it. The main reasons for this
were that:

a. it created an uncomfortable feeling to work on personal
   business during the regular work hour;

b. it lacked of privacy in their workplace while performing
   their learning through the computer;

b. it lacked of privacy in their workplace while performing
   their learning through the computer;

c. it was difficult to maintain the continuity of thoughts.
A typical example can be provided from this participant's comment. He said:

I do enjoy the flexibility of this kind of technique. But there is no way for me to dial in and check or send information during my work hour. I do not want to do so because I feel I am taking advantage of the company. Although all the necessary equipment is in front of me, I will feel uneasy and guilty to do it. The next best thing I can do is to wait until I get home after work.

Concerns in Receiving Feedback

In this section, there are two major issues related to participants' feelings about receiving responses from other participants: the speed of responses and lack of responses.

Speed of Responses

Many participants in this class expected to receive responses from their messages within 12 hours. When electronic mail and bulletin board technique was adopted in this class, there was no "live conversation" function available. Thus, it resulted in spending too much time on waiting for messages. The communication software (PcPlus and Red Ryder) has a "talk" mode that permits two people to communicate with each other simultaneously. It also has a function for checking who is logging in currently. However, the odds of two participants being on-line simultaneously was low. A person usually had to wait at least 12 hours to receive feedback from other participants. According to participants' responses, the average
time spent on waiting for responses was between 12 and 24 hours.

A further examination of participants' computer communication records showed that factors affecting the speed of feedback may relate to the content of the message, the time of day when the message was sent, and the computer equipment. Regarding the content of information, some participants said it took a little longer to respond to the message when its content was extensive. What time of day the message was sent also influenced how fast it reached the receiver. Although electronic mail and bulletin board technique has a great feature--time flexibility--, it also has its limitations. For example, the time that non-traditional students could participate in the discussion or respond to people was confined to their work schedule. How to find a solution which can increase the speed of receiving feedback is important in increasing motivation to learn and the rate of participation. The final factor affecting the speed of feedback concerns whether the participant has his/her equipment at home. It usually took those who used school computer terminals longer to respond to other participants' messages because of the time schedule of the computer laboratories, especially during the weekend. Although there was access to some laboratories 24 hours a day, some participants felt that they were either too crowded or the locations were inconvenient.
No Responses

Five participants said that more than once they received nothing back from other participants in the discussion process. They felt that this lack of participation from others was frustrating. The following are examples of participants' feelings about receiving no responses:

I do feel very frustrated, because I saw no input from some of the participants. Due to the "non-contact" medium (the communication software used in this class), it is much more difficult to draw the non-participating participants into the discussion.

I had an unequal feeling about some participants just do not provide opinions. It is not fair for others who really provide a lot of information into the discussion and some just wait for the results with very little inputs.

I think the mandatory of checking in at least once a day is necessary. Hopefully, it can make some improvements in responding to messages. Being a group leader, I spent much time to involve people in the discussion, but unfortunately, I feel very disappointed about the result.

Frustration about lack of participation was mentioned by most participants in this class. Those who participated frequently (5) felt that the results of the discussion were unsatisfactory. Peer pressure in involving people in the discussion was not evident. How to increase participants' interest and motivation are two concerns that must be addressed in ensuring success in using this type of technique.
In short, personal concerns in sending and receiving message are discussed. These concerns are related to how a person prepares his/her responses and feelings about receiving no responses. Those in this class felt strongly that participating in the discussion should not be seen as the responsibility of only a few people. They felt that every participant should try enthusiastically to participate as frequently as he/she can to keep the conversation going, so ideas can be generated and thoroughly examined. The commitment of participation in the discussion is one of the fundamental elements for the successful use of electronic mail and bulletin board technique in learning. Participants who use this technique in learning should recognize the importance of actively participating in a discussion. The instructor's encouragement during and after the discussion process will have positive influence on increasing participants' interest in providing more input in the discussion process.

Effects of Using Electronic Mail and Bulletin Board Technique

Although there were three participants who had experience in using the computer to communicate with others, there was only one who had used electronic mail and bulletin board technique in an academic learning event. Before this class, participants were taught with traditional classroom instruction methods, i.e., regular classroom meetings and independent study. The experience of learning with electronic mail and
bulletin board technique deserves to be studied to determine whether there are any changes in the learning process and learning results.

Key issues in this section include:
1. What were participants' impressions about electronic mail and bulletin board technique?
2. What changes were created due to the use of electronic mail and bulletin board technique in learning?
3. What were participants' opinions about whether there was any improvement in their quality of responses?

A discussion of each issue is described below.

**Participants' Impressions About Using Electronic Mail and Bulletin Board Technique in Learning**

An examination of participants' responses revealed that the three most frequent reactions about using electronic mail and bulletin board technique in learning were that it provides the following opportunities for them:
1. making more enjoyable contacts with their classmates.

   This is the most frequent reaction from the participants. They felt that this type of technique made learning more fun than the traditional method of instruction.

2. experiencing a new way of learning

   General opinions about this new way of learning were:
   a. It has great potential for the future because of its capacities and distinctive features (They were identified
in Chapter V, i.e., flexible learning time and equal opportunity in expressing opinions.)

b. It provides more opportunities for interactions among participants. One participant said, "It permits more interactions than would occur if we had to meet with each other regularly in the classroom every week."

3. becoming more involved in the learning activities.

One participant (E) said:

Electronic mail and bulletin board technique requires us to interact with each other through computers. Interactions between us require everyone to prepare well before going into the discussion. You have to understand that what you say in the computer will be seen by the rest of the group. You do not want to say something irrelevant or no sense to the topic. To avoid this, what you have to do is to study more about the topic, so you can discuss with each other.

What Changes Were Created Due to Using Electronic Mail and Bulletin Board Technique?

According to participants' responses, the greatest changes after using electronic mail and bulletin board technique concerned study time and the level of interaction. They said this type of technique permitted more flexible study time and better interactions. The following are examples of participants' responses:
To me, the greatest change after the use of electronic mail and bulletin board technique was to allow me to study and make contact with classmates at odd hours. For a non-traditional student like me, it certainly provides a new approach to facilitate my learning.

Electronic mail and bulletin board technique gave me a flexible time schedule. It allowed me to have a higher level of interaction with others. We let our ideas bounce around and examine them back and forth. The result was that there were more in-depth and thoughtful discussions which in turn generate better quality and meaningful results.

Quality of Responses.

The effectiveness of using electronic mail and bulletin board technique in improving the quality of responses received a very positive reaction from the participants. All agreed that after using this type of technique in learning, their experiences were better than those with traditional methods. With the traditional class discussion method there is the advantage of communicating through face-to-face interaction that can help convey meaning more quickly and clearly. However, the traditional classroom methods of learning limit the amount of time a person can examine the information in the subjects.

Using electronic mail and bulletin board technique in learning gave participants a chance to discuss content without feeling rushed. The following are some comments regarding this advantage:

Electronic mail and bulletin board technique definitely helps me improve the quality of my responses, because it is
concrete and there is no demand for a "timely" response. One is able to speak in a different manner, i.e., quote articles and add interjections that a verbal response would not.

Yes. I think it can help me improve a lot in my responses. Because of the technique, it allows me to take as much time as I need to prepare or research to give an appropriate response rather than feeling rushing to respond without giving the question adequate consideration.

Electronic mail and bulletin board technique helps me in improving the quality of my responses compared with the traditional classroom learning situation. It generates more discussion and I will prepare more for it. Without the technique, it would have to do more works to get the same amount of information generated in this class. Also, it helps students understand the flow of the discussion. You do not need to spend too much time to find out where the class is.

Yes. It gives me more time to think over about what I have to say in the computer. It gives me more time to correct myself, too. I won't feel pressed that much compared with the classroom face-to-face communication. I feel less pressure and anxiety by using this technique, too.

All participants agreed that using electronic mail and bulletin board technique improves the quality of responses. The reactions from the participants are summarized as follows:

1. It permits more time for participants to prepare themselves before responding to a message.

2. It can generate more information in less time compared with traditional learning methods.
3. It permits participants to locate where they are in the learning process.

Participants agreed that with the features identified above this type of technique permitted them to generate a higher quality of responses than in traditional classes.

In conclusion, many topics were discussed in the Human Environment section. These topics are related to the concerns about using electronic mail and bulletin board technique in learning. The discussion focused on the personal feelings toward this type of technique and toward others who used it in learning. Hopefully, the results of the discussion will provide valuable information to help participants feel more comfortable using it in the learning process—especially in the psychological aspect (i.e., concerns in asking something or commenting in the computer, and concerns in receiving feedback).

Learning Environment

The main purpose of this section is to discuss what participants felt and experienced in a learning situation employing electronic mail and bulletin board technique. Topics covered in this section include:

1. frustration and success in using electronic mail and bulletin board technique in learning.
2. factors that encouraged or hindered using electronic mail and bulletin board technique.

3. advantages and disadvantages of using electronic mail and bulletin board technique in learning.

4. recommendations from the class for future electronic mail and bulletin board participants.

Frustration and Success in Using Electronic Mail and Bulletin Board Technique in Learning

Frustrations

Participants' frustration in using electronic mail and bulletin board technique in learning can be divided into two areas: the class members and the communication software.

The major frustration of some participants (5) was that some class members rarely participated. Those who participated more frequently in the discussion process felt that it was difficult to involve others. They did not know whether this was caused by lack of motivation, learning desire, or knowledge in using the communication software. Participant B said:

To try to get other people involved is a frustrating experience. (Name) and I were assigned as group leader and we try to get people to participate in the discussion but the efforts was not paid off. I made personal phone calls to participants' home. I asked them where they were and why they did not respond or participate in the discussion. I wanted to help them if they have problem to get into the system or they experience some other technical difficulties. But, the result was the same as usual. The participation rate was not gone up. I
felt this is a big frustration in my learning experience to the class.

Lack of participation gave some participants a frustrated and uncomfortable feeling. According to some participants, lack of participation has little relation to whether a person is an experienced user of the computer or this type of technique. In this class there were many first-time electronic mail and bulletin board technique users, including a first time computer user, who participated enthusiastically in the discussion.

Frustration due to difficulty in using the communication software (Procomm Plus and Red Ryder) associated with electronic mail and bulletin board technique was experienced by some participants. A few said they had difficulty using the software at the beginning. Individual instruction in using it is preferred (the discussion of this issue was included in the section titled "School Environment-- Participants' Desires of Applying the Electronic Mail and bulletin board Technique in the Future").

Success

Participants' successful experiences in using electronic mail and bulletin board technique can be organized into two areas:

A. The first is in learning how to use this type of technique and interact with other participants. Learning a different communication skill was the criterion for judging whether the learning experience was successful for some
participants. Here is an example from participant C. He said:

I think the success I picked up was that I become more knowledgeable in using this type of technique in learning. It helps me understand how much quicker that I can get things done. I think this is even quicker than the traditional classroom learning. I can receive more in-depth explanations than what you can have from the telephone conversation. You can also have a file to store your messages. By phone, this is a one-time deal. By computer, I can sit down and read the information thoroughly, copy down the important sections, and try to figure out how to respond later on.

B. The second area concerned what they gained from using electronic mail and bulletin board technique in learning.

The following are some examples of participants' comments:

I experienced that electronic mail and bulletin board technique gave me a chance to present my ideas to the group in a more efficient way and I can have my ideas presented in a fully detailed manner.

It helped me communicate with other participants better since our class only met once every two weeks. The experienced participants helped those who were less experienced participants in getting into the system and in solving technical difficulties. You learned from each other more, because you are communicating and interacting with each other.

Electronic mail and bulletin board technique fits my personal learning style. When it comes to learning, I prefer to sit down, read the contents and write out my study results. You can get the dialogues going. It was a good
experience based on what I had learned from this class. It was fun.

In short, participants had various opinions about the issues of frustration and success with using electronic mail and bulletin board technique in learning. In an electronic conference or any traditional learning situation, some learners are very active and enthusiastic in participating in learning, and some merely try to pass the course without contributing much. In a traditional class with lecturing as the instructional method, learners may not have to contribute much since the major learning activities are directed by the instructor. Learners can follow the instructor's directions and achieve their learning goal. However, for those who must learn by participating in an electronic conference the learning environment is primarily self-directed and informal. Thus, the motivation and commitment of the learners become crucial for the success of the learning, especially in the case of learning as a group. How to motivate participants to increase their interactions is important for the success of applying electronic mail and bulletin board technique in a learning event. Factors contributing to participants' frustration and success in using this type of technique are summarized and presented in Table 17.
Table 17

Frustrations and Successes in Using Electronic Mail and Bulletin Board Technique in Learning

<table>
<thead>
<tr>
<th>Area</th>
<th>Main Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frustration---</td>
<td></td>
</tr>
<tr>
<td>1. lack of participation</td>
<td>a. lack motivation, or</td>
</tr>
<tr>
<td></td>
<td>b. no proper support in using the</td>
</tr>
<tr>
<td></td>
<td>communication software</td>
</tr>
<tr>
<td>2. difficulties in</td>
<td></td>
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<tr>
<td></td>
<td>using the communication software</td>
</tr>
<tr>
<td>Success------</td>
<td></td>
</tr>
<tr>
<td>1. learning a different</td>
<td>a. communicating better</td>
</tr>
<tr>
<td>communication skill</td>
<td>b. interacting with others frequently</td>
</tr>
<tr>
<td>2. gaining more knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. communicating better</td>
</tr>
<tr>
<td></td>
<td>b. interacting with others frequently</td>
</tr>
<tr>
<td></td>
<td>because of electronic mail and bulletin board</td>
</tr>
<tr>
<td></td>
<td>technique</td>
</tr>
</tbody>
</table>

Factors That Encouraged or Hindered Participants' Use of Electronic Mail and Bulletin Board Technique in Learning

The main purpose of this section is to describe the factors that positively or negatively influenced participants' using electronic mail and bulletin board technique. These factors can serve as a reference to provide further understanding about what will facilitate or deter the application of this type of technique.
Factors that Encouraged the Use of Electronic Mail and Bulletin Board Technique in Learning

According to participants' responses, two factors encouraged their using of electronic mail and bulletin board technique. They were: the opportunity to learn a new communication skill and frequent interaction and feedback between the participants.

Regarding learning a new communication skill, participants (5) considered electronic mail and bulletin board technique a new method of communication, and they wanted to learn about it. The following are examples of participants' comments:

The main reason for me to learn this type of technique was that I want to expand my knowledge and skill in the utilization of it in learning and to see the applicability of this type of technique in my related field.

I like to interact with people, especially when learning is involved. I want to learn what is electronic mail and bulletin board technique so I can gain more knowledge about it.

Regarding the factor of frequent interactions and feedback between the participants, participants thought these factors existing between the participants increased their learning desire. They said they benefited much through learning from each other.

Learning a new way of communicating was not the original intent of this class. However, many responses included this factor, because most participants (5) were first-time
participants in using electronic mail and bulletin board technique in learning. For the designer or the instructor of a class, the response may be welcomed-- if learning electronic mail and bulletin board technique is acceptable as one of the learning goals of the class. However, if it is only used for communication and the emphasis is on the course itself, the idea of learning a new communication skill should not be reinforced. The reason is that people tend to be impressed by the novelty of a new high-tech innovation or new ideas.

To conclude, participants' opinions of factors with the most positive influence on their using electronic mail and bulletin board technique in learning are the chance of learning a new communication skill and frequent interactions. For the future use of this type of technique, the class instructor should emphasize the learning priority (mastery of the course contents) at the beginning of the class, so students' attention will not be distracted or dominated by the novelty of the technique itself.

Factors that Hinder the Use of Electronic Mail and Bulletin Board Technique in Learning

The purpose of this section is to describe what factors prevent participants from using electronic mail and bulletin board technique in the learning process. The reason for learning possible negative factors is that when this type of technique is adopted in a similar class situation, these
factors can be considered to avoid potential obstacles that may 
hamper participants' interest in participation.

The major factor that deterred participants from using 
electronic mail and bulletin board technique in learning was 
lack of participation from some students. This factor appeared 
in the previous section about frustrations related to 
participants' electronic conference experience. Its repeated 
appearance showed that lack of participation apparently was the 
most frequently occurred problem in the class, and it 
dissatisfied many participants. The following example shows the 
degree of dissatisfaction of participant E:

I think probably the factor hindered me 
most was that some people just did not 
want to participate in the discussion. I 
think they were just looking and watching 
what everyone is doing. I even think that 
they were not trying to get on the 
system. Another thing associated with 
this feeling was that if no one pay 
attention to the discussion, why should I 
bother to participate. I talk to several 
participants and they felt discouraged, 
too. Because of lacking responses or 
feedback, I sense that in this class, we 
developed a major group and a sub-group 
throughout the whole learning process. I 
agree that we do have a central core in 
the discussion and this is not what I 
like to see.

The participation problem was the primary factor that 
hindered some participants' willingness in using electronic 
mail and bulletin board technique in learning. Other factors 
preventing the use of this type of technique include:
1. technical problems related to the use of communication software.

2. lack of available computer laboratories for those who have no computer at home.

Participants in an electronic conference situation must understand that involvement in a learning event through the use of a computer is different from that in a traditional learning environment. Although commitment and motivation are two essentials in various learning environments, electronic mail and bulletin board participants must show a higher intensity of them in the learning process. As one participant explained, it takes a much greater willingness and commitment to participate in such a learning event as this. It also takes stronger motivation. The results of participants' opinions of factors that encouraged or hindered the use of electronic mail and bulletin board technique are summarized in Table 18.
Table 18

**Factors Which Encouraged or Hindered the Use of Electronic Mail and Bulletin Board Technique in Learning**

* Factors which encouraged using this type of technique
  1. learning a new communication skill
  2. experiencing frequent interactions and feedback between participants

* Factors which hindered using this type of technique
  1. lack of participation from others
  2. technical problems related to the use of communication software
  3. lack of available computer laboratories for those who had no computer at home

**Advantages and Disadvantages in Using Electronic Mail and Bulletin Board Technique in Learning**

This researcher is interested in identifying participants' opinions and concerns about the advantages and disadvantages of using electronic mail and bulletin board technique in learning. Their opinions and concerns were collected from the administration of such instruments as field notes from observation, questionnaires, and interviews. The results are discussed as follows.

**Advantages of Using Electronic Mail and Bulletin Board Technique in Learning**

According to participants' responses, the advantages of using electronic mail and bulletin board technique included such merits as flexibility in learning time and location, ability in permitting repeated examination of ideas, ability to
reach others, and the feeling of completion about the communication process.

The flexibility in learning time and location existing with electronic mail and bulletin board technique received the highest praise from participants, especially from non-traditional ones. Their comments included the following:

Before I enrolled in this class, I used to try very hard to match the class and my work schedule. I had to give up several favorite courses because of the time conflict. Now, with this kind of learning method available, I wish to see there will be more classes that are facilitated by this kind of technique. I am looking forward to seeing this happen in the near future.

Being working full time and trying to take class during the night, sometimes, it is really tough for me to maintain the balance between my career advancement and my family life. With the use of this technique, it definitely fits my lifestyle perfectly.

I am very happy to participate in this type of learning environment. The main reason is that I prefer to learn things under a cozy and quiet environment. I had problems with those chairs in the classroom. They are just too hard for my back.

Other advantages of using electronic mail and bulletin board technique in learning include: 1. ability in permitting repeated examination of ideas, 2. ability to reach others, and 3. a feeling of completion in the communication process. Participants had the following to say about these advantages:
The major advantage of this type of technique to me is that I can get on the computer right away and participate in the discussion rather than waiting for the next class meeting. It is the way that provides users a chance to interact at user's convenience.

I consider that it has the advantage in framing messages and ideas. It can give people a chance to complete their thoughts. When interacting, it gave me a chance to see the sequence of thoughts.

Participant A compared this type of technique with the traditional classroom instruction. She said:

Comparing this type of technique to the traditional classroom learning, it permits me to get a lot of information quickly, absorb the information better, and examine the information over in different way. This is an advantage over the classroom learning. In classroom setting, you can receive information but the amount and the time used to get information will be longer. Also, in a classroom learning situation, you may have a discussion but it won't be long enough to cover the details. In the computer, you can examine a topic without any time pressure. As my concern, that is the advantage. Also, in the computer, it gives me an equal feeling when communicating with someone. It is less formal and learning can be achieved in a casual manner.

In short, participants had many positive experiences using electronic mail and bulletin board technique in learning. Advantages, such as flexibility in learning time and location and chances for repeated examination of ideas are enjoyed by many participants. An understanding of what participants appreciated the most about this type of technique will provide
information in designing proper learning activities to stimulate and promote students' learning interest.

Disadvantages of Using Electronic Mail and Bulletin Board Technique in Learning

Basically participants' responses can be organized into four problem areas: receiving responses, motivation, information overload, and impersonality. A discussion of each problem is described below.

Regarding receiving responses from others, participants said it took too much time to wait for a response. Also, sometimes there were no responses. Participant D said:

The disadvantage is that because of the way it has been used, it may produce no responses or lack of responses from someone. I am not blaming about the system itself. I am concerning about the feasibility to apply this to other learning situations. **When you conference with individual or group, it is only good when people are responding.**

Participant G described the feeling of getting no response. He said:

The moment I sent out my message I start to hope that feedback will come back within the expected time. But, to be honest with you, sometimes, it took at least twenty-four hours to get them back, and sometimes, it just won't come. I contacted several participants and tried to find out whether they get my message. Yes. They all said they did. But, why they do not want to respond to me? I felt like to say "Talk to me. I need someone to clear up my confusion." I felt very anxious when I get no responses.
The motivation issue was reported repeatedly in participants' responses about problems and concerns. Commitment, consistency, and motivation are the fundamental characteristics that participants must possess if any electronic mail and bulletin board technique is adopted. As participant F said:

What I like to see in an electronic mail and bulletin board situation is that participants will participate actively in a discussion. How much a person can provide in the discussion process is one thing. But, how consistent and how often the person can take part in the discussion are the factors that count.

The information overload created problems for some participants in sorting and organizing information. Participant D said:

I felt more comfortable when I only have to communicate with one person. My problem about this class was that there was always a lot of information waiting for you to read. After a day or so, responses came back. (Name) said this. (Name) said that. I have to work double time to try to put all ideas together and figure them out. It is just too much extra work and time spent on putting pieces together.

Participant H said:

The system and the type of communication technique we use can not really give the whole group a chance to interact simultaneously. In a way, this really slows down the time on reaching consensus and keep focusing on the discussion topic. People will bring in four or five issues into the same topic. It is hard to focus on one idea at a time.
With the impersonality issue, some felt that communicating through computers would give them a less intimate feeling. Their responses include the following:

One of the major disadvantages of this type of technique is that it is "cold." You are not talking live to the person. You cannot feel and see the way they say it and how they say it.

When I am communicating with someone, I tend to use my basic instincts in judging peoples' reaction. What should I react to the person is pretty much relying on the reaction from that person. Electronic mail and bulletin board technique may be useful in facilitating learning in many aspects. But, unavoidably, it has a shortcoming in providing adequate aids to allow the message receiver to sense the true meanings behind those words on the computer screen.

In short, participants had various opinions of using electronic mail and bulletin board technique in learning. It received high praise in such areas as flexible learning time and a better chance of examining ideas. The major drawback of its application is the unavailability of live, simultaneous, group interaction in the current mainframe computer system. A desire to receive intimate feelings while communicating through computers was demonstrated in many participants' responses.

With the development of modern technology, a live, instant electronic conference is possible and has been documented in many reports. How to obtain one and what should be done deserve the efforts of school administration, the technical department,
and the instructor working closely together. In their joint efforts they should provide a learning environment that can meet the participants' needs in the aspect of human interaction. The results of participants' opinions of advantages and disadvantages in using electronic mail and bulletin board technique in learning are summarized and presented in Table 19.

Table 19

Advantages and Disadvantages in Using Electronic Mail and Bulletin Board Technique in Learning

* Advantages
1. flexibility in learning time and location
2. opportunity for repeated examination of ideas
3. ability to reach others
4. a feeling of completion in the communication process

* Disadvantages
1. problems regarding responses--
   a. speed of feedback
   b. no responses
2. lack of strong motivation in some participants
3. information overload problem
4. impersonal feeling--
   a. no live conversation
   b. no intimate feeling

Overall Opinions About Using Electronic Mail and Bulletin Board Technique in Learning

The major purpose of this section is to describe participants' overall feelings about various aspects of using electronic mail and bulletin board technique in learning. These aspects include value, degree of difficulty in using the
communication software, and level of worthiness. Participants' feelings about using this type of technique in learning were obtained from the second questionnaire and the final interview.

In general, participants had various opinions on the following aspects of using electronic mail and bulletin board technique in learning:

1. Most participants (5) considered that this type of technique is valuable in helping them learn better in various learning activities, such as giving and receiving information and instruction.

2. Most participants (5) thought the experience of using electronic mail and bulletin board technique was rewarding. They said they learned more than they would have in a traditional learning method.

3. Most participants (6) felt electronic mail and bulletin board technique gave them many opportunities to prepare well-organized information for the discussion and to have frequent interactions, which resulted in generating a very productive learning result.

4. Five participants considered it inexpensive to participate in a learning event such as this. The reason for this might have been their owning personal computers. Those who had no computers had an opposite view. They said it would be too expensive if they had to purchase computer equipment to meet the nature of the class.
5. Four participants felt frustrated about using this type of technique in learning, mainly because they experienced a low participation rate and untimely responses from some participants. Three participants felt the experience was satisfactory, and one had mixed feelings.

6. Four participants (mainly new and less experienced participants) considered the technique complicated to use. They experienced much difficulty in various areas, such as setting up the equipment and finding proper operation procedures.

7. All participants agreed that electronic mail and bulletin board learning environment was very flexible.

8. Four participants considered it a challenging task to perform their learning by using this type of technique, because a person has to be self-motivated, self-directed, and consistent in keeping up with the pace of the discussion.

Participants expressed their opinions on various aspects of using electronic mail and bulletin board technique in learning. According to this researcher's observation, the overall learning result did not meet the expectations of some participants, who thought it should have more frequent involvement from everyone in the class to interact more frequently. Participant G raised questions about using the technique in a traditional learning environment. He said:
There are many problems need to be addressed before we can fully apply this type of technique in learning. These problems may include participants' knowledge and skill about how to participate in an electronic conference; participants' commitment and motivation problem; and the time delay problem. These problems some can be taken care of by providing extra training but some were related to the fact that will we be qualified to obtain knowledge with a situation that traditional learning characteristics have been inhaled deeply in our mind. Let's use the commitment issue for discussion sake. The traditional learning situation requires an individual to provide something during the learning process. It is the same to electronic mail and bulletin board technique used in learning. However, the feeling is different. In traditional learning situations, you might also feel that you have to prepare well before presenting your ideas or thoughts, because you have to present them in person. But, for the electronic mail and bulletin board situation, it seems less strict that missing some discussions is not a big deal. I do not have to see you right away anyway. By the time I see you, things are pretty much settle down probably. This is an attitude difference.

From his comments, issues such as participants' commitment, motivation, and attitudes have a strong relationships with the success of using electronic mail and bulletin board technique in a traditional learning environment.

In conclusion, four different areas relating to the use of electronic mail and bulletin board technique in learning were examined in this chapter. Participants' opinions reflected a wide range of concerns in the related issues within each area. The main purpose of reporting these concerns is to provide an
information-rich coverage, so that possible actions can be adopted to reduce the intensity of the potential drawbacks identified in each area.
CHAPTER VII

MOST SIGNIFICANT CONCERNS ABOUT USING ELECTRONIC MAIL AND BULLETIN BOARD TECHNIQUE IN LEARNING

Introduction

The information described in this chapter was obtained through the administration of the final questionnaire. This questionnaire was constructed from data collected in previous phases of this research. The purpose in administering this questionnaire was two folds: to determine how participants valued various issues related to the use of electronic mail and bulletin board technique in learning, i.e., the most positive influence in their learning process, and the major advantages of this type of technique; second, to provide further information for the future application of electronic mail and bulletin board technique in a learning environment. To provide information about the implementation process of this questionnaire, a discussion of the process of questionnaire administration, the process of analyzing the data, and the report of the results is described below.
The Process of Administering the Questionnaire

The final questionnaire was sent to all participants (8) three months after the completion of the Spring quarter, 1992. The process of administering this questionnaire was divided into the following three different periods:

A. This researcher informed participants (8) by telephone that a questionnaire package would be sent to them within a few days, so they could anticipate its arrival. Another purpose in making personal phone calls was to receive confirmation from each participant that his/her address was correct so the questionnaire could reach them without unnecessary delay. This questionnaire package included:
   a. A personal letter addressed to each participant. Its purpose was to evoke a feeling of intimacy with each participant. Hopefully, with a three-month time lag, the letter could serve as a bridge to unite participants. Three key points were mentioned in the letter: this researcher's appreciation for their participation in the study, the process of completing the questionnaire (i.e., how much time it would take), and the expected date of return.
   b. The questionnaire.
   c. A self-addressed, stamped envelope.

B. Ten days after the questionnaires were mailed, participants received a phone call to ensure that they received it.
Participants were reminded about certain key points when filling out the questionnaire (i.e., the meanings represented by different numbers).

C. Within four weeks from the date the questionnaires were mailed, this researcher had received questionnaires from all participants.

The timeline used to administer this final questionnaire is illustrated in Diagram 3.

Diagram 3

Timeline for Administering the Final Questionnaire

Questionnaire Package: a letter, the questionnaire, and a self-addressed, stamped envelope

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/12/92</td>
<td>First phone call, <em>checked address</em>, <em>notified them about the package</em></td>
</tr>
<tr>
<td>9/19/92</td>
<td>Mailing the questionnaire</td>
</tr>
<tr>
<td>9/29/92</td>
<td>Second phone call, <em>confirmed the receipt of the package</em></td>
</tr>
<tr>
<td>10/29/92</td>
<td>Receiving all questionnaires, <em>reminded participants of the key points when answering the questionnaire</em></td>
</tr>
</tbody>
</table>

The Process of Analyzing the Data

When all questionnaires from the participants were received, responses to each question were processed with the following approaches:

1. Values assigned to each item of a question were tallied;
2. The average value of each item was calculated by dividing the total score of each item with the number of participants, and;

3. The rank of importance of each item was decided according to the average value.

A summary table of each question and responses was then produced, so participants' responses to each question could be presented in a clear and detailed manner. Also, it would provide readers a clearer picture of the relationships between each item in a question.

It should be emphasized that there was a three-month time lag between the completion of the course and the administration of the questionnaire. Participants' responses might be affected because of a change in attitude or the dissipation of memory about using electronic mail and bulletin board technique.

Report of the Findings

The results for each question were reported in the same sequence as the questions in the final questionnaire. Participants were asked to give either three or five responses to each question. The level of importance or concern of each question was represented with a value (i.e., 1, 2, 3) to it. The value 1 represents the lowest level of importance or concern, but it still has a higher level of importance or concern than items which were not selected. The value of number
3 or 5 (depending on the number of choices required) represents the highest level of importance or concern. Also, this researcher's participant observation fieldnotes and participants' computer communication records are also used to supplement further discussion of the results of this questionnaire. Following is a discussion of each question.

* Question One

This question asked "What would you consider to be important if you have a chance to participate in a class which electronic mail and bulletin board technique is adopted as an instructional and learning tool?" Each participant was asked to rank three of the six items.

From participants' responses, their concerns were focused primarily on:

a. Having hands-on experience (receive instruction) in using this type of technique before the actual application.


c. Having helpers who provide assistance in using electronic mail and bulletin board technique.

Although this class had two helpers (selected within the class by the instructor) at the beginning of the class, from this researcher's observation it was not very effective due to their various personal reasons, i.e., commitment and motivation. Thus, when assigning helpers in an electronic mail
and bulletin board learning situation, three issues should be noted. They are: helpers' knowledge of this type of technique, commitment, and experience. Since helpers must spend extra time helping other participants, incentives (i.e., extra credit for their work and encouragement) should be provided by the instructor. The results of participants' responses are summarized in Table 20.

Table 20

<table>
<thead>
<tr>
<th>Items</th>
<th>Weight of Concerns</th>
<th>Average Value</th>
<th>Rank of Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having clear instruction at the beginning of the class about using electronic mail and bulletin board software</td>
<td>1 6 7 20/8 = 2.5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Having a well-written software manual</td>
<td>5 2 7 16/8 = 2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Having helpers who provide assistance in using electronic mail and bulletin board technique in learning</td>
<td>5 2 7 9/8 = 1.13</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Having an instructor who identifies possible sources for help</td>
<td>3 3 3/8 = .38</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Having the assistance of the Academic Computing Service</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 24
* **Question Two**

This question asked "What factors had the most positive influence on your experience using electronic mail and bulletin board technique?" Each participant was asked to rank three of the eleven items.

According to participants' responses, the three factors that had the most positive influence on their electronic mail and bulletin board learning experience were:

a. the interaction between participants.
b. the chance to learn how to use this type of technique.
c. the excitement of experiencing a new instructional strategy.

One important aspect is that when adopting this type of technique as an instructional and learning tool, it is important to inform participants about the reason for using it to prevent their mistakenly thinking learning this type of technique is the priority of the course. The results of participants' responses are summarized in Table 21.

* **Question Three**

This question asked "What factors had the most negative influence on your learning experience with electronic mail and bulletin board technique?" Each participant was asked to rank three of the thirteen items.
According to participants' responses, the three factors that had the most negative influence on their electronic mail and bulletin board learning experience were:

a. infrequent participation from other participants
b. untimely feedback from participants
c. difficulty in using the communication software (PcPlus and Red Ryder)

These three factors, according to this researcher's observation and an examination of participants' computer communication records, did affect some participants much in keeping themselves motivated throughout the learning process.

What strategies are effective in promoting participants' interest in learning, especially in an electronic mail and bulletin board learning situation, is an important issue that needs further study. The results of participants' responses are summarized in Table 22.

* Question Four

This question asked "To have a meaningful electronic mail and bulletin board class, what conditions are necessary for participants to possess?" Each participant was asked to rank three of the seven items.

According to participants' responses, the three necessary conditions mentioned most frequently were:

a. a strong desire to participate
b. a strong motivation to learn

c. proper knowledge in using the computer to communicate with others.

These three conditions can also be considered as prerequisites for participating in an electronic mail and bulletin board learning event. Although instructors have no control about how motivated participants are before they enroll in the class, they can provide helps (i.e., individualized instruction and opportunities for hands-on experience) to assist participants in becoming familiar with this type of technique quickly. This will help them complete their learning tasks and increase their confidence in using it. Hopefully, this can also stimulate and increase participants' motivation in participating in an electronic mail and bulletin board learning event. The results of their responses are summarized in Table 23.
Table 21

Factors That Had a Positive Influence on Participants' Learning Experience

1- least positive influence  2-- average influence  3-- most positive influence

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF INFLUENCE</th>
<th>AVERAGE VALUE</th>
<th>RANK OF INFLUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>the interaction between participants</td>
<td>1 3 3 7</td>
<td>16/8 = 2</td>
<td>1</td>
</tr>
<tr>
<td>the chance to learn about electronic mail and bulletin board technique</td>
<td>1 2 3</td>
<td>8/8 = 1</td>
<td>2.5</td>
</tr>
<tr>
<td>the excitement of experiencing a new instructional technology</td>
<td>2 2 4</td>
<td>8/8 = 1</td>
<td>2.5</td>
</tr>
<tr>
<td>the suitability between class assignments and electronic mail and bulletin board technique</td>
<td>1 1 2</td>
<td>5/8 = .63</td>
<td>4.5</td>
</tr>
<tr>
<td>the rapport developed between classmates</td>
<td>1 2 3</td>
<td>5/8 = .63</td>
<td>4.5</td>
</tr>
<tr>
<td>the feedback from other participants</td>
<td>1 1</td>
<td>3/8 = .38</td>
<td>6.5</td>
</tr>
<tr>
<td>the technical assistance from other participants</td>
<td>1 1</td>
<td>2/8 = .25</td>
<td>6.5</td>
</tr>
</tbody>
</table>

(The information reported in this table only include those which had responses.)

N= 22
Table 22

**Factors That Had a Negative Influence on Participants’ Learning Experience**

1-- least negative influence of the three  
2-- average influence of the three  
3-- most negative influence of the three  

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF INFLUENCE</th>
<th>AVERAGE VALUE</th>
<th>RANK OF INFLUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>infrequent participation from others</td>
<td>2 1 3 6</td>
<td>13/8 = 1.63</td>
<td>1</td>
</tr>
<tr>
<td>untimely feedback from participants</td>
<td>1 3 1 5</td>
<td>10/8 = 1.25</td>
<td>2</td>
</tr>
<tr>
<td>difficulty in using communication software</td>
<td>1 2 1 5</td>
<td>8/8 = 1</td>
<td>3</td>
</tr>
<tr>
<td>infrequent feedback from participants</td>
<td>2 1 3</td>
<td>7/8 = .88</td>
<td>4</td>
</tr>
<tr>
<td>insufficient time to participate</td>
<td>1 1</td>
<td>3/8 = .36</td>
<td>5</td>
</tr>
<tr>
<td>unfamiliarity with the operation of computers</td>
<td>2 2</td>
<td>2/8 = .25</td>
<td>6</td>
</tr>
<tr>
<td>inadequate time to participate</td>
<td>1 1</td>
<td>1/8 = .13</td>
<td>7.5</td>
</tr>
<tr>
<td>difficulty in accessing a computer</td>
<td>1 1</td>
<td>1/8 = .13</td>
<td>7.5</td>
</tr>
</tbody>
</table>

N= 24
Table 23
What Conditions Are Necessary for Participants to Possess in Participating in an Electronic Conference

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF DESIRE</th>
<th>AVERAGE VALUE</th>
<th>RANK OF DESIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a strong desire to participate</td>
<td>1 2 3 n</td>
<td>1 2 4 7 17/8 = 2.13</td>
<td>1</td>
</tr>
<tr>
<td>strong motivation to learn</td>
<td>1 3 2 6</td>
<td>13/8 = 1.63</td>
<td>2</td>
</tr>
<tr>
<td>knowledge in using the computer to communicate with others</td>
<td>2 2 3 7 12/8 = 1.5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>rapport with participants at the beginning of the class</td>
<td>2 1 3 4/8 = .5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>know how to present ideas precisely and with a clean format in the computer</td>
<td>1 1 2/8 = .25</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>good writing ability</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N=24

* Question Five*

Introductory information and this question asked "The following listed advantages of electronic mail and bulletin board technique are recognized in most computer-mediated communication related literature. What advantages of it contributed the most to your participating in this class?" Each participant was asked to rank five of the fifteen items.
According to participants' responses, they benefited the most from the following advantages:

A. Time-related category
   a. flexibility in learning time and space
   b. ample time in preparing for responses

B. Learning-enhancement category
   c. opportunity to see the sequence of thoughts in the discussion process
   d. opportunity to absorb information better
   e. "equal" status in the learning process

C. capability category
   f. ability in overcoming geographic isolation
   g. accessibility to the instructor

Regarding item e, equal status in the learning process, this researcher's observation was that participants had much freedom in participating in the discussion. Using electronic mail and bulletin board technique permitted participants to have the following advantages in gaining equal communication status:
   a. There was no chance for participants to be interrupted by other people while speaking, so their thoughts could be presented completely.
   b. There was no immediate time pressure involved during the communication process.
   c. Participants did not have to worry about making mistakes and embarrassing themselves while speaking before the public.
With these advantages, participants could communicate with peers under a less stressful condition. The results of participants' responses are summarized in Table 24.

Table 24

<table>
<thead>
<tr>
<th>Advantages Which Contributed the Most to Participants' Using Electronic Mail and Bulletin Board Technique in Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - the least of the five items</td>
</tr>
<tr>
<td>3 - average degree</td>
</tr>
<tr>
<td>5 - the most of the five items</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF CONTRIBUTION</th>
<th>AVERAGE VALUE</th>
<th>RANK OF CONTRIBUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>possessing an ability to overcome geographic isolation</td>
<td>1 1 2 2 6</td>
<td>2(3/8=2.88)</td>
<td>1</td>
</tr>
<tr>
<td>permitting more time to prepare for responses</td>
<td>1 2 1 2 6</td>
<td>2(2/8=2.75)</td>
<td>2</td>
</tr>
<tr>
<td>increasing accessibility to the instructor</td>
<td>3 1 1 5</td>
<td>1(3/8=1.63)</td>
<td>3</td>
</tr>
<tr>
<td>absorbing information better</td>
<td>2 2 4</td>
<td>1(0/8=1.25)</td>
<td>4</td>
</tr>
<tr>
<td>providing an &quot;equal&quot; status among participants in the learning process</td>
<td>1 1 1 3</td>
<td>9(8/8=1.13)</td>
<td>5.5</td>
</tr>
<tr>
<td>providing a convenient way to fulfill social needs daily in a busy schedule</td>
<td>1 1 2</td>
<td>9(8/8=1.13)</td>
<td>5.5</td>
</tr>
<tr>
<td>permitting ideas to disseminate quickly</td>
<td>1 1 2</td>
<td>9(8/8=1.13)</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Total N=40. (This table only contained information from rank 1 to 5.)
* Question Six

Introductory information and this question asked "The following electronic mail and bulletin board technique related disadvantages are found in most computer-mediated communication related literature and from your responses in the interview. In your electronic mail and bulletin board experience, what disadvantages affected you the most?" Each participant was asked to rank five of the ten items.

According to participants' responses, the major factors affecting their using electronic mail and bulletin board technique in learning were:

a. long delay before reaching a group consensus
b. procrastination in reading and sending messages
c. information overload problem
d. no way to sense participants' feelings toward discussion topics
e. participants' "lurking" problem (log in and act as a silent observer)
f. discussion focus changed too frequently

(items e and f shared the same value)

The repeated appearance of these problems shows a strong need for the instructor, or instructional designer (if any is involved) and electronic mail system expert to work closely to find a better way to overcome them. An idea such as providing guidelines to help participants establish a healthy attitude
about using this type of technique is recommended. Another advantage of developing these guidelines is that it may help prevent participants' abusing this type of technique. For example, they may overuse the time flexibility feature or procrastinate in responding to messages; or, they may use too much freedom in deciding when to participate in the discussion, causing a low participation rate. The results of the participants' responses are summarized in Table 25.

* Question Seven

This question asked "What types of pre-course activities (requirements) should be included for classes which electronic mail and bulletin board technique is adopted as an instructional and learning tool?" Each participant was asked to rank three of the six items.

According to participants' responses, major activities preferred to be included were:

a. a communication software training section
b. a description of the course prerequisites
c. an introductory section about electronic mail and bulletin board technique

It is necessary in an electronic conference situation that a group of participants had compatible backgrounds in educational level and knowledge and skill in using the hardware and software in the communication process, so they can interact
with fewer constraints. For students, before enrolling in a course using the technique, a description of the course's prerequisites will help participants determine whether they have sufficient knowledge and skills for the class. The results of their responses are summarized in Table 26.

* Question Eight

Introductory information and this question asked "The following listed responses are synthesized from the interview question "How do you value your contribution(s) to this class?" The purpose of this question was to learn what criteria participants used to judge their contribution to the class. Each participant was asked to rank five of the eight items.

According to participants' responses, they judged their contributions to the class by using the following criteria:
1. participate frequently in the discussion
2. provide thoughts to the class
3. provide much information to the class
4. share learning experiences
5. provide references and explanations about discussion topics

The results of their responses are summarized in Table 27.
Table 25

Disadvantages Affecting Participants' Use of Electronic Mail and Bulletin Board in Learning

1- least disadvantageous  3- average disadvantages  5- most disadvantageous

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF INFLUENCE</th>
<th>AVERAGE VALUE</th>
<th>RANK OF INFLUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>long delay before reaching a group consensus on discussion topics</td>
<td>2 4 2 8</td>
<td>26/8 = 3.25</td>
<td>1</td>
</tr>
<tr>
<td>procrastination in reading and responding to messages</td>
<td>3 1 2 2 8</td>
<td>23/8 = 2.86</td>
<td>2</td>
</tr>
<tr>
<td>information overload</td>
<td>2 2 2 6</td>
<td>22/8 = 2.75</td>
<td>3</td>
</tr>
<tr>
<td>no way to sense participants' feelings and reactions</td>
<td>2 1 1 1 1 6</td>
<td>16/8 = 2</td>
<td>4</td>
</tr>
<tr>
<td>participants' &quot;lurking&quot; problem (i.e., logging on and observing without contributing to the discussion)</td>
<td>2 1 1 4</td>
<td>11/8 = 1.38</td>
<td>5.5</td>
</tr>
<tr>
<td>too frequent change in discussion focus because of new topics involved</td>
<td>2 1 3</td>
<td>11/8 = 1.38</td>
<td>5.5</td>
</tr>
<tr>
<td>the intimacy of feedback</td>
<td>1 1 2</td>
<td>8/8 = 1</td>
<td>7.5</td>
</tr>
<tr>
<td>communication anxiety associated with sending and receiving messages</td>
<td>1 1</td>
<td>1/8 = .13</td>
<td>9</td>
</tr>
</tbody>
</table>

N= 40
Table 26

Suggestions for Pre-Class Activities in Classes Which Use Electronic Mail and Bulletin Board Technique as an Instructional and Learning Tool

1-- least desirable of the three
2-- average desirability of the three
3-- most desirable of the three

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF DESIRE</th>
<th>AVERAGE VALUE</th>
<th>RANK OF DESIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a communication</td>
<td>1 2 4 6</td>
<td>17/8 = 2.13</td>
<td>1</td>
</tr>
<tr>
<td>software training section</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a description of the course prerequisites</td>
<td>2 2 1 5</td>
<td>9/8 = 1.13</td>
<td>2</td>
</tr>
<tr>
<td>an introductory section about electronic mail and bulletin board technique</td>
<td>1 2 1 4</td>
<td>8/8 = 1</td>
<td>3</td>
</tr>
<tr>
<td>a clear description of the course requirements</td>
<td>3 1 4</td>
<td>6/8 = .75</td>
<td>4</td>
</tr>
<tr>
<td>a pre-diagnosis to ensure everyone is on the same level</td>
<td>1 1 1 3</td>
<td>5/8 = .52</td>
<td>5</td>
</tr>
</tbody>
</table>

N = 24
Table 27

**Participants' Opinions of the Value of Their Contribution to the Class**

1-- least valuable  
3-- average value  
5-- most valuable

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF CONTRIBUTION</th>
<th>AVERAGE VALUE</th>
<th>RANK OF CONTRIBUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>participate in the discussion as frequently as possible</td>
<td>1 1 5 7</td>
<td>32/8 = 4</td>
<td>1</td>
</tr>
<tr>
<td>provide ideas and thoughts to the class</td>
<td>2 2 3 7</td>
<td>29/8 = 3.63</td>
<td>2</td>
</tr>
<tr>
<td>provide much information to the discussion</td>
<td>3 4 7</td>
<td>25/8 = 3.13</td>
<td>3</td>
</tr>
<tr>
<td>share learning experiences</td>
<td>1 3 1 5</td>
<td>10/8 = 1.25</td>
<td>4</td>
</tr>
<tr>
<td>provide references and explanations about discussion topics</td>
<td>1 1 2 4</td>
<td>9/8 = 1.13</td>
<td>5</td>
</tr>
<tr>
<td>provide at least an equal amount of information</td>
<td>3 1 1 5</td>
<td>8/8 = 1</td>
<td>6</td>
</tr>
<tr>
<td>provide technical help to those who are less familiar with using electronic mail and bulletin board technique</td>
<td>3 2 5 7/8 = .88</td>
<td>N = 40</td>
<td></td>
</tr>
</tbody>
</table>
* Question Nine

This question asked "What would you consider to be a reasonable time to receive responses after you send a message to other participants?" Most participants (six of eight) considered that within 12 hours would be a reasonable time to receive responses.

Two participants selected the "other" item. One considered within six hours and the other two hours as a reasonable time to receive a message.

* Question Ten

This question asked "What would you consider to be a reasonable time to give responses after you received message from other participants?" Most participants (six of eight) considered that within 12 hours would be a reasonable. Two participants chose six hours and two hours, respectively.

* Question Eleven

This question asked "Regarding the issue of class interaction, what would you like to see in future classes which electronic mail and bulletin board technique is adopted as an instructional and learning tool?" Each participant was asked to rank three of the six items.

According to participants' responses, they would like to see the following activities:
a. frequent small groups and class interactions through computers
b. frequent participation
c. participants' responses within a reasonable time

These preferences provide instructors valuable information in designing class activities. Questions such as what strategies should be adopted to increase participants' interest in learning and interactions need to be considered thoroughly to ensure that the class activities meet participants' expectations. The results of their responses are summarized in Table 28.

* Question Twelve

This question asked "What will you do to promote peers' participation in future classes that employ electronic mail and bulletin board technique in learning?" Each participant was asked to select three of the ten items listed in this question. According to participants' responses, they would use the following strategies:

- a. setting an example (i.e., be an active participant)
- b. developing rapport with other participants
- c. asking more questions after receiving messages whenever it is possible.

Instructors should also provide encouragement to those who participate actively in the discussion. For example,
instructors can acknowledge a person's effort in participation and send a message of recognition to every participant's computer file. Instructor can also provide participants opportunities to become acquainted with each other. Hopefully, participants can feel more comfortable in asking questions or commenting on other's opinions in the discussion. The results of their responses are summarized in table 29.

*Question Thirteen*

This question asked "What level of electronic mail and bulletin board expertise should an instructor have for conducting an electronic mail and bulletin board class?" Each participant was asked to select the role they think the instructor should serve. The results showed what participants think an instructor should be:

a. an electronic mail and bulletin board expert (three responses)

b. a facilitator, an evaluator, an instructional designer (each of these roles received two responses)

c. a subject-matter expert (one response)

The roles selected by the participants have a strong interrelationship with each other. For example, an instructor must have the ability (instructional designer) to design course activities and ensure the smoothness of students' learning. To help students learn, the instructor must be a facilitator and a
subject matter expert. Also, with the application of electronic mail and bulletin board technique, the instructor must have proper knowledge and skill in using this type of technique. The results of participants' responses are summarized in table 30.

* Question Fourteen

This question asked "What do you consider electronic mail and bulletin board technique assisted you most in various learning aspects." Each participant was asked to rank the seven listed items in the question. According to participants' responses, they benefited the most in the following areas:

a. increasing their interactions with classmates
b. feeling less pressure while communicating
c. stimulating their creative thinking

The results of their responses are summarized in table 31.
Table 28

Participants' Preferences for Interaction in Future Classes Which Uses Electronic Mail and Bulletin Board Technique as an Instructional and Learning Tool

1-- least desirable of the three
2-- average desirability of the three
3-- most desirable of the three

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF PREFERENCE</th>
<th>AVERAGE VALUE</th>
<th>RANK OF PREFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3  n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>having frequent small groups and class interactions through computers</td>
<td>2 3 2 7</td>
<td>$14/8 = 1.75$</td>
<td>1</td>
</tr>
<tr>
<td>having frequent participation and interactions with participants</td>
<td>2 1 3 6</td>
<td>$13/8 = 1.63$</td>
<td>2</td>
</tr>
<tr>
<td>having participants respond within reasonable time</td>
<td>1 3 1 5</td>
<td>$10/8 = 1.25$</td>
<td>3</td>
</tr>
<tr>
<td>having more class activities designed (i.e., case studies, and group assignments) to promote the use of electronic mail and bulletin board technique</td>
<td>2 2 4</td>
<td>$8/8 = 1$</td>
<td>4</td>
</tr>
<tr>
<td>determining who is on line with the user</td>
<td>1 1 2</td>
<td>$3/8 = .38$</td>
<td>5</td>
</tr>
</tbody>
</table>

$N = 24$
Table 29

Participants' Opinions in Promoting Peers' Participation in an Electronic Conference

1-- least preferred of the three
2-- average preference
3-- most preferred of the three

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF PREFERENCE</th>
<th>AVERAGE VALUE</th>
<th>RANK OF PREFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>setting an example (i.e., being an active participant)</td>
<td>1 1 3 5</td>
<td>12/8 = 1.5</td>
<td>1</td>
</tr>
<tr>
<td>developing rapport with other participants</td>
<td>2 3 5</td>
<td>11/8 = 1.38</td>
<td>2</td>
</tr>
<tr>
<td>asking more questions after receiving messages in the discussion</td>
<td>1 1 1 3</td>
<td>6/8 = .75</td>
<td>3</td>
</tr>
<tr>
<td>providing needed helps (i.e., reference sources, and technical assistance)</td>
<td>1 1 2</td>
<td>5/8 = .63</td>
<td>4</td>
</tr>
<tr>
<td>forming study groups</td>
<td>3 3</td>
<td>3/8 = .38</td>
<td>5</td>
</tr>
<tr>
<td>having an instructor who is more involved in the discussion</td>
<td>1 1 2</td>
<td>3/8 = .38</td>
<td>5.5</td>
</tr>
<tr>
<td>contacting participants through various communication media (i.e., telephone)</td>
<td>1 1</td>
<td>2/8 = .25</td>
<td>7.5</td>
</tr>
<tr>
<td>becoming more familiar with other participants</td>
<td>1 1</td>
<td>2/8 = .25</td>
<td>7.5</td>
</tr>
</tbody>
</table>

N = 22
Table 30

Participants' Opinions About What Expertise An Instructor Should Have to Conduct an Electronic Conference

<table>
<thead>
<tr>
<th>INSTRUCTOR' ROLE</th>
<th>NUMBER OF RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>* electronic mail and bulletin board expert</td>
<td>3</td>
</tr>
<tr>
<td>* facilitator</td>
<td>2</td>
</tr>
<tr>
<td>* evaluator</td>
<td>2</td>
</tr>
<tr>
<td>* instructional designer</td>
<td>2</td>
</tr>
<tr>
<td>* computer user</td>
<td>1</td>
</tr>
<tr>
<td>* subject matter expert</td>
<td>1</td>
</tr>
<tr>
<td>* manager</td>
<td>0</td>
</tr>
<tr>
<td>* leader</td>
<td>0</td>
</tr>
<tr>
<td>* mentor</td>
<td>0</td>
</tr>
<tr>
<td>* others</td>
<td>0</td>
</tr>
<tr>
<td><strong>N= 11</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 31

Participants' Opinions About the Area of Electronic Mail and Bulletin Board Technique That Assisted Them the Most

1-- the lowest degree of assistance  7-- the highest degree of assistance

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF ASSISTANCE</th>
<th>AVERAGE VALUE</th>
<th>RANK OF ASSISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>increase my interaction with other participants</td>
<td>1 3 4 8</td>
<td>49/8 = 6.13</td>
<td>1</td>
</tr>
<tr>
<td>generate more ideas</td>
<td>2 1 2 2 1 8</td>
<td>36/8 = 4.5</td>
<td>2</td>
</tr>
<tr>
<td>feel less pressure when communicating with classmates</td>
<td>1 1 3 1 1 8</td>
<td>34/8 = 4.25</td>
<td>3</td>
</tr>
<tr>
<td>stimulate my creative thinking</td>
<td>1 2 4 1 8</td>
<td>29/8 = 3.63</td>
<td>4</td>
</tr>
<tr>
<td>save time trying to contact a participant</td>
<td>3 1 1 1 1 8</td>
<td>27/8 = 3.38</td>
<td>5.5</td>
</tr>
<tr>
<td>help me organize and clearly present ideas</td>
<td>3 3 1 1 8</td>
<td>27/8 = 3.38</td>
<td>5.5</td>
</tr>
<tr>
<td>improve the overall quality of my assignments</td>
<td>1 3 3 1 8</td>
<td>22/8 = 2.75</td>
<td>7</td>
</tr>
</tbody>
</table>

**N= 56**
* Question Fifteen

This question asked "What kinds of computer-related equipment should electronic mail and bulletin board participants have when participating from a remote area?" They were asked to select the items they considered most necessary.

According to participants' responses, the most desired equipment were:

a. a computer with modem
b. a printer

Regarding the item b, there were two participants who had a computer at home but had no printer. They had to come to the university computer laboratories and had their messages printed there.

* Question Sixteen

This question asked "Based on your electronic mail and bulletin board learning experience, in which of the following areas can this type of technique work best?" Each participant was asked to rank each item from one to five.

According to participants' responses, the top five most helpful items were:

a. giving and receiving information
b. exchanging opinions
c. generating ideas
d. giving and receiving instruction
e. asking questions

The results of participants' responses are summarized in Table 32.

* Question Seventeen

In this question, participants were asked to identify the time of day used to study after the introduction of electronic mail and bulletin board technique. Their responses will be compared with information collected in chapter 4, "Participants' Study Time."

According to the information collected in chapter 4, the most frequent time periods for full-time students to study were between 8 a.m. and noon and 8 p.m. and 12 a.m.; for part-time students their study time was mainly between 8 p.m. and 12 a.m. After using electronic mail and bulletin board technique in learning, students' study time had changed. For full-time students, their study time was between 8 a.m. and 12 a.m.; for part-time students, the study time was between 4 a.m. and 8 a.m. and 8 p.m. and 12 a.m. Some said they would log in to see whether there was any information received overnight before they left for work. Many participants (6) reported that this type of technique made learning possible seven days a week. They could have discussion any time and day. Participants' changes before and after the introduction of electronic mail
and bulletin board technique are summarized and compared in Table 33.

*Question Eighteen*

Each participant was asked to identify changes occurred after using electronic mail and bulletin board technique in learning with their learning problems reported in chapter 4. In the past, participants' major learning problems were: (1). reading for meaning—7 responses (2). dealing with time constraints—6 responses (3). communicating with professors—5 responses and (4). asking questions—4 responses.

Participants' responses changed dramatically after they used this type of technique. In comparing these two different stages, evidences showed that:

a. There was a 50% reduction rate in reading for meaning
   (reduced from 7 (87.5%) to 3 (37.5%))

b. There was a 50% reduction rate in dealing with the time constraint problem (reduced from 6 (75%) to 2 (25%))

c. There was a 37.5% reduction rate in gaining access to professors (reduced from 5 (62.5%) to 2 (25%)), and

d. There was a 37.5% reduction rate in asking questions
   (reduced from 4 (50%) to 1 (12.5%)).

Participants' responses are summarized in table 34.
Table 32

Participants’ Opinions on the Degree of Helpfulness in Using Electronic Mail and Bulletin Board Technique in Learning

Score: 1 -- not helpful
2 -- somewhat not helpful
3 -- average
4 -- somewhat helpful
5 -- very helpful

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHT OF HELPFULNESS</th>
<th>AVERAGE VALUE</th>
<th>RANK OF HELPFULNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>giving and receiving information</td>
<td>1 7 8</td>
<td>39/8= 4.88</td>
<td>1</td>
</tr>
<tr>
<td>exchanging opinions</td>
<td>2 6 8</td>
<td>38/8= 4.75</td>
<td>2.5</td>
</tr>
<tr>
<td>generating ideas</td>
<td>2 6 8</td>
<td>38/8= 4.75</td>
<td>2.5</td>
</tr>
<tr>
<td>giving and receiving instructions</td>
<td>5 3 8</td>
<td>35/8= 4.38</td>
<td>4</td>
</tr>
<tr>
<td>asking questions</td>
<td>2 4 2 8</td>
<td>32/8= 4</td>
<td>5</td>
</tr>
<tr>
<td>maintaining friendly relationship</td>
<td>4 1 3 8</td>
<td>31/8= 3.88</td>
<td>6</td>
</tr>
<tr>
<td>problem solving</td>
<td>3 1 4 8</td>
<td>25/8= 3.13</td>
<td>7</td>
</tr>
<tr>
<td>decision making</td>
<td>2 1 2 3 8</td>
<td>22/8= 2.75</td>
<td>8</td>
</tr>
<tr>
<td>negotiating</td>
<td>2 5 1 8</td>
<td>21/8= 2.63</td>
<td>9.5</td>
</tr>
<tr>
<td>getting to know someone</td>
<td>1 4 1 1 1 8</td>
<td>21/8= 2.63</td>
<td>9.5</td>
</tr>
<tr>
<td>persuasion</td>
<td>1 4 3 8</td>
<td>21/8= 2.63</td>
<td>9.5</td>
</tr>
<tr>
<td>resolving disagreement</td>
<td>2 2 2 2 8</td>
<td>20/8= 2.5</td>
<td>12</td>
</tr>
</tbody>
</table>

N=96
Table 33
Comparisons Between Full-time and part-time students' change on their study time before and after the use of Electronic mail and Bulletin Board technique

<table>
<thead>
<tr>
<th>Participants</th>
<th>Before the technique</th>
<th>After the technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Full-time students</td>
<td>8 a.m. to Noon and</td>
<td>anytime during the</td>
</tr>
<tr>
<td></td>
<td>8 p.m. to 12 a.m.</td>
<td>day</td>
</tr>
<tr>
<td>* Part-time students</td>
<td>8 p.m. to 12 p.m.</td>
<td>4 a.m. to 8 a.m. and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 p.m. to 12 a.m.</td>
</tr>
</tbody>
</table>

Table 34
Participants' Learning Problems With and Without Using Electronic Mail and Bulletin Board Technique in Learning

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WITHOUT THE TECHNIQUE</th>
<th>WITH THE TECHNIQUE</th>
<th>RATE OF REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. reading for meaning</td>
<td>7 (87.5%)</td>
<td>3 (37.5%)</td>
<td>50%</td>
</tr>
<tr>
<td>2. dealing with time</td>
<td>6 (75%)</td>
<td>2 (25%)</td>
<td>50%</td>
</tr>
<tr>
<td>constraints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. communicating with the</td>
<td>5 (62.5%)</td>
<td>2 (25%)</td>
<td>37.5%</td>
</tr>
<tr>
<td>professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. asking questions</td>
<td>4 (50%)</td>
<td>1 (12.5%)</td>
<td>37.5%</td>
</tr>
</tbody>
</table>
CHAPTER VIII

SUMMARY AND CONCLUSIONS

The purpose of this study was to learn factors which influenced participants' use of electronic mail and bulletin board technique in a traditional learning environment. This chapter summarizes the research process and results of this study. It includes a description of the research process, reports of patterns and trends occurring during the research process, implications of the findings, and recommendations for further research.

Research Process

A qualitative research method was used in this study. Due to the type of learning environments (traditional and non-traditional) involved in this class, qualitative data gathering technique was chosen for the greater probability of identifying factors which influenced student participation in an electronic mail and bulletin board learning environment.

To provide detailed and comprehensive coverage of various aspects of a qualitative study, the concept of triangulation was adopted. It employed four data collection methods in this study--questionnaires, interview, document analysis, and participant observation. These methods were used in different stages of the research process. A summary of activities
involved in the data collection process is presented in diagram 4.

Diagram 4

Timeline for Research Activities in various Stage

Activities: A-- questionnaire
          B-- interview
          C--computer communication record
          D--participant observation

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activities</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A and D</td>
<td>Second week</td>
</tr>
<tr>
<td>II</td>
<td>A, C, and D</td>
<td>Fifth week</td>
</tr>
<tr>
<td>III</td>
<td>B, C, and D</td>
<td>Final week</td>
</tr>
<tr>
<td>IV</td>
<td>B</td>
<td>Sept. 1993</td>
</tr>
</tbody>
</table>

General Patterns and Trends in the Findings

The general patterns and trends that occurred during the study are described in the following sequence: physical, school, learning, and human environment. A discussion of the patterns and trends in each environment occurs below.

Physical Environment

Participants who participated in the study from a remote area experienced problems with a low-quality computer screen. Those who had computers at home had the advantage of logging into the mainframe computer system without the limitations of time and place. However, some participants reported that they experienced such problems as broken sentences and meaningless symbols on the computer screen. Possible explanations for these
problems might be created by the poor phone line quality or incompatibility with the mainframe computer system. Those who experienced these problems were frustrated, because of their fear of miscommunication, resulting in responses unrelated to the message.

Participants with no computer equipment had to use a computer laboratory on the campus. However, their learning involvement was limited by the laboratory's availability. One of the most distinctive features of electronic mail and bulletin board technique is that it permits users to have flexibility in time and location while communicating with others. However, those who had to use university computer laboratory facilities in participating in the discussion were confined by the laboratory's public-use time schedule. Frequently the participants experienced unexpected schedule changes. Also, they had difficulty finding an open laboratory during the weekend.

Participants preferred to have a better learning environment during their discussions. Their initial concerns with the computer laboratory conditions were the quietness, privacy, ventilation, chair, lighting, angle of the computer monitor, and available workspace. These concerns identified by the participants were also mentioned in Dumn and Dumn's (1975) article--how to diagnose learning style, they related these concerns to immediate learning environment.
To cope with the lack of quietness and privacy in a computer laboratory, participants participated in the discussion from a corner of the laboratory or made copies of messages, left, and responded to the messages later. Some participants said this affected their concentration on the learning tasks.

Participants used various sources of help to solve technical problems experienced during the operation process. The three sources most frequently used by the participants were Academic Computing Service (ACS) at the Ohio State University, the instructor, and the operation manual for the communication software.

Participants had a positive reaction toward the Academic Computing Service (ACS). They praised their on-screen, instant instruction when errors occurred, which helped them save time in resolving the problem.

Some participants criticized the readability of the communication software's operation manual (IBM/compatible or Macintosh version) furnished by the ACS. They suggested that this manual should be written in an easy to understand language, that its descriptions for using the software should be presented in a step-by-step format, and that it should include troubleshooting procedures for various operation problems.
School Environment

Most participants preferred to have the electronic mail and bulletin board technique used more in traditional learning environments. Participants said they had more fun using this type of technique in learning compared with learning through the classroom instruction method. They said they benefited the most from its following features: its flexibility in learning time and location, its ability in permitting repeated examination of ideas generated in the discussion process, its ability in permitting more time to prepare for responses, its ability in reaching classmates or the professor, and its ability in carrying extensive information. Similar advantages can also be found in Norton and Stamman (1989), Kaye (1988), Roberts (1987) and Haile (1986).

Some participants were frustrated because of individuals' differences in work experiences and knowledge of learning subject. During the discussion, participants who had more work experiences and subject-related knowledge tended to provide more input in the discussion process. This situation affected a few participants, who had less experience in working or learning, thus feeling pressure due to the amount and quality of information they can offer.

Some participants were confused by the introduction of electronic mail and bulletin board technique, and mistook learning it as the primary purpose of the course. Since most
participants(5) had no experience in using this type of technique in learning or communicating with friends before they enrolled in this class, the novelty of using it as a learning tool distracted their attention from the learning content. The purpose of the course--learning how to construct a lesson plan and related instructional tools--was overlooked by these participants. They spent too much time learning how to use the communication software and solving the technical problems during the operation process.

**Human Environment**

Most participants would not use electronic mail and bulletin board technique as the major source to communicate with others because of its inefficiency in sending and receiving messages. Two factors contributed to this. The first factor was the lag time between sending and receiving messages. Participants had to spend an unreasonable amount of time receiving feedback from other participants. Another factor was its lack of participation from some participants. These two factors resulted in a long waiting in having questions answered during the communication process, prolonging the time to gain group consensus and causing some participants to lose interest in providing more information in the discussion.

The lack of participation issue can be seen in various articles written by Mason (1988), Gilcher (1989), and Philips and Pease (1985). Also, related discussions about the issue of
time delay in sending and receiving information can be found in Gilcher (1989), Harasim (1990), Feenberg (1987), Mason (1988), and Kiesler, Siegel, and McGuire (1984).

Participants considered face-to-face communication the most efficient method to communicate with others, and chose the telephone as their most frequent local alternate source to reach people. With communication through the computer, participants said they could only judge people's reactions through their own interpretations of the words on the screen. However, through face-to-face communication, they could have a better idea about the listener's reactions, because they knew his/her body movements, facial expressions, and tone of speech. Feenberg (1987) also pointed out that the communication connection in a computer-mediated communication situation is not as concrete as in a face-to-face situation.

Participants said using the telephone could save them time in contacting others when quick answers were needed. They did not have to wait long for a response or absence of one.

Some participants were concerned about what they said in an electronic mail and bulletin board learning event. They said the main reason for their concern was that they felt they had to be very cautious about what they said because it would be kept as a permanent record in the computer file. Also, they did not like being considered less knowledgeable than others in the discussion if they made a mistake unintentionally.
Participants in this electronic mail and bulletin board learning situation did not rely on their first instinct and respond to some messages immediately. They generally used three different methods to help them respond properly to the messages: taking notes, making a printout from the computer, or downloading the messages into word processing software. Participants considered these methods were helpful in sorting out the contents of a message, conducting more in-depth research before responding to others, and providing appropriate responses to a message.

Most participants valued their contribution(s) to this course not by the quantity of the information they provided, but by the quality of their responses and by how consistent they were in participating in the discussion. Most said the amount of information received from other participants would not have any substantial influence on whether they should provide as much information as possible in return. Instead, what they emphasized most were the quality of content in a message. In other words, whether their input could contribute significantly to the body of the discussion was one of these participants' criteria. Another criterion was on how consistent a person was in participating in the discussion. They said consistency, commitment, and motivation were three fundamental elements in participating in an electronic conference.
The greatest changes in participants after using electronic mail and bulletin board technique in learning were in the learning time and level of interactions. Because of this type of technique, individuals could participate in the discussion activities anytime. They said they had a better chance than before to interact with others during odd hours, i.e., from 5 a.m. to 7 a.m. and from 5 p.m. to 7 p.m. It made learning available 24 hours a day. They said that in a traditional learning situation, class discussions were limited by how much time they could spend in one class section. There was also a limitation on how many opportunities a person could have to express his/her opinions. Using this type of technique permitted them to have more interactions with fewer constraints.

Participants had the following impressions about using electronic mail and bulletin board technique in learning: (1), learning was more enjoyable than in the traditional method of learning, and (2), they were more involved in the learning process. They experienced frequent interactions with their classmates. Many features of this type of technique such as accessibility in reaching people, ability in permitting repeated examination of ideas, and unlimited opportunities in participating in the discussion provided them a fresh, pleasant learning experience compared with other traditional learning methods, such as lecturing, and independent study.
Participants felt positive on using electronic mail and bulletin board technique in learning. It helped them much in improving their quality of responses. For example, they were more orderly and comprehensible. Participants said the factors that helped them produce better responses were:

1. flexibility in time to prepare an adequate response.
2. opportunity to locate where they were in the discussion process.
3. necessity to organize their responses carefully before sending them out.

Learning Environment

New or less experienced participants in electronic mail and bulletin board technique felt that it would be better if there were a training section at the beginning of the class to help them understand the basics of the operation procedure. Many participants experienced difficulties (i.e., setting up the communication software and logging into the mainframe computer) using this type of technique during the first few weeks of class. They said they spent too much time trying to understand various functions of it, such as how to correct a typographical error. Some said it was difficult to learn two different subjects (electronic mail and bulletin board technique and lesson plan) simultaneously. They felt that individual or group instruction in using the communication software (Procomm Plus and Red Ryder) would help them apply
this type of technique quickly, so they could contribute more in the discussion process.

The number of messages contained in the computer file varied from individual to individual. In this study, it varied from 70 to more than 150 messages per person. Based on the number of messages stored in their computer files, three groups existed. The first group (three participants), those with more than 120 messages in their personal file, acted as the central core of the discussion. Its members initiated most of the discussion activities. They constantly raised questions and tried to involve other people in the discussion. The second group (three participants), those with between 100 and 120 messages, was less active (i.e., they asked fewer questions) in the discussion process compared with the first group. The third group (two participants), those with less than 100 messages, was the least active in the discussion process due to various personal problems (i.e., lack of motivation, and commitment).

Electronic mail and bulletin board technique could best be used in information-related activities. These activities include giving and receiving information, giving and receiving instruction, exchanging opinions, generating ideas, and asking questions. Participants felt that this type of technique used in learning could help them learn more and have more meaningful discussion results than with traditional classroom learning activities.
Electronic mail and bulletin board technique was not very effective in problem-solving activities. Participants indicated the following affected areas: negotiating, group decision making, gaining group consensus, persuading, and resolving disagreements. The main reason for this was that this type of technique could not provide them an environment in which they could talk live, and observe people's reactions simultaneously. Because of this, it is difficult for them to take proper actions (i.e., doing more probing or easing the tension when they sensed a difference in a listener's reaction) to proceed.

The factors that encouraged participants using electronic mail and bulletin board technique were that it provided chances for them to learn a new communication skill, experience a new learning method, and have frequent interactions and feedback between each other. Learning a new communication skill was not the original purpose of the course; however, some participants were overwhelmed and fascinated by the novelty of this type of technique. Some spent too much time learning it and overlooked the priority of the course. Many participants recognized the ability of it in helping them learn in a more convenient and flexible environment. Non-traditional students appreciated highly on having this type of technique used in learning, which permitted them to have fewer conflicts between learning and working schedules.
The factors that hindered participants' use of electronic mail and bulletin board technique were lack of participation, technical problems, and unavailability of the computer laboratories. Lack of participation was the major factor that frustrated most individuals in the discussion. No feedback from others made the message sender feel ignored, thus reducing his/her interest in and frequency of using this type of technique to reach people. Technical problems, especially in editing, greatly inconvenienced this group. They felt that the operation manual was neither concise nor easy to understand. For the availability of the computer laboratory, participants who had no computer equipment at home felt that their use of this type of technique was limited by the unexpected laboratory schedule changes and absence of laboratory hours during the weekend.

Participants felt that with the use of electronic mail and bulletin board technique in learning, they benefited the most in the areas of free learning time and space, ability in permitting repeated examination of ideas, accessibility in reaching the instructor and their classmates, and a satisfied feeling at the end of the discussion process. Participants said compared with the traditional learning environment, these advantages provided them the opportunity to perform their learning under a more flexible environment.
The disadvantages of using electronic mail and bulletin board technique in learning identified by the participants were the speed of the response, information overload, communication anxiety, and impersonality. The fact that there was no live group discussion available accounted largely for the delay of responses. If live conversation were available with the mainframe computer system, participants could discuss the learning subject in a designated time and save time waiting for responses.

The information overload problem had much to do with the users' commitment in having their messages processed. However, since the personal file is like a mailbox, all sorts of messages can be sent to it without any limitations. Participants would have to spend much time in sorting out the priority of responding to those messages. Also, in the discussion process, ideas and opinions can be generated very quickly. If a person must be away for several days and cannot check into the system regularly, the amount of accumulated messages will be large enough to create pressure and anxiety when he/she reads them.

The problem of impersonality concerns the passionless feeling of communicating through computers in which the intimacy of face-to-face conversation is replaced with words on a screen. Some participants described this feeling as "cold."
The above disadvantages of using electronic mail and bulletin board technique in learning can also be found in articles written by the following authors, such as Gilcher (1989), Mason (1988), Harasim (1990), Feenberg (1987), and Kiesler, Siegel, and McGuire (1984).

Implications for the Study

1. **The technique.** When using electronic mail and bulletin board technique in learning and instruction, instructor(s), mainframe computer consultant(s), and school administrator(s) have different responsibilities in satisfying students' needs.

   The instructor should point out the learning priorities and provide needed assistance to minimize the possibility of students' being distracted by the novelty of electronic mail and bulletin board technique. Hopefully, this would prevent students from failing to recognize the intent of the course, and minimize a deterrence in learning interest from the technical difficulties occurring during the learning process. To prevent possible distraction, instructor(s) needs to provide a clear instruction about how this technique should be used, and its various uses.

   To help overcome participants' technical difficulties in using electronic mail and bulletin board technique,
mainframe computer consultant(s) from the school computer department should provide quick solutions for solving technical problems and an operation manual that is clear and easy to follow.

The school administrators should have more computer laboratories available for the students. However, an ideal situation for students to perform their learning in an electronic mail and bulletin board situation is one in which they have their own computer equipment at home. Setting up a computer loan center for those who have the needs will help students gain convenience in the learning process. Also, school administration should have a special contract with the telephone company for lower fares on long distance phone calls to help relief students' burdens on paying extra costs to use this type of technique in learning.

Learner backgrounds. When placing students in small discussion groups, the members' learning backgrounds, work experiences, knowledge about the learning subject, and skills in operating the hardware and software are essential considerations for successful learning results. In other words, their ability in participating in the discussion should be compatible. A mismatch would result in situations with more experienced students dominating the discussion, greatly reducing the opportunities for
others to express their opinions. Also, those who have less subject knowledge and work experience may feel pressure in discussing the learning subjects.

3. **Software evaluation.** The communication software should be evaluated carefully before it is used in a learning situation. Whether the communication software is user friendly should be determined. When first using the software, students may be frustrated by their unfamiliarity with its operation. User-friendly software will help students learn the basic application and help them begin their learning tasks sooner. The software should have built-in tutorial and practice sections to help students learn the operation skill. Adding a self-learning section in the communication software and individual or group instruction can minimize extraneous time spent learning how to use the software and permit them to concentrate fully on their learning subject.

4. **Laboratory organization.** The arrangement and schedule of the computer laboratory should be organized thoughtfully, so students can learn under comfortable and convenient conditions. Laboratory conditions, such as lighting, ventilation, computer hardware, space, and chairs should be arranged to help users perform their learning comfortably. The laboratory schedule should also be convenient for those who must use the facilities.
5. **Issues to be considered.** When an instructor decides to use an electronic mail and bulletin board technique as a learning and instructional tool, several issues should be considered. First, the compatibility between the subject's content and this type of technique's capacities in facilitating discussion should be evaluated carefully according to the nature of various learning domains—cognitive, affective, and psychomotor. Second, course activities should be designed scrupulously to promote students' interest in learning, because electronic mail and bulletin board learning environments require participants to have a strong commitment in participating actively in the learning process. Third, encouragement should be provided constantly to stimulate more interactions between participants. Last, but not least, the time constraint with a ten-week quarter system should be evaluated. Using this type of technique may be ideal if participants know how to apply it; otherwise, anxiety may occur.

6. **Knowledge of application.** To use an electronic mail and bulletin board technique, it is recommended to help participants learn how to use this type of technique before adopting it in an instructional setting. For example, a course should be offered specifically in teaching users how to use it. The benefits of doing this
are that it can help save time in teaching users how to use it, especially in a quarter system school; it can increase users' confidence in applying it in their learning process; and, users can move on to their learning tasks sooner without spending extraneous time in learning how to use it.

7. **Frequent interactions.** Electronic mail and bulletin board participants must interact frequently to increase the frequency of discussion about their learning subject. Relying on a few participants' efforts, i.e., trying to involve more people in the discussion and asking more questions, is not enough to ensure the growth of their knowledge. Preferably, active participation from all students will help the learning process grow constructively.

8. **Group discussion time.** Instructor(s) may consider designating certain time periods during the day for group discussion, so participants can have a better chance to 'get together' and 'meet each other' simultaneously through computers. This will provide chances for them to have their questions answered quickly and shorten the time waiting for responses.

9. **Availability of computer laboratory.** Participants' concerns about the problem with laboratory availability are that-- if flexible learning time and location are the
merits of electronic mail and bulletin board technique, what should be offered to increase the availability of computer facilities for those who have no computer equipment?; and what should be done to provide no-computer users an opportunity to interact with others during the off-hours on weekdays and weekends. From participants' computer communication dialogues, it showed that the communication frequency for no-computer participants was high during the weekdays, but dropped dramatically on the weekends.

10. **Ideal conditions.** An ideal electronic mail and bulletin board learning event would involve as many people as possible in each discussion process. All participants in the conference should have the same opportunity and right to participate. The central core of participants in the discussion process may have a negative effect on other's feelings. The frequent presence of the central core members may discourage some participants' willingness to participate in the discussion. They may feel pressure that they can not provide as much information as those in the central core, or they may think that the discussion is dominated by certain people. A purposive boycott may then occur and used as a protest by some participants.
11. **Major functions.** An electronic mail and bulletin board technique consist two major functions. They are electronic mail and bulletin board. The electronic mail function permits users to communicate with each other one at a time and perform basic communication, such as sending messages and exchanging opinions. The bulletin board function permits the creation of different discussion topics, which provide users many opportunities to select what interest them the most and participate in the discussion.

12. **Conveniences.** Using an electronic mail and bulletin board technique in an instructional setting provides its users many conveniences in participating in the learning process. These features include flexible learning time and locations, free of geographic isolation, and an equal status in the communication process. However, to have a successful use of this type of technique it should consider the following conditions-- users' writing ability, their self-initiation in using it, cultural differences, professional ethics and moral obligation, users' feeling of using it in their learning process, and the effects of using different learning strategies (traditional and non-traditional) at the same time.
Recommendations for Further Investigation

To expand one's comprehensive knowledge in using electronic mail and bulletin board technique, additional research must be conducted. Hopefully, this will add to the body of knowledge for using this type of technique in the future.

Further research should be designed to address such questions as the following to add to the present understanding of the application of electronic mail and bulletin board technique.

1. **Adjustments?** What can help participants adjust their ways of learning when different instructional strategies are used simultaneously? This study only concentrated on the aspect of using electronic mail and bulletin board technique. Information about how participants adjust and their psychological reactions toward various instructional strategies would provide valuable information in preparing future electronic mail and bulletin board instruction.

2. **Attitudes?** What are school administrators' attitudes toward traditional and non-traditional learning environments existing simultaneously? Will this type of combination create more difficulties in the administration process? If so, what are they?

3. **Communication software?** How do professors adopt electronic mail and bulletin board technique? What criteria
should they use to judge efficiency and effectiveness of communication software associated with this type of technique in their instruction? What are their major concerns in designing the course activities when this type of technique is adopted?

4. **Design factors?** What factors should be considered when designing a learning event involving the use of two different types of learning approaches (classroom instruction and electronic mail and bulletin board technique)?

5. **Instructor and designer perspectives?** This research focuses primarily on learning from the participants' perspectives about using an electronic mail and bulletin board technique in their learning process. To achieve thorough understandings about the practice of using it in an instructional setting, further researches should be conducted in obtaining information from instructors' perspectives of using it as an instructional tool. The potential research questions include what are an instructor's expectations of participants' learning results; what are an instructor's expectations in adopting this type of technique as an instructional tool; what criteria does an instructor use to evaluate participants' learning results; What does an instructor like the most and least about participants' interactions during the learning process; and,
what criteria do an instructor use in selecting this type of technique.

6. **Necessary requirements?** If an electronic mail and bulletin board technique is adopted as a method of instruction in a traditional teaching and learning environment, what are the necessary requirements for students, school administration, the mainframe computer system, technical consultants and instructors to possess?

7. **Amount of participation?** Participants' experience and knowledge in using electronic mail and bulletin board technique may reduce time and pressure in using it. However, this does not ensure that they will actively participate in the discussion. The primary factors affecting a person's frequency of participation may relate to his/her motivation and commitment. Therefore, how to encourage students to participate actively and what incentives should be provided in an electronic mail and bulletin board learning situation need to be studied further.

8. **Modes?** A study about a more user friendly approach--client/server mode is recommended. The current Magnus system at the Ohio State University is operated through a transmit emulation mode, which has the following problems when utilizing it--the long occupancy of a telephone line when logging into the discussion, difficulty in using the editing function of a communication software, and difficulty in
installing a communication software. A system that employs
the client/server mode will provide participants many
conveniences in shortening the time they have to spend on
learning how to use a communication software, because many
functions are similar to their computers; and, users can
feel less intimidated when using it in their learning
process.
Appendix A

No:_____

**Questionnaire 1-- Background Information**

Directions: Please fill in the blanks or circle the appropriate response. All data will remain confidential and be used for summary purpose.

**Personal Information:**
1. Gender: M F
2. Age:________
3. Rank (year in college): ________
4. Employed: Y N
5. Where employed: public private educational institution

**Educational Information:**
1. College of enrollment:____________________________________________
2. Student major:____________________________________________________
3. Part-time or full-time student
4. Have you participated in any type of computer driven course: Y N
   If Yes, please briefly describe:_____________________________________
5. Have you ever participated in any electronic mail and bulletin board learning event? Y N

**Computer-related Information:**
1. Computer scares me: Y N
2. Electronic mail and bulletin board technique scares me: Y N
3. Computers are so impersonal: Y N
4. Through computers I have talked with other computer users from other cities/countries: Y N
5. I use the computer electronic mail service: Y N
6. I belong to a service such as CompuServe: Y N
7. I have my personal computer: Y N
8. I have a modem for my personal computer: Y N
9. I have access to a computer with a modem: Y N
10. Is the computer you use an (check all that apply):
   ___ Apple
   ___ Mac
   ___ IBM
   ___ IBM/compatibles

11. I have used computers to write papers for my classes: Y N

12. I have had a class/classes where I was required to use a computer: Y N

13. My biggest problem about working with computer is:

14. Why do you want to work with computers

15. Are you comfortable using a computer keyboard: Y N

16. Are you interesting in learning to do new things using a computer: Y N
   Please explain:

17. Are you aware of any physical condition you may have that would make it difficult for you to use a computer (i.e., vision, lower back condition, headaches, etc.): Y N
   If yes, please specify: ____________________________________________

18. Are there any language barriers (computer terminologies) that would make it difficult for you to use a computer: Y N
   If yes, please specify: ____________________________________________

19. How much previous experience, if any have you had using computer?
   ___ none
   ___ 1 - 3 years
   ___ 4 - 6 years
   ___ 7 - 10 years
   ___ more than 10 years

20. Are you familiar with using a word processor?
   ___ not at all
   ___ somewhat familiar
   ___ very familiar
21. Do you have a Magnus account in the Ohio State University before enrolling in this class? Y N
Appendix B

No:_____

**Questionnaire 2-- Concerns During the Middle of the Class**

**Learning Background Information:**

1. Usual time of day spent studying (check all that apply)
   - ____ 8:00 AM - 12:00 PM
   - ____ 12:00 PM - 4:00 PM
   - ____ 4:00 PM - 8:00 PM
   - ____ 8:00 PM - 12:00 AM
   - ____ 12:00 AM - 4:00 AM
   - ____ 4:00 AM - 8:00 AM

2. What type of learning environment do you prefer?
   - structured__ non-structured__ or both__

   Please explain your choice:

3. What is your preferred learning style (check all that apply):
   - ____ lecture ______ demonstration
   - ____ reading materials
   - ____ simulation/role play ______ group project
   - ____ question/answer ______ electronic mail and bulletin board learning event

   other (please specify):

4. Do you have a fear of public speaking/large groups: Y _ N

   If yes, why you feel that way?

5. Please check the following situations associated with your current learning conditions (please check all that apply):
   - ____ dealing with time constraints
   - ____ deciding when to study
   - ____ sustaining motivation for dealing with motivational blocks
   - ____ dealing with exam anxiety
   - ____ utilizing library facilities
meeting course goals and objectives by course deadline
asking questions to improve understanding of materials
deciding the most effective place to study
reading for meaning
learning effectively on my own
deciding on learning priorities
taking notes from classroom lectures
listening effectively
communicating to professors when help is needed

6. Have you ever kept a journal for personal or class purpose? Y N

7. How would you feel about journal writing as a course assignment? (e.g., reflecting on your feelings about thought-provoking issues from the course)
   __ I really would like to do it
   __ I would be willing to try it
   __ I do not know
   __ I would be reluctant to do it
   __ I would hate to do it

8. Have you ever done collaborative work before?
   __ I have done a lot of collaborative work
   __ I have done some group work
   __ I have never worked in group

9. Do you like to work together with classmates?
   __ I enjoy it- Why__________________________
   __ I am willing to try it
   __ I do not know
   __ I dislike it- Why__________________________
   __ I dislike it a lot
10. Why do you like or dislike group projects or assignments? (Please provide an answer in your own words.)

11. What would you expect to happen in this class?

12. What motivates you to sign up for this class?

13. What are your hopes for the class?

15. What do you see as the purpose of this class using electronic mail and bulletin board technique?
Appendix C

Final Questionnaire

Directions: Please provide responses as required in each question. All data will be remained confidential and be used for summary purpose only.

1. What would you consider to be important if you have a chance to participate in a class which electronic mail and bulletin board technique is adopted as an instructional and learning tool? (Please select and rank three appropriate items with: 1-- least important of the three 2-- average importance 3-- most important of the three)

   ____ Having clear instruction at the beginning of the class about using electronic mail and bulletin board technique software
   ____ Having helpers who provide assistance in using electronic mail and bulletin board technique in learning
   ____ Having an instructor who identifies possible sources for help
   ____ Having the assistance of the Academic Computer Service
   ____ Other ________________________________

2. What factors had the most positive influence on your experience using electronic mail and bulletin board technique? (Please select and rank three items with: 1-- least positive influence 2-- average influence 3-- most positive influence)

   ____ the interaction between participants
   ____ the chance to learn about electronic mail and bulletin board technique
   ____ the excitement of experiencing a new instructional technology
   ____ the suitability between class assignment and electronic mail and bulletin board technique

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the rapport developed between classmates
the feedback from other participants
the technical assistance from other participants
the technical assistance from the Academic Computing Service
the excitement of participating in a research activity
other __________________________

3. What factors had the most negative influence on your learning experience with electronic mail and bulletin board technique?
(Please select and rank three items with:
1-- least negative influence
2-- average influence
3-- most negative influence)
infrequent participation from others
untimely feedback from participants
difficulty in using communication software
infrequent feedback from participants
insufficient time to participate
unfamiliarity with the operation of computers
inadequate time to participate
difficulty in accessing a computer

4. To have a meaningful electronic mail and bulletin board class, what conditions are necessary for participants to possess? (Please select and rank three items with:
1-- least desire of the three
2-- average
3-- most desire of the three)
a strong desire to participate
strong motivation to learn
knowledge in using the computer to communicate with others
rapport with participants at the beginning of the class
know how to present ideas precisely and with a clean format in the computer
good writing skill
others__________________

5. The following listed advantages of electronic mail and bulletin board technique are recognized in most computer-mediated communication related literature. What advantages of it contributed the most to your participating in this class? (Please select and rank five items with:
1-- the least of the five items
2-- average degree
3-- the most of the five items)
possessing an ability to overcome geographic isolation
providing convenience in learning time and space
permitting users to see the chain of thought in discussion
increasing accessibility to the instructor
absorbing information better
providing an "equal" status among participants in the learning process
providing a convenient way to fulfill social needs daily in a busy schedule
permitting ideas to disseminate quickly
feeling less pressure compared with face-to-face communication
enhancing learning desire
providing participants a chance to improve their language skill
receiving much information quickly

The following electronic mail and bulletin board technique related disadvantages are found in most computer-mediated communication literature and from your responses in the interview. In your electronic mail and bulletin board experience, what disadvantages affected you the most? (Please select and rank five items with:
1-- the least influence of the five
2-- average influence
3-- the most influence of the five)

long delay before reaching a group consensus on discussion topics
communication anxiety associated with sending and receiving messages
procrastination in reading and responding messages
the intimacy of feedback
information overload
too frequent change in discussion focus because of new topic involved
no way to sense participants' feelings and reactions
participants' "lurking" problem (i.e., logging on and observing without contributing to the discussion)

What types of pre-course activities (requirement) should be included for classes which electronic mail and bulletin board technique is adopted as an instructional and learning tool? (Please select and rank three items with:
1-- the least desirable of the three
2-- average desirability
3-- the most desirable of the three
8. The following listed responses are synthesized from the interview question—"How do you value your contribution(s) to this class?" (Please select and rank five items with:
1-- the least valuable of the five
2-- average value
3-- the most valuable of the five
participate in the discussion as frequently as possible
provide technical help to those who are less familiar with using electronic mail and bulletin board technique
provide ideas and thoughts to the class
provide at least an equal amount of information
provide much information to the discussion
share learning experience
provide references and explanations about discussion topics

9. What would you consider to be a reasonable time to receive responses after you send a message to other participants?
24 hours
18 hours
12 hours
6 hours
others__________________________

10. What would you consider to be a reasonable time to give responses after you received message from other participants?
24 hours
18 hours
12 hours
6 hours
others__________________________

11. Regarding the issue of class interaction, what would you like to see in future classes which electronic mail and bulletin board technique is adopted as an instructional and learning tool? (Please select and rank three items with:
1-- the least desirable of the three
2-- average desirability of the three
3-- the most desirable of the three)
having frequent small groups and class interactions through computers
determining who is on line with the user
having frequent participation and interactions with participants
having more class activities designed (i.e., case studies, and group assignments) to promote the use of electronic mail and bulletin board technique
having participants respond within reasonable time

12. What will you do to promote peers' participation in future classes that employ the use of electronic mail and bulletin board technique in learning? (Please select and rank three items with:
   1-- the least preferred of the three
   2-- average preference
   3-- the most preferred of the three)
   becoming more familiar with other participants
   setting example (i.e., being an active participant)
   contacting participants through various communication media (i.e., telephone)
   developing rapport with other participants
   having an instructor who is more involved in the discussion
   asking more questions after receiving messages in the discussion
   forming study groups
   providing helps (i.e., reference source, and technical assistance)

13. What level of electronic mail and bulletin board expertise should an instructor have for conducting an electronic mail and bulletin board class? (Please select the appropriate item(s))
electronic mail and bulletin board expert
facilitator
evaluator
instructional designer
computer user
subject matter expert
manager
mentor
others ________________________________

14. What do you consider electronic mail and bulletin board technique assisted you in various aspects? (Please assign value to each item with:
   1-- the lowest degree of assistance
   4-- average degree of assistance
   7-- the highest degree of assistance)
increase my interaction with other participants
increase the overall quality of my assignments
generate more ideas
help me organize and clearly present ideas
feel less pressure when communicating with classmates
save time trying to contact a participant
stimulate my creative thinking

15. What kind of computer-related equipment should electronic mail and bulletin board participants have when participating from a remote area?

- a computer with modem
- a printer
- more telephone lines
- others

16. Based on your electronic mail and bulletin board learning experience, in which of the following area can this type of technique work best? (Please assign value to each item with:

1-- not helpful
2-- somewhat not helpful
3-- average
4-- somewhat helpful
5-- very helpful)

- giving and receiving instruction
- resolving disagreement
- exchanging opinions
- persuasion
- generating ideas
- getting to know someone
- giving and receiving information
- negotiating
- asking questions
- decision making
- maintaining friendly relationship
- problem solving

17. Based on your experience in using electronic mail and bulletin board technique in learning, what time period of the day you used this type of technique in learning?

- 8:00 a.m. - 12:00 p.m.
- 12:00 p.m. - 4:00 p.m.
- 4:00 p.m. - 8:00 p.m.
- 8:00 p.m. - 12:00 a.m.
- 12:00 a.m. - 4:00 a.m.
- 4:00 a.m. - 8:00 a.m.
18. Based on your experience, after the use of electronic mail and bulletin board technique in learning, do you have any changes on your personal learning problems identified before? (your problem(s) was (were))

___ dealing with time constraints
___ deciding when to study
___ sustaining motivation for dealing with motivational blocks
___ dealing with exam anxiety
___ utilizing library facilities
___ meeting course goals and objectives by course deadline
___ asking questions to improve understanding of materials
___ deciding the most effective place to study
___ reading for meaning
___ learning effectively on my own
___ deciding on learning priorities
___ taking notes from classroom lectures
___ listening effectively
___ communicating to professors when help is needed
Appendix D

Questions for the Final Interview

A. What difficulties or frustrations did you experience during electronic mail and bulletin board technique in this class?

B. What success did you experience during the class about using electronic mail and bulletin board?

C. What will you recommend for the use of electronic mail and bulletin board technique in the future class?

D. How did your perceptions of electronic mail and bulletin board technique change during the quarter?

F. What factors hindered you about learning electronic mail and bulletin board technique this quarter?

G. What are the benefits of using electronic mail and bulletin board technique?

H. What are the disadvantages of using electronic mail and bulletin board technique?

I. Have you experienced any problems in using electronic mail and bulletin board technique?

J. Have there ever been times when you wanted to say something or asking something in a conferencing, but felt uncomfortable in doing so? If so, can you tell me about it?
K. How do you decide whether to send a message publicly or privately?

L. What aspects of this class were especially successful?

M. What aspects of this class were especially unsuccessful?

N. Would you like to see electronic mail and bulletin board technique used as an instructional tool in other class? Why?

O. If you have another chance to use electronic mail and bulletin board technique in a class, how would you utilize this type of technique?

P. Will you continue to use your Magnus account to communicate with your friends? Why?

Q. For what specific activities have you found about electronic mail and bulletin board technique to be especially useful?
Appendix E

Guidelines for Tape Recording
(developed based on Patton (1990), Qualitative Research and Evaluation Method-- How to Keep Transcribers Sane, pp. 350-351)

I. Equipment

a. Double check the battery before interview. Extra batteries and adapter should also be prepared.
b. Extra tape, paper pad and pen in case some interviewees preferred not to be recorded.

II. Before Interview

a. Schedule a room (quiet and free from interruptions) for interview.
b. Place microphone in an appropriate distance from the interviewee for sound clarity purpose.
c. Check recorder function.
d. Use 60 minutes tape.
e. Do not use slow speed recording function.

III. During Interview

a. Explain the purpose of the interview and how much time will be needed for the process.
b. Obtain agreement (Tell interviewees that this researcher will use tape recorder, and they have the choice of to or not to be recorded.)
c. Follow the sequence of each question.
d. Turn off the recorder when irrelevant conversation is involved.
e. Upon the completion of each interview, check the tape length, the quality of the previous recording result, and power level of the batteries.
f. Identify the beginning and the end of each interview by saying the interviewee's name.
g. Specify the date, time and place for each interview.
IV. After Interview

a. Listen to tape-- make notes; list proper names and unfamiliar terminologies.
b. Label tapes and store them in proper place.
c. Transcribe the content as soon as possible.
d. Mail related transcriptions to each interviewee for verification purpose.
Appendix F

Guidelines for Participant Observation

The nature of a program emerges from the interaction of
1. the physical setting;
2. the social environment of people in the program;
3. the nature of staff leadership and administration; and
4. the activities provided for in the program.

* The physical setting: The description of the physical setting (program setting should be sufficiently detailed to permit the reader to visualize that setting. Interpretive adjectives should be avoided in the observer's own description of the environment. These adjectives include comfortable, beautiful, or stimulating... etc...)

What you should look for?
1. The way the walls look in rooms
2. The amount of space available
3. How the space is used
4. The nature of the lighting
5. How people are organized in the space
6. The interpretive reactions of program participants to the physical setting.
7. What type of computer they use? (lap-top)
   What type of equipment they have? modem, mouse, printer, Monitor screen
8. How they arrange their equipment?
9. Where is the building located?
10. What is the quality of the phone line in that area?
11. Where the person work most frequently? home, office, or both
12. What types of phone bill they have?

* The Human, Social Environment

In describing the social environment, the observer looks for:

1. The ways in which people organize themselves into groups and subgroups
2. Patterns of interaction
3. Frequency of interaction
4. The direction of communication patterns (between students and professor and between students and students)
5. Male groupings?
6. Female groupings?
7. Male-female interaction
8. Interactions among people with different background characteristics, with different racial characteristics, and of different age
9. Decision-making patterns
10. What is the operating procedure?
11. How does the student view messages?
12. How does the student respond messages?
13. Does she/he have to deal with outside interference frequently?
14. What does the person think about using computer to communicate with others?
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