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The Other Side of Distance Education: Learner Interaction at Remote Sites

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THE OTHER SIDE OF DISTANCE EDUCATION:

LEARNER INTERACTION AT REMOTE SITES

by

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ABSTRACT

The Other Side of Distance Education:

Learner Interaction at Remote Sites

by

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Program: Research and Evaluation Methodology in Education

This dissertation describes the observations of the interaction of adult learners at remote distance education sites. The researcher audited 11 complete courses at four receive sites during two academic terms. The observations were done in the Com-Net, audio-graphic system provided by Utah State University. The courses were provided for university credit to adults around the state.

The research was designed to answer three research questions:

1. What interactions do learners at a distance exhibit in their educational setting?
2. What observable events appear to prompt the beginning and ending of the learners' interactions?
3. What observable outcomes result from the learners' interactions?

A field study was conducted, using qualitative methodologies.

In addition to answering the three research questions, the researcher observed four types of interaction already described in the literature of the field of distance education and identified a fifth type of interaction based on the field

observations. The researcher also expanded on Burnham's definition of parallel learning in distance education.

Finally, in this document, the researcher offers a definition of adult learner interaction at remote sites. The definition is provided to spark further discussion and research. (391 pages)

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DEFINITIONS

Content: is the collection of information in an academic discipline that is the subject of the educational experience.

Environment: is the surroundings of the distant learner during the normally scheduled educational opportunity.

Instructor: is the expert or the media expert created by the expert who provides the content and evaluates the acquisition of the content by the learner.

Interface: is the media, technology, or persons that stand between the learner and the instructor and facilitate the transfer of the content and the interaction between the learner and the instructor.

Learner: is the person involved in the deliberate acquisition of information in a content area.

Learner-Content Interaction (Moore's): "the process of intellectually interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learners mind" (Moore, 1989b, p. 2).

Learner-Content Interaction (proposed): is the reciprocal action or mutual influence between the learner and the content of the instruction or the influence of the content of instruction on the learner.

Learner Control: "...is concerned with the opportunity and ability to influence, direct, and determine decisions related to the educational process" (Garrison & Baynton, 1987, p. 5).

Learner-Environment Interaction (Proposed): is that reciprocal action or mutual

influence between a learner and the learner's surroundings that can either assist or hinder the learning.

Learner Interaction: is either the reciprocal action or mutual influence between the learner and the object of the interaction or the influence of the object of interaction on the learner.

Learner-Instructor Interaction (Moore's): "interaction between the learner and the expert who prepared the subject material, or some other expert acting as instructor" (Moore, 1989b, p. 2).

Learner-Instructor Interaction (proposed): is the reciprocal action or mutual influence between the learner and the instructor or media created by the instructor to deliver instruction.

Learner-Interface Interaction (Hillman, Willis, and Gunawardena's): "interaction that occurs between the learner and the technologies used to deliver instruction" (Hillman, Willis, & Gunawardena, 1994, p. 30)

Learner-Interface Interaction (proposed): is the reciprocal action or mutual influence between the learner and the technologies used to deliver instruction or the influence of the technologies used to deliver instruction on the learner.

Learner-Learner Interaction (Moore's): "inter-learner interaction, between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor" (Moore, 1989b, p. 4).

Learner-Learner Interaction (proposed): is the reciprocal action or mutual influence between learners.

Parallel learning: is that acquisition of the content that takes place concurrently with, but independently of, the delivery of instruction.

INTRODUCTION

Let's peek at some classes through a few openings in the fence surrounding distance education for just a minute before we begin:

Opening 1.

An evening psychology class has just received their scores for the first exam. They are angry and grumbling to each other. Among other things said directly to the instructor, they accuse him of writing a poor exam. A student at another location is heard to ask the complainers to let the class get back to learning. A student at this location slaps his hand on a microphone key and responds hotly, "That's what I'm trying to do!" He then packs his bag and leaves.

Opening 2.

This senior-level history course has three students in this classroom. Two of the students are history majors, and one is a university employee who is auditing. One of the history majors has been sick and unable to attend for 2 weeks. This is her first day back in the classroom. She is lying on the floor in front of her table, knees up and a clipboard resting on her knees, taking notes. The other history major, having a good background in the topic, is telling a historical story to the instructor using the microphone in front of her.

Opening 3.

This is a course in adult education. There are three students in the classroom. One of the students has pressed down the microphone key and is answering a question that was asked during the lecture by the instructor.

The second student is signaling to the third student to take a bigger handful of candy from the bag that is being passed around.

Opening 4.

This is a course for students preparing to be elementary school teachers. The instructor has prepared a video demonstrating teaching techniques. There are two students in a classroom and they have found the proper place on the video and are watching. Their behavior is like two people sitting at home watching television. They are eating snacks, and commenting to each other about the video. From time to time they write observations in their workbooks, which will be turned in for grading at the end of the term.

Opening 5.

This is a science course with 10 students at this location. The instructor is lecturing and writing notes on the electronic board. Off to the right side of the classroom, two students who know each other well are trying to solve a problem at the end of the chapter. Another student is across the hall checking her e-mail in the computer lab, but she has left the door open in case something is said that she considers important.

What do these scenarios have in common? All the students are adults. The students are attending a university course. The classrooms are distant from the instructor. The instructors are delivering course material to students they cannot see. There are other students in these courses at other locations at the same time. The students are not sitting in their seats taking notes for 50 minutes during the day. These students are active. Beyond that, these students are interactive.

When adult learners take on the daunting task of obtaining a college degree at a distance with other learners, at a site provided by an institution, they are faced with opportunities for, and obstacles to, the exercising of their own control of their learning, individually and as a group. This control over their learning may be beneficial or detrimental to their ability to learn.

Previous studies of adult learner characteristics and behavior at a distance have been primarily studies about satisfaction, self-discipline, motivation, knowledge acquisition, demographics, and learning styles. Studies of learners at a distance show that many learner characteristics are influenced by the learners' ability to control and their perception of their own control in the instructional setting. Their control behaviors are observable because of their interactions with objects and events in their learning environment. These interactions are the result of their contact with the instructor, other learners, the content, the mediating technology, and the learning environment.

The Problem

When the term interaction is used in the distance education literature, the most common meaning is communication between the instructor and the learner. Even the technology used to connect the instructor and one or more learners is characterized by its interactivity. That is, one mediating technology is referred to as being more interactive than another.

Reports of studies about learner characteristics in distance education, that included discussions of interaction, frequently use the word interaction to refer to communication between the learner and the instructor. Authors seldom report on

interaction among learners. A few recent attempts have been made to expand the use of and definition of the term interaction to include all the behaviors that learners might have in their distance education setting and to describe the interaction events in relation to instructional events (Hillman, Willis, & Gunawardena, 1994; Moore, 1989b; Wagner, 1994; Walden & Burnham, 1996). However, there is still much confusion about the definition of interaction, what constitutes an interaction, and the identification of the objects of interaction.

The body of research that deals with an interaction does so from a place outside the classroom. There are few, if any, studies from the learners' point of view. The methodology of this body of research consists of surveys, some interviews, and a few quick peeks into the classrooms. Even the learners are out of the instructional setting when they answer the surveys. So what are we likely to know about interaction from this point of view? We are likely to know about interaction from the instructors' point of view, from a distance. The instructors may hope that their learners are interacting with each other under instructor direction, and with the content under instructor guidance. But, there is limited information about what really happens when the students enter the classroom, and about their interactions with each other and the instructor.

The Purpose of This Study

I originally proposed to look at observable learner control behaviors at distance education sites in the Com-Net system. Early in the study it became evident that, first, observable learner control behaviors took the form of interactions and, second, that the use of the term interaction in the distance education literature

was not well defined. The purpose of the study changed due to the early observations and the definitions of interaction in the literature. The new purpose of this study became two-fold. The first purpose was to describe, from a vantage point inside the classroom, the actual observable interactions of these learners that influenced their learning. I have described how these control behaviors can be defined by the interactions on page 8 and in the Findings section beginning on page 102. The second purpose was to refine the definitions of the types of interaction and provide a description of the structure of the interactions of adult distance learners built on observable events in the classrooms.

To meet the purpose, I was guided by three research questions. Those questions were:

1. What interactions do learners at a distance exhibit in their educational setting?
2. What observable events appear to prompt the beginning or ending of learner interactions?
3. What observable outcomes result from the learner interactions?

The Process of the Study

The study was conducted during two academic terms in the Com-Net system at Utah State University, and will be described in detail in later sections of this document. The following is a summary of the activities that I performed to answer the research questions.

I attended, as an auditing student, 11 complete courses at four different distance sites. I attended six courses one term and five courses the second term for

a total of 5 months (two academic terms). During those courses, I participated as a student, but, at the same time, I kept field notes, and audio taped the events in the room where I was attending. During those class periods, I watched for and recorded in the field notes, as completely as possible, the learners' interactions (including my own) that influenced the acquisition of the course content. During the 5 months of observations, I compared the events in the classes, I wrote observations, assumptions, possible explanations, and while making further observations, I watched for confirmation or disconfirmation of my assumptions and explanations.

I attempted to provide an answer for each of the research questions. To do this I described and categorized observations. While I was attending the courses, I compared initial versions of categories, and descriptions with the continuing observations, thus grounding my thoughts with additional information.

Using the results of my initial data analysis, I wrote a protocol for conducting focus group interviews. The questions in this protocol sought to provide additional information and confirmation or disconfirmation of my observations, assumptions, and my understanding of the field.

After I completed the classes, I conducted focus groups with students, technical assistants, and instructors at sites where I had not attended courses. I asked a peer to conduct a focus group with the site administrators. I compared their responses to my observations. Following the focus groups, my understanding of the field was revised as necessary and is reported in this dissertation. Shall we begin?

REVIEW OF RELEVANT LITERATURE

The background literature for this study can be grouped into four main categories: adult education, distance education, research about adult learners in distance education settings, and the learners' interactions in the distance education setting. The literature that I will discuss is limited to those items that provided a background and discussion that is directly related to the context for this study--the Com-Net audio-graphic system; the population for this study--adult distance learners in groups in a university setting; and the purpose of this study--the three research questions and definitions of type of interaction. First, the areas of distance education and adult education will be discussed to provide the general context for this study. Second, a more specific context will be outlined in the discussion of the research in adult distance learners in groups in university settings in North America. Third, because the main focus of the observations of this study was the learners' interactions in their learning environment, I will discuss the concept of interaction as it appears in the distance education literature. And finally, many writers of articles about distance education have called for research about the learners and their interaction. Through this study I will attempt to answer that call.

Adults as Learners

The instruction of adults is different from the instruction of children because adults are better equipped to exercise control of their own learning and to actively participate in the instructional process. Adults are accustomed to exercising control in all the aspects of their lives and have full life experiences that may be as

extensive as their teachers' experiences (Darkenwald & Merriam, 1982; Tennant, 1991). Knowles (1978) said, "Any experience that they perceive as putting them in the position of being treated as children is bound to interfere with their learning" (p. 56). Thus their instructors are not the authority that is bigger than and intimidating to the learner (Burnham & Walden, 1996). The learners' control is observable because of their interactions with objects in their learning environment.

Learner control has been defined by Garrison and Baynton (1987). "Control is concerned with the opportunity and ability to influence, direct, and determine decisions related to the educational process" (p. 5). For example, control can take the form of attention to the instructional delivery (interaction with the content), discussion of the content with other learners (interaction with other learners), or even responses or questions to the instructor during class time (interaction with the instructor). Garrison and Baynton have gone on to explain that "control can be achieved only by striking a balance between independence and other basic elements (i.e., power and support) in the learning process through the process of two-way communication between teacher and student" (p. 5). Balance must also be struck between the learners, between the learners and the environment, and between the learners and the mediating interface. Learners have a range of power, support, and behaviors needed to effect this balance.

Not all learner control behavior is desirable. The learners' control can, without consideration of the objectives of the instruction, remove the learner from the instruction that is being presented at that time (Burnham, 1995). Consequently, adults, more than children, through their interactions have the ability to influence the pace and process of their own learning either beneficially or detrimentally.

Distance Education

Institutionally based education, at a minimum, requires an instructor, one or more learners, and a content. To make it distance education a communication or mediating technology is also required that allows interaction at a distance. The definition of distance education has gone through an evolution and a number of writers have attempted to define distance education (Barker, Frisbie, & Patrick, 1989; Eastmond, 1995; Garrison, 1989b; Garrison & Shale, 1987; Keegan, 1986, 1988; Moore, 1990; Shale, 1988). A definition by Moore and Kearsley (1996) is probably the best or at least the most recent in the evolution:

> Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements. (p. 2)

The first method used for distance education was correspondence courses. Some time later, courses were delivered by radio. Now, with newer and better technology, "the ability of a student to interact with the instructor and other students is what distinguishes modern distance education from broadcast media and textbooks" (Threlkeld & Brzoska, 1994, p. 46).

Research About Adult Distance Learners

In 1988, Calvert wrote that "descriptive research on practices and outcomes, is most common in the literature" (p. 3). This still appears to be true. However, she predicted:

> The fact that learners in distance education are not present with the instructor in a classroom makes salient the question of who they are

> and how they work. Thus, while the same could be asked about learners in the classroom, distance educators are particularly likely to focus on the characteristics of their students. (p. 5)

As will be shown, this prediction has not come true to any great degree. In 1991, Beaudoin reported that "empirical research studies largely address two topics: the effects of specific distance education methods and student outcomes as a measure of program effectiveness" (Beaudoin, 1991, p. 272). This is also still the case.

In 1995, Moore (1995) reported on the Third Distance Education Research Symposium Conference in an editorial in the American Journal of Distance Education. The areas of research focus that he identified were policy and administration, instruction (including learner-instructor interaction), course design, and learners and learning. The learner attributes that were of interest were perceived self-efficacy, conation (striving), learning styles and strategies, psychological type, social affiliative needs, and their need for site facilitators.

Recent research in distance education tends to focus on one of three categories: delivery systems and programs, instructional methodology and technology, and to a lesser extent, learners. For example, during the most recent Conference on Distance Teaching and Learning in Madison, Wisconsin, 71 papers and workshops were presented (Olgren, 1996). Of those 71 presentations, only 10 focused primarily on the learners. The remaining presentations focused on the delivery systems and programs or on the instructional methods and instructional technology to use the mediating technology. In 1988, Coldeway (1988, p. 46) said, "The tendency has been to regard enquiry as only ancillary to the job of designing and implementing distance education." It seems that instructional and program

planning are still the primary interest in studies of distance education. Tallman (1995) stated the need for research about the learners in distance education:

> It is critical that the value of the human element within the instructional transaction not be lost or denigrated by the din of technological proliferation or the need for industrial efficiency. Distance instruction offered through institutions of higher education has a responsibility to sustain the critical priority of human beings in a democratic society. (p. 386)

During the last 18 months, I located 35 articles describing 32 studies that met the requirements that I identified as important to this study. The requirements that I outlined were that the studies be about adult learners' characteristics and behaviors in distance education group settings in North America while they studied for university credit.

The Context of the Studies

Table 1 lists contextual information about the 32 studies that is important for comparison with the context of the study in this report. Table 1 also shows a broad range of numbers of learners in the groups and a broad range of percentages of each gender in the sample. Several delivery methods were used in the courses that were being studied. The information in this table will be more important in later sections when I discuss the characteristics of these studies compared to previous studies.

The Focus of the Studies

Table 2 lists the learners' characteristic(s), attribute(s), or the concept(s) about learners that were the focus of the studies and discussed in the findings.

Table 1

Demographic Characteristics of 32 Research Studies in Distance Education

Study	Number of learners (including control)	Gender % Female % Male	Delivery Method(s)
Atman, 1991	88		
Barker & Platten, 1988	34		1-way video, 2-way audio
Baynton, 1992	326		Home study and telecourse
Beare, 1989	175		Variety of deliveries (study compared deliveries)
Biner, 1993 and Biner, Dean, & Mellinger, 1994	378	50 50	1-way audio, 2-way audio
Biner, Bink, Huffman, & Dean, 1995	449	69 31	1-way video, 2-way audio
Brindley, 1987	40	60 40	Variety of deliveries
Burge and Howard, 1990	120		Audio only
Burkhart-Kriesel, 1994	7		1-way video, 2-way audio
Coggins, 1988	153	60 40	Audio conferencing
Dille & Mezack, 1991	151	72 28	Telecourse
Dohner, Zinser, Cullen, & Schwarz, 1985			Satellite (2-way audio, 2-way video)
Egan, Sebastian, Welch, & Page, 1991			Televised delivery systems

(table continues)

Study	Number of learners (including control)	Gender % Female % Male	Delivery Method(s)
Egan, Welch, Page, & Sebastian, 1992	514		2-way audio and video, video tape and facilitator
Fulford & Zhang, 1993	123		2-way audio and video, 2-way audio, 1-way video
Fulford & Zhang, 1995	260		Interactive television
Garrison, 1990	522	65 35	Audio conferencing
Gunawardena & Boverie, 1993 and Gunawardena, 1994			Audiographics, e-mail
Harring-Hendon, 1989	51	76 24	
King & Doerfert, 1995	139	17 83	Videotape, Iowa Communications Network
Larson, 1994	102	92 8	Interactive television
May, 1993	9	100 0	Home study or teleconference
McCleary & Egan, 1989			2-way television
Mitcham, 1989			Audio-teleconfer-encing
Murphy, 1996			2-way audio-video
Owen & Hotchkis, 1991	458	65 35	Various delivery systems (some home study)

(table continues)

Study	Number of learners (including control)	Gender % Female % Male	Delivery Method(s)
Peruniak, 1988	224	70 30	Various delivery systems (some home study)
Pugliese, 1994	306	57 43	Telecourse
Wallace, 1992 and Wallace & Murk, 1994	141	32 68	Closed circuit television
Wilkes & Burnham, 1991	241	60 40	1-way video, 2-way audio, classroom
Wilkinson & Sherman, 1990	135 program directors, 297 faculty		From 142 different programs
Wong, 1989	248	72 28	Satellite television, telephone

There were three primary attributes of interest to the researchers. The satisfactions of the learner with the experience was studied in 12 (38%) of the studies. If the studies that focus on the learners' perception of the experience are included, the number goes to 14 (44%). The second most common attribute studied was interaction with 10 (32%) of the studies stating that as a focus. The third most common attribute studied was persistence with 7 (22%) of the studies looking at that variable.

There are two categories in the discussion of the outcomes of these studies that are mentioned most often. Fourteen (44%) of the studies specifically mentioned interaction and perceptions of interaction as being an important attribute of the learners and experiences for these learners. Eight (25%) of these studies

Table 2

The Characteristics, Attributes, or Concepts of the Research Focus and the Findings in 32 Distance Education Research Studies

Study	Focus of Research	Focus of Findings
Atman, 1991	Conation, attention control	Link between attrition and student attention
Barker & Platten, 1988	Attitude about effectiveness, motivation, interest, difficulty	Interaction, instructor behavior
Baynton, 1992	Control - independence, competence, support	Control, environmental influences
Beare, 1989	Satisfaction, perception of the experience, achievement (grade)	Preference for live instruction, student achievement, use of the delivery method
Biner, 1993 and Biner, Dean, & Mellinger, 1994	Satisfaction	Instructor/instruction, technology, management, on-site personnel, prompt material delivery, support services, out-of-class interaction with instructor
Biner, Bink, Huffman, & Dean, 1995	Personality characteristics, course grade	Personality characteristics, course grade
Brindley, 1987	Persistence	Hindering and facilitating incidences, interaction with the university, instructional support, pre-course preparation, goals, grades, content
Burge and Howard, 1990	Satisfaction, inhibition	Feeling of success, familiarity with equipment, absence of visual cues was inhibiting

(table continues)

Study	Focus of Research	Focus of Findings
Burkhart-Kriesel, 1994	Social interaction	Educational atmosphere, social interaction
Coggins, 1988	Persistence, learning style	Learning styles
Dille & Mezack, 1991	Letter grade, locus of control, learning style	Locus of control, experience, abstract conceptualization
Dohner, Zinser, Cullen, & Schwarz, 1985	Interaction, satisfaction, effectiveness	Interaction, satisfaction, usefulness
Egan, Sebastian, Welch, & Page, 1991	Achievement	DE performance improvement, group dynamics instructor/instruction, facilitator support
Egan, Welch, Page, & Sebastian, 1992	Perceptions, attitudes about the courses	Conventional courses better than DE courses
Fulford & Zhang, 1993	Satisfaction, perception of interaction	Perception of overall interaction, perception of personal interaction
Fulford & Zhang, 1995	Perception of interaction, learners location, satisfaction	Amount of interaction, learners location
Garrison, 1990	Satisfaction	Interactivity, interaction with instructor
Gunawardena & Boverie, 1993 and Gunawardena, 1994	Learning style, interaction with media	Media, satisfaction with other learners, support systems
Harring-Hendon, 1989	Self-directedness	Self-directed learning readiness
King & Doerfert, 1995	Interaction, satisfaction, persistence	Demographics, satisfaction, learner-instructor interaction

(table continues)

Study	Focus of Research	Focus of Findings
Larson, 1994	Satisfaction, frustration,	Demographics, satisfaction, barriers
May, 1993	Collaboration, interaction	Interaction, autonomy
McCleary & Egan, 1989	Performance, persistence	Instructor effectiveness, persistence, satisfaction, interaction
Mitcham, 1989	Motivation, learning style	Emotional climate, motivation, competence
Murphy, 1996	Quantity and description of interaction (learner-instructor)	Differences in learner-instructor interaction
Owen & Hotchkis, 1991	Demographics, persistence, success	Motivation, demographics,
Peruniak, 1988	Life situation, locus of control	Motivation, prior learning experience, life priorities
Pugliese, 1994	Persistence, failure, loneliness, dyadic communication, apprehension, social experience, locus of control	Loneliness, failure,
Wallace, 1992 and Wallace & Murk, 1994	Perception of the experience, motivation	Perception of the DE program, motivation, interaction
Wilkes & Burnham, 1991	Motivation; perception of satisfaction, environment, involvement	Professional advancement, cognitive interest, motivation perception of environment
Wilkinson & Sherman, 1990	Procrastination	Procrastination reasons, methods used to combat
Wong, 1989	Perception of the experience, interaction	Things to change

discussed the delivery method as important to the learners. Obviously interaction is an important concept to learners, researchers, and distance educators. The concept of interaction will be discussed in more depth later in this review.

What can be said about the use of the term interaction in the research studies? Table 3 further dissects the studies that mentioned interaction either as an object of study or as important to the outcomes of the research. There are 15 studies reported in 18 articles. Those articles preceded by an "a." or "b." identify pairs of articles written about a common research study.

It is evident that interaction is important but poorly understood. Importance was placed on interaction with the instructor. The interaction between the learners and the instructors was most often identified as asking and answering questions or otherwise verbally expanding on a topic. Interaction with other learners was also important. This interaction was exhibited and characterized by verbal communication with questions, answers, and discussions. The ease of interaction with the university was mentioned occasionally as being a requirement for learner satisfaction. But, it was not evident which part of the university interaction was important: the ease of communication or the topic of the communication.

Only three of the articles offered a definition of any form of interaction. The definition of interaction in the articles has to be implied from the way the authors used the term. Generally it was implied that a situation or experience contained interaction if the learners and the instructors were able to communicate. The definition of interaction, either stated or implied by the usage of the term, was very narrow.

Table 3

The Use of the Term Interaction in 15 Research Studies

Article	Interaction with	Behaviors	Definition or Usage
Barker & Platten, 1988	Instructor	Questions and answers via telephone	Questions and answers during class time between students and instructors, students called in on telephones at the sites, weakness mentioned by students was limited interaction with instructors.
a. Biner, 1993	Instructor, university	Communication with instructor in and out of class, ability to contact university	Ability to contact instructor and university.
b. Biner, Dean, & Mellinger, 1994	Instructor, university	Communication with instructor, ability to contact university	Ability to contact instructor and university, interaction between students was not mentioned even though it appears to have been possible.
Brindley, 1987	Instructor, university	Ability to contact instructor and university	Student/instructor interaction important to persistence, peer groups important for persistence, need student/instructor interaction outside of class time, interaction = communication.
Burkhart-Kriesel, 1994	Instructor, other learners	Communication with instructor, class time communication with other learners (on and off topic)	Provides historical definition: "Social interaction in distance education traditional described a process between the student and instructor that was mediated via correspondence" (p. 19). Trade-off of class time communication with instructor is class time communication with other learners thought not always beneficial.

(table continues)

Article	Interaction with	Behaviors	Definition or Usage
Dohner, Zinser, Cullen, & Schwarz, 1985	Instructor, other learners (onsite and cross site)	Class time communication, cross site desirable	Interaction operationalized to mean "exhibit questions, answers and elaborations". Cross site and onsite interaction desirable.
Fulford & Zhang, 1993	Instructor, other learners	Questions and answers on topic	Encouraged by instructor queries, "vicarious interaction", anticipated interaction, mentions Moore's (1989b) types and focuses on learner/ instructor and learner/learner. Interaction was answering and asking questions, volunteering opinion.
Fulford & Zhang, 1995	Instructor, environment, other learners	Questions and answers on topic	Quotes Wagner's definition (1994). An instructional interaction is "an event that takes place between a learner and the learner's environment. Its purpose is to respond to the learner in a way intended to change his or her behavior toward the goal" (p. 8). "In the past, interaction has been treated as a generic teaching techniques. Instead, maybe it should be treated as a learning outcome" (p. 50).
Garrison, 1990	Instructor, other learners	Communication with instructor, on and off topic class time discussion between learners	Mentions Moore's (1989b) types. Recognizes learners' responsibilities for interaction.
a. Gunawardena 1994	Instructor, other learners	Class time discussions	Related to "social presence" student with instructor and other students. interaction is one facet of social presence.

(table continues)

Article	Interaction with	Behaviors	Definition or Usage
b. Gunawardena & Boverie, 1993	Media, other learners	Use of different media, class time discussions	Related to learning styles, group functioning, and choice of media, feasibility of learners to interact with each other.
King & Doerfert, 1995	Instructor	Communication with instructor	Mentions Moore (1989b), Hillman, et al. 1994), and Kearsley (1995) for importance of interaction. Satisfaction with learner/instructor interaction compared by media.
May, 1993	Other learners, instructor	Out of class discussions about topic	Inter-learner discussions and collaboration outside of class time about course topic.
McCleary & Egan, 1989	Instructor	Class time communication and feedback on assignments	Sees lack of "visual interaction" between learners and instructor as a detriment, but learners wanted more feedback on assignments.
Murphy, 1996	Instructor, other learners	Verbal class time communication	Questions, answers, and discussion during class time. Verbal interaction only.
a. Wallace, 1992	Instructor, other learners, university	Class time discussion, communication with university	Mentioned only in abstract and recommendations. Need for better mediation (technology) for interaction with instructor and between learners.
b. Wallace & Murk, 1994	Instructor, other learners	Limited class time communication	There were limitations to the amount of time students could reach instructor. Group interaction needs to be encouraged.

(table continues)

Article	Interaction with	Behaviors	Definition or Usage
Wong, 1989	instructor, other learners	limited class time communication, print based, encouraged class time between learners	interaction seemed to mean contact with. Wanted increased feedback on assignments.

The Methodology of the Research

Table 4 lists the methodologies and instruments used in the same 32 studies and shows that the research about adult distant learners has been primarily limited to surveys. Twenty-five (78%) of these studies report that one or more surveys were used. Of the studies that used surveys, 22 (69%) used surveys that they or their institution created. Someone else's survey (including commercially available) was used in nine (28%) of the studies. Learners were interviewed in seven (22%) of the studies. Grades and other forms of extant data were used in four (12%) studies. Videotapes were made for study in two studies and observation as data gathering was used in only two studies.

Interaction

Education requires learning behavior on the part of the learners, an interaction with the learning situation, not merely sitting in front of an information delivery system such as an instructor or a television. Education requires two-way communication, and distance education requires mediated two-way communication.

Table 4

Research Methodologies and Instruments Used in 32 Distance Education Research Studies

Study	Methodology	Instrument
Atman, 1991	Surveys	Goal Orientation Index, Test of Attentional and Interpersonal Style
Barker & Platten, 1988	Survey	36-item survey
Baynton, 1992	Survey	28-item survey
Beare, 1989	Survey	Course evaluation
Biner, 1993 and Biner, Dean, & Mellinger, 1994	Survey	Telecourse Evaluation Questionnaire
Biner, Bink, Huffman, & Dean, 1995	Survey	Sixteen Personality Factor Questionnaire
Brindley, 1987	Interview	Critical Incident Technique
Burge and Howard, 1990	Survey	50-item survey
Burkhart-Kriesel, 1994	Interview, observation	Interview protocol, observation worksheet
Coggins, 1988	Survey	Survey and Canfield Learning Style Inventory
Dille & Mezack, 1991	Survey	Survey and Rotter's Internal-External Locus of Control, Kobe's Learning Style Inventory
Dohner, Zinser, Cullen, & Schwarz, 1985	Surveys, interview	Surveys
Egan, Sebastian, Welch, & Page, 1991	Survey, interview, course grades	Course evaluations, focus groups, media evaluation, course grades

(table continues)

Study	Methodology	Instrument
Egan, Welch, Page, & Sebastian, 1992	Survey	Media Evaluation Survey
Fulford & Zhang, 1993	Survey	18-item survey
Fulford & Zhang, 1995	Video evaluation instrument, survey	Video evaluation instrument, survey
Garrison, 1990	Survey	Survey
Gunawardena & Boverie, 1993 and Gunawardena, 1994	Survey	Kobe Learning Style
Harring-Hendon, 1989	Survey	Self-Directed Learning Readiness Scale, survey
King & Doerfert, 1995	Census, survey	68-item survey
Larson, 1994	Survey	5-section questionnaire
May, 1993	Interview	Semi-structured interview
McCleary & Egan, 1989	Survey	Course Evaluation, Media Services Evaluation
Mitcham, 1989	Survey	Learning style assessment, course evaluation
Murphy, 1996	Observations (three times)	Coded three second intervals on Distance Interaction Analysis System
Owen & Hotchkis, 1991	Extant data, survey	School records, student biographies, survey
Peruniak, 1988	Survey	Life Situation Survey

(table continues)

Study	Methodology	Instrument
Pugliese, 1994	Telephone survey	Communication Adaptability Scale, UCLA Loneliness Scale, Personal Report of Communication Apprehension (PRCA-24), James Internal-External Locus of Control Scale
Wallace, 1992 and Wallace & Murk, 1994	Survey	Survey
Wilkes & Burnham, 1991	Survey, interview, observation	Educational Participation Scale, Learning Environment Inventory, college and University Classroom Environmental Inventory, 2 surveys
Wilkinson & Sherman, 1990	Survey of distance educators	80-item questionnaire
Wong, 1989	Questionnaire, telephone interview, grades	survey

For example, Burnham and Seamons (1987) stated, "Television viewing without interaction would be classified as information dissemination and not education" (p. 9). Drops (1996) further stated, "With television, more interaction occurs in using the remote to select a program rather than watching any specific program" (p. 343).

Importance of Interaction

It is commonly agreed that interaction is an important ingredient in distance education for a variety of reasons. King and Doerfert (1995) stated, "Interaction is important for a variety of types of learning, learner satisfaction, and persistence of distance education students" (p. 197). Drops (1996) said, "The value of learning is

directly related to the kinds and levels of interaction experienced by the students" (p. 343). I noted in the summarization of research studies that interaction is a common focus of research. This was also the case in other research studies that did not meet the criteria for inclusion in my comparison. Interaction was also considered important even when the learners were alone.

Definition of Interaction

Moore (1989a) said interaction "has so many meanings as to be almost useless unless specific sub meanings can be defined and generally agreed upon" (p. 9). Indeed, the term interaction is used in a variety of ways, with a variety of assumptions, and is seldom defined before it is used, discussed, and studied.

When the term interaction is used, it usually refers to communication between the learner and the instructor and the media used to facilitate that communication. Writers refer to one distance delivery method being more interactive than another. That use of the term interaction generally means the degree to which the media facilitate communication between the learner and the instructor. For example, Collins and Murphy (1987) said that "delivering knowledge by an interactive satellite affected the educational experiences offered to students" (p. 57).

For others, the word interaction means the ability of the learner to communicate with other learners. Typically, these writers worry about the lack of interaction that a distance student has while learning, that is, there is no "classroom" interaction.

Fulford and Zhang (1995) have made the claim that "interactivity in a two-way television setting is both a technological concept and a psychologically constructed reality" (p. 43). They further stated, "The learner's constructed reality of interaction is dependent on human interchange rather than just the capabilities of the technology" (p. 44). Cookson and Chang (1995) used this definition: "Instructional interaction refers to the range of interpersonal transactions associated with the processes of teaching and learning that occur within an instructional setting" (p. 19).

In the same issue of The American Journal of Distance Education as the article by Hillman et al. (1994), Wagner (1994) called for a functional definition of interaction. In her article she proposed the operationalization of interaction based on the domains of learning theories, instructional theories, instructional designs, and instructional delivery. She then described in detail each of these domains.

However, Wagner (1994) stated that her definition of interaction is "reciprocal events that require at least two objects and two actions" (p. 8), limiting the meaning generally used by most writers, including herself. She did say that "interactions occur when these objects and events mutually influence one another" (p. 8). Beyond these limitations, it is apparently her belief that interaction is something to be quantified, operationalized, and tightly managed by the instructional designer.

Mackin and Hoffman (1996) presented a paper at the 12th Annual Conference on Distance Teaching and Learning about interaction in their courses at the Department of Energy Safeguards and Security Central Training Academy. In their paper they attempted to define interaction by saying, "In its more traditional sense, the term 'interaction' often means the student is *doing* something. For the

Academy ITV staff, however, the term has come to mean *engaging* the student" (p. 189).

For the purpose of this study, I needed a succinct, unambiguous definition of interaction that allows for the types of interaction proposed by Moore (1989b). My old, big, Webster's unabridged dictionary (Harris & Allen, 1925) defined interaction as "mutual or reciprocal action or influence" (p. 1123). Building with, and on, the words of those who have come before me, I used the following definition of learner interaction:

> **Learner interaction** is either the reciprocal action or mutual influence between the learner and the object of the interaction or the influence of the object of interaction on the learner.

Types of Interaction

Moore (1989b) described three types of interactions that can take place for a learner. These are learner-content, learner-instructor, and learner-learner. Five years later, Hillman et al. (1994) added another type of interaction, learner-interface. Even though Lehman, Monson, Dewey, and Jones (1996) listed five levels of interaction--between participants and the instructor, with participants at various sites, with site personnel, with participants within a site, and with the visual and print materials--the types described by Moore and Hillman et al. are the ones generally used by researchers in the field of distance education.

Moore spent a considerable amount of writing defining what he means by each type of interaction. However, shorter definitions can be found in his discussions. Learner-content interaction is defined as "the process of intellectually

interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learners mind" (p. 2). The second portion of my definition of interaction covers the influence of the content.

Learner-instructor interaction is defined as "interaction between the learner and the expert who prepared the subject material, or some other expert acting as instructor" (p. 2). This type of interaction is covered by the first part of my definition as being reciprocal action.

Learner-learner interaction is defined as "inter-learner interaction, between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor" (p. 4). Again, this fits within the first portion of my definition by virtue of being reciprocal. However, in his discussion of learner-learner interaction, Moore's examples leave the impression that learner-learner interaction is managed by the instructor or the instructional design rather than being the responsibility of the learners.

Hillman et al. (1994) also used a considerable amount of space to describe learner-interface interaction. However, a shortened definition can be found-- "interaction that occurs between the learner and the technologies used to deliver instruction" (p. 30). This definition fits the second part of my definition because these technologies influence the learners.

What Needs To Be Done

As early as 1984, Morgan (1984) called for qualitative methodologies in research in distance education, where the "emphasis is on holistic studies carried out in natural settings, rather than laboratory-type conditions, using qualitative

methods of interview and observational techniques with less prominence on quantitative methods and statistical manipulation of survey data" (p. 253).

Again, from the 1995 Third Distance Education Research Symposium Conference, there was a request that "researchers should pay more attention to the interaction which occurs among students in remote sites; both within one site and among different sites" (Shearer, 1995, p. 20). A further request was that "this analysis should go beyond the normal investigation of the affective domain that is often reported in the literature" (p. 20). And another conclusion was also reached at this same conference. Shearer (1995) reported that there was a "need to take a purely empirical (observational) research methodology in distance education as in behavioral psychology, and to move away from interventionist methods of physical sciences" (p. 21).

Cookson (1995) presented at the same Third Distance Education Research Symposium Conference. He stated that "systematic empirical research of the process of instruction-learning in audioconferencing situations has not been extensive" (p. 295). Shortly thereafter in the same presentation, he commented "One of the key elements to understanding and guiding the nature of instruction by audioconferencing, indeed of multiple forms of distance education, is the concept of instructional interaction" (p. 295).

Wagner (1994), in her discussion of the functional definition of interaction, called for an empirical assessment. She said:

> The empirical assessment needed to establish the construct of interaction as an operational variable requires the deliberation and objectivity found in the methods of disciplined inquiry.... If discussions regarding interaction are to extend beyond indiscriminate applications

> of a poorly defined term toward no specific instructional end, distance educators may need to operationalize categories of interaction. (p. 7)

The need is great to empirically describe the field of interactions that the learners exhibit in distance education.

Summary

The past research about learners in distance education settings, which provided the context for this study, tended to focus on the perceptions of the learners themselves and very little on observations of the learners. Curiously, the research has generally attempted to get inside the learners' heads without getting inside the learners' classrooms, to read their minds without reading their behavior, to connect their feelings to program outcomes without connecting their experiences to their environments and each other.

Researchers and writers go on researching and writing without a close and steady look at what is actually happening. While doing this study, I made an attempt to take a close and steady look at the learners in their natural environment.

RESEARCH DESIGN, METHODOLOGY, AND PROCEDURES

Kerlinger (1992) defined research design as "the plan and structure of investigation so conceived as to obtain answers to research question" (p. 279). He also said that "research design has two basic purposes: (1) to provide answers to research questions and (2) to control variance" (p. 280).

Borg and Gall (1989) defined research design and research methodology as

> the procedures selected by a researcher for studying a particular set of questions or hypotheses. The term is generally used, however, to refer specifically to the researcher's choice of quantitative or qualitative methodology, and how, if at all, causal relationships between variables or phenomena are to be explored. (p. 321)

For this document, I have chosen Kerlinger's definition of research design as the plan to provide answers to the questions and account for variability. I use the term methodology to identify the specific set of procedures utilized to answer the research questions. Then I use the term procedures to specify the exact steps I took to answer the research questions, account for variability, and assure reliability and validity.

The Research Questions

The driving force behind any research study is the questions or hypotheses. This study began with three research questions. These questions determined the research design, the research methodology, and the procedures I used to find answers to those questions. The questions are:

1. What interactions do learners at a distance exhibit in their educational setting?

2. What observable events appear to prompt the beginning or ending of the learners' interactions?

3. What observable outcomes result from the learners' interactions?

Research Design

To answer these research questions in any depth, I needed to spend considerable time in the field, in the community of the learners, watching for the answers to these questions. This study was an in-depth study of the learners' community and how they interact with each other, the instructors, the content, or the environment in that community. So, I chose a field study as the research design based on a definition by Lancy (1993):

> Where the anthropologist employs the *ethnographic* method to study *culture*, the sociologist conducts a *field study* to document a *community*.... These researchers have a common view that communities are created and held together by the interaction of their members. (p. 4, emphasis in original)

The terms field study and field research are sometimes used interchangeably as we see in a definition by Adams and Schvaneveldt (1985):

> Field studies focus on the social setting or situation and the events that occur in that situation as people carry on their particular activities. Field research is a design for the study of human behavior in which one obtains understanding about a situation by becoming close to the people in that situation. (p. 132)

Smith and Kornblum (1989) have some especially pertinent things to say about field research which apply to this study, although they sometimes refer to these studies as ethnographies:

> Ethnographic field research requires the most intense involvement with one's subject. The ethnographer's "presentation of self" and the

> changes he or she experiences are part of the research process itself. (p. 3)

Involvement with the students was what I needed to be a continual observer and student participant in their interactions. Smith and Kornblum continue:

> Whether they are working alone or as part of a larger research team, the relationships that develop between the ethnographic researcher and the people they are studying are critical to the success of their research. (p. 5)

> It is also worth noting that ethnographic field research is a method in which one person typically gathers and analyzes the data. Reliance on individual effort is somewhat uncommon in this age of larger-scale and more bureaucratic research programs...[and] it remains true that the observer often works alone, equipped with little more than a notebook and a pen (and at times a tape recorder or a camera). (p. 4)

Because this study was to be an individual effort, I had the opportunity to use the solitary field research methods. The notebook, pencil, and tape recorder became my tools. Fetterman (1989) summed up the task as I saw it, "The ethnographer's task is not only to collect information from the emic or insider's perspective, but also to make sense of all the data from an etic or external social scientific perspective" (p 21).

There are stages in a field study and various authors talk about the parts of a field study in different ways. Smith and Kornblum (1989) have specifically identified four parts of field research: gaining trust, building relationships, maintaining objectivity, and the observer's role. Fetterman (1989) mentioned several stages of ethnographies, among them are selection and sampling, entry, participant observation, thinking, triangulation, and writing. Goetz and LeCompte (1984) gave similar research stages: theory and design, selection and sampling, role of the ethnographer, data collection strategies, and analysis and interpretation of data.

And Lancy (1993) has described the research stages as entering the field, collecting data, refocusing the study, analyzing the data, and structuring the report.

Adams and Schvaneveldt (1985) seemed to me to condense the differences in the identification of the stages to best meet the needs of my study. They identified five steps in field research (Adams & Schvaneveldt, 1985, pp. 122-124). These five steps are:

1. entering the field
2. gaining and building trust
3. obtaining and preserving the data
4. analyzing the data
5. writing the research report.

These five steps are the ones I used to guide the procedures of this study, and the ones I will use to discuss the procedures and findings later in this document. Where appropriate, I also discuss my reflections on my role as a participant and researcher in the community of students.

Research Methodology

A qualitative research design dictates qualitative methodology. Qualitative methods, including the methods required by most field studies, have been used historically in the social sciences, and recently in education, to explore phenomena. These methods correspond to the purpose of this study--to explore and answer questions. I used Borg and Gall's (1989) concise summary of 10 characteristics of qualitative methodology to direct the planning of this study. Correspondingly, Patton (1990, pp. 39-62) listed 10 themes of qualitative inquiry. These two sets of

descriptors of qualitative research methodology overlap and complement each other so well that I will discuss this study in light of the items that both contribute. As I discuss each of these two sets of characteristics and themes of qualitative research methodology, I will begin to outline how these characteristics fit the methodology and procedures I used for this study. The exact procedures I used and activities I performed to answer the research question are more explicitly described in the Research Procedures section beginning on page 55.

As with quantitative methods, qualitative methods require some way of ensuring internal validity, external validity, reliability, and objectivity. Following the discussion of the themes of qualitative methodology, I will discuss reliability and validity and the means typically used to assure this validity, reliability, and objectivity in qualitative studies.

Overview of Borg and Gall's Characteristics of Qualitative Research Methodology

Borg and Gall (1989, pp. 385-387) have provided a list of 10 activities in qualitative methodology. In the following sections I list the activities and how I used the activity in this study.

Holistic Inquiry

"Research involves holistic inquiry carried out in a natural setting" (p. 385). The research takes into account the construct being studied and its context. The whole distance learning environment for these adults influences their interactions. To get the best, overall picture (holistic), sources of variability (differences for the

learners) were considered. These sources included the various sites, the kinds of learners, content, the number of times per week that the learners met together, and the time of day that the classes were held. During the course of this study, I observed over extended periods of time (whole courses) at four remote sites, classes held once a week and classes held twice a week, classes held morning, afternoon, and evening, and classes in 11 academic departments. This provided a holistic picture of the interactions of the students who attend distance education courses in the Com-Net system provided by Utah State University.

Human Instrument

"Humans are the primary data-gathering instrument" (p. 385). For this study, I was the human instrument gathering data in field notes of observations of learner interaction behaviors. In the field notes I also kept notes about my own responses to this experience as a participant observer. I used a tape recorder to tape the events in the classroom only as a backup to the field notes in case something happened to the field notes. However, the tape recorder could not pick up visual information.

I followed certain protocols. Namely, I noted descriptions of student interaction behaviors as rigorously and as objectively as possible in the field notes. I noted information about activities of the students including, but not limited to seating location, interaction with and questions asked of the instructor and each other, movement about the room, and other environmental and social factors.

Qualitative Methods

"Emphasis [is] on qualitative methods" (p. 385). I used participant observation (field study) procedures. I kept field notes about my observations as the primary source of data and audio-taped the classes for backup. I encouraged students and technical assistants to talk about their experiences by being a responsive listener. Following completion of the classroom observations, I conducted focus groups at three other receive sites to seek agreement or disagreement with my understanding of what I observed. These focus groups contributed additional information for my understanding of these interactions.

Purposive Sampling

"Purposive rather than random sampling" (p. 386) is done. My sampling unit was the courses because these were the smallest unit of the experience I could choose. My primary goal in choosing courses was variability. Secondary goals were scheduling and driving distance.

Inductive Analysis

"Inductive data analysis" (p. 386) is used. The ultimate purpose of this study was to answer the research questions, in the field, about learner interaction behaviors that learners at a distance exhibited that influenced their learning, what preceded or prompted those behaviors, and what observable outcomes the learners experienced from those behaviors. From observations of these behaviors, I created a foundation of information about learner interaction behaviors and what observable events preceded and resulted from those behaviors. As this foundation of information was formed, I watched for confirmation and disconfirmation of my

assumptions across each of the sources of variability during all the subsequent class sessions and referred to my field notes for agreement or contradiction. Upon finding data that differed in some manner or did not fit the foundation, the foundation was refined, and the process begun again. I discussed my observations and assumptions with peers and advisors.

Following all the observations, I conducted focus groups and watched and probed for their interpretation and evidence of their agreement or disagreement with my assumptions. Again, the foundations of my assumptions and explanations were open to change. I have described the results of this study and, where possible, I have provided examples from my field notes.

Grounded Theory

"Theory that is 'grounded in the data,' that is, developed from the data" (p. 386) is how theories and answers to research questions are created. This is a further statement of the inductive method. Theories and in the case of this study, answers, are based on the details of the observations. Ideas about possible answers to the questions and descriptions of the field became apparent during the observation and participation in the courses. Once I had these answers and descriptions written down in some form, I looked for evidence and replication of the events that either supported the descriptions and answers, required refinement of the answers and descriptions, or did not support their continued consideration. I also looked for differences and similarities between classes and between sites on which to base understanding and descriptions.

I attempted a preliminary analysis of the data and wrote extensively about the findings based on that analysis. Upon completion of the field work, I analyzed the data again, using a more complete understanding of learner interaction based on the further observations, my writing, and discussions with others.

Emergent Design

"Design emerges as the research progresses" (p.386). The procedures of observing, keeping of field notes, audio taping, and focus group interviewing were predetermined, but additional data gathering opportunities arose. For example, I was able to question students in a class on campus who were observing a limited number of distance education classrooms about their impressions. This additional information was useful in giving me further insights into distance education students and confirming what I had been observing by verifying that other observers saw similar events. Discussions, with my primary advisor, of what I was observing, and what sense it was making to me, helped refine both my observations and description skills. I looked for opportunities to add information to my understanding of the experiences of the students I was observing.

The focus group protocol was based on the descriptions, observations, and generalizations created during the two preceding terms and was not predetermined before the research began.

My behavior resembled, as closely as possible, the behavior of the other students. I appeared to take notes (the field notes and any reflective notes were included on these same pages, and sometimes, were the only notes I wrote, if other students couldn't see what I wrote), took most of the in-class tests, and responded

to questions from the instructor and other students. But, because I was on record as an audit student, I had some flexibility that allowed my observation to take priority over my student behavior. As an auditing student, I was expected, by other students, not to be as concerned as they were about class work. I made it my practice to be interested in the content, do work that demonstrated that interest, and not interfere with the education of the other students except as I was involved by the other students in the social atmosphere of the classroom. Thus, my behavior was determined as the situation progressed. I tried to maintain a demeanor that was somewhere in the middle of the demeanors of the other students without being too different from who I really am. I was neither the most studious nor the most active.

Interpreted Outcomes

"Subject plays a role in interpreting outcomes" (p. 386). In qualitative studies there is deliberate interaction between the investigator and those who are the object of the investigation. By attending these classes, I became one of the students and interacted with them on a regular basis as well as interviewing some of them later. Being a novice Com-Net student, I was able to ask naïve questions of the students and attempt to get their impression of their experiences.

Students played the role in the focus group of helping me to interpret and refine the results. This input from students in these focus groups helped to put any bias in my observations into perspective.

Intuitive Insights

"Utilization of intuitive insights" (p. 386) follows observation and is used to create hypotheses and aid understanding. Intuition is the ability to come to an

understanding after the experience. But there is not necessarily an awareness of the step-by-step logic creating the understanding. I needed to be able to trace assumptions that began as intuition back to the original source and justify their inclusion in the final product. I repeatedly asked myself, "Where did you get that idea"? and then looked for it in the data.

Intuition gives insight that informs grounded theory. My insights and understanding of the learners' interactions were verified by the subjects (the focus groups), repetition of the behaviors, and other behaviors. In addition, I spent time describing my understanding to my advisor, answering his questions, and determining if what I was observing fit into a whole understanding with what others had observed.

One of the more interesting challenges to me was the necessity of being two people at once. On one side I was a researcher/observer; on the other I was a student. On one side I had understandings that needed verification or refinement; on the other I needed to have a completely open mind. On one side I monitored my own responses to the environment; on the other I needed to behave naturally and reactively. I believe it was the interface between the halves that was the source of some intuitive insights.

Social Process

"Emphasis [is] on social process" (p. 387). There was a social culture at these distance education sites and I was a part of that culture. In quantitative research, the researcher tries to place limits on involvement with the subjects. In qualitative research, the researcher becomes involved in the social process.

Overview of Patton's Themes of Qualitative Inquiry

Patton (1990) said about the choice of research methodology:

> Rather than believing that one must choose to align with one paradigm or the other, I advocate a paradigm of choices. A paradigm of choices rejects methodological orthodoxy in favor of *methodological appropriateness* as the primary criterion for judging methodological quality. (p. 39, emphasis in original)

He then explained, "A qualitative inquiry strategy emphasizes and builds on several interconnected themes" (p. 39). He followed that statement with his 10 themes of qualitative inquiry and a description of each.

Naturalistic Inquiry

"Qualitative designs are naturalistic in that the research does not attempt to manipulate the research setting... [and] the point of using qualitative methods is to understand naturally occurring phenomena in their naturally occurring states" (Patton, 1990, pp. 39, 41). That was the purpose of my study, to understand the learner interactions in their natural state.

Inductive Analysis

"Qualitative methods are particularly oriented toward exploration, discovery, and inductive logic.... Categories or dimensions of analysis emerge from open-ended observations" (Patton, 1990, p. 44). That is exactly what happened: I went in to take a look at the learners' interactions and came away with an understanding of learner interactions in an audio-graphic distance education setting.

Holistic Perspective

"The *whole* phenomenon under study is understood as a complex system

that is more than the sum of its parts" (Patton, 1990, p. 40, emphasis in original). In order to get a whole picture, I needed to become part of the picture and see it from more than one vantage point. That is why I attended whole courses at different sites, at different times. For example, the first quarter I attended all of the science course at Bridger and then the second quarter I attended all of the English course at Central City. I wanted to spend time with entire groups of students over an extended time.

Qualitative Data

Qualitative data has "detailed, thick description; inquiry in depth; direct quotations capturing people's personal perspectives and experiences" (Patton, 1990, p. 40). Even with the encouragement to use thick description, it has been a task to choose only those items that best describe the study and the results of the study. Sometimes it seemed that every day was a new study.

Personal Contact and Insight

"The researcher has direct contact with and gets close to the people, situation, and phenomenon under study; researcher's personal experiences and insights are an important part of the inquiry and critical to understanding the phenomenon" (Patton, 1990, p. 40). I spent 5 months with the students in the Com-Net system, participated in class discussions, studied for exams, worried about what the instructors thought of me, and shared stories of events in our lives outside the classrooms with the rest of the students in this community. I interacted with the interacters and was one of them.

Dynamic Systems

Dynamic systems require "attention to process; assumes change is constant and ongoing whether the focus is on an individual or an entire culture" (Patton, 1990, p. 40). Patton added, "This perspective is nicely captured by the observation in the ancient Chinese proverb that one never steps into the same river twice" (p, 53). I never stepped into the same classroom twice. It was necessary to continue my contact with these students, to see them when it was sunny or snowing, to see them when they were prepared for class or unprepared, to see them when they were happy or angry, to laugh with them and worry with them.

Unique Case Orientation

Unique case orientation "assumes each case is special and unique; the first level of inquiry is being true to, respecting, and capturing the details of the individual cases being studied; cross-case analysis follows from and depends on the quality of individual case studies" (Patton, 1990, p. 40). In this study, each case is a course. The cross-case analysis is the answers to the questions derived from observations collected from all 11 courses.

Context Sensitivity

Context sensitivity "places findings in a social, historical and temporal context; dubious of the possibility or meaningfulness of generalizations across time and space" (Patton, 1990, p. 40). The findings of the study are cautiously limited to the Com-Net system at Utah State University. However, the findings can be used as a body of knowledge for other readers and researchers to compare their findings, to see if their case is similar to my case, to perform a cross-case, or cross-program

analysis. The findings of this study add information not found in the literature, but do not in any extensive way contradict findings from past research.

Empathic Neutrality

"Complete objectivity is impossible; pure subjectivity undermines credibility...the researcher includes personal experience and empathic insight as part of the relevant data, while taking a neutral nonjudgmental stance toward whatever content may emerge" (Patton, 1990, p. 41). This may have been the hardest guideline of all. Some of the students I grew fond of, some I disliked. Either way, I required myself to interact with them as I would if I were somewhere in the middle of a preference continuum. Some situations I wanted to fight from a stance of experience and having had a course which was beyond the course in which I was observing student interaction. However, I required myself to behave as I would have had I been "just another student" in that class. Finding the middle ground is sometimes as hard as finding the rope beneath the feet of a tight rope walker.

Design Flexibility

"Design flexibility stems from the open-ended nature of qualitative inquiry as well as pragmatic considerations. Being open and pragmatic requires a high tolerance for ambiguity and uncertainty as well as trust in the ultimate value of what inductive analysis will yield" (Patton, 1990, p. 62). The first few weeks in the field, I felt stress because I was not finding patterns, answers, or hypotheses. I tried creating these rather than waiting. A couple of early understandings were retained, but were not as elegant as ones that arose of their own volition later, after I relaxed a bit. The timing of this study was, for me, ideal. I had the interest of my sponsors,

but no money and little of their time invested. It was my primary task first to explore the process of a research project, and second to tell my sponsors and advisors what I saw. Having done this research and found interesting answers, I now find myself more willing to believe that something will come forth eventually if I keep watching.

Methodology Steps

The steps recommended by Borg and Gall and the themes of Patton both contributed to the methods I used to guide this study. There were a few items that each did not share with the other, but that complemented the other. While Borg and Gall discussed the human as a data-gathering instrument, Patton talked about the need for neutrality from the human observer. While Borg and Gall talked about purposive sampling, Patton talked about context sensitivity. And while Borg and Gall talked about subjects playing a role in interpreting the data, Patton talked about thick description. Both sets of components were my guides.

Validity, Reliability, and Objectivity

Borg and Gall (1989) said that "reliability studies give us information on the degree to which a measure will yield similar results for the same subjects at different times or under different conditions" (p. 184). They defined internal validity as "the extent to which extraneous variables have been controlled by the researcher" (p. 642), and external validity as "the extent to which the findings of an experiment can be applied to particular settings" (p. 649).

Kirk and Miller (1986) also defined reliability and validity; "'reliability' is the extent to which a measurement procedure yields the same answer however and

whenever it is carried out: 'validity' is the extent to which it gives the correct answer" (p. 19). Both of these pairs of authors discussed reliability, validity and objectivity as it is generally used in research that uses quantitative methodologies. Kirk and Miller summed up the problem with using methods devised for the natural sciences for the social sciences:

> As social scientists have come to recognize in recent decades, however, hypothesis testing is appropriate to only a small proportion of the questions they ask. Qualitative research has always retained the proper ideals of hypothesis-testing research--sound reasoning and the empirical risking of theory. But, in being intrinsically exploratory, it explicitly departs from certain strictures of the hypothetico-deductive model.... Relaxing certain of the narrow definitions of the hypothetico-deductive model, then, facilitates discovery of the new and unexpected. It would be an error, however, to drop the scientific concern for objectivity. (pp. 17-18)

Lincoln and Guba (1985) have, perhaps, the most straightforward methods for providing the assurances we needed. The four conventional concerns have been "translated" into four analogous terms. These concerns are credibility (internal validity), transferability (external validity), dependability (reliability), and confirmability (objectivity). In my discussion, I will use Lincoln and Guba's terms, but will parenthetically remind the reader and myself of the more common term. As with the subcategories of qualitative methodology outlined in the previous sections, I will again discuss how this study met the requirements of reliability, validity, and objectivity.

Credibility (Internal Validity)

There are five major techniques prescribed by Lincoln and Guba (1985) for achieving credibility:

> Activities increasing the probability that credible findings will be produced ... an activity that provides an external check on the inquiry process ... an activity aimed at refining working hypotheses as more and more information becomes available ... an activity that makes possible checking preliminary findings and interpretations against archived 'raw data' ... an activity providing for the direct test of findings and interpretations with the human sources from which they have come--the constructors of the multiple realities being studied. (p. 301)

Each of these techniques has one or more associated activities.

Activities increasing the probability that credible findings will be produced. Activities that increase the probability of credible findings are prolonged engagement, persistent observation, and triangulation. Lincoln and Guba (1985) described prolonged engagement as "the investment of sufficient time to achieve certain purposes: learning the 'culture,' testing for misinformation introduced by distortions either of the self or of the respondents, and building trust" (p. 301). I spent 5 months in this community of students to meet the requirement of prolonged engagement.

Persistent observation "adds the dimension of salience to what might otherwise appear to be little more than a mindless immersion.... If prolonged engagement provides scope, persistent observation provides depth" (p. 304). I was persistent. I attended 11 entire courses. This persistence resulted in nearly 300 hours spent in the classrooms, approximately 1800 events recorded in the field notes, and observations of at least 48 other students.

Triangulation has its origins in radio triangulation. Lincoln and Guba (1985, p. 305) credited Norman Denzin with identifying four types of triangulation: multiple and different sources, methods, investigators, and theories. As for triangulation, I observed multiple classes (sources). I kept field notes and conducted focus groups

(methods). I compared observations with others who have observed these students (investigators). I watched for confirmation and disconfirmation of my understandings and answers to the research questions (theories). I compared one idea about the interactions with other ideas.

An activity that provides an external check on the inquiry process. Lincoln and Guba (1985) called external checks peer debriefing. They described it as "a process of exposing oneself to a disinterested peer in a manner paralleling an analytic session and for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind" (p. 308). I did this two ways. I conducted focus groups and probed for their understanding of what happens in these classrooms. I also shared my insights with others who have been in these classrooms and taught other groups of students in these classrooms.

An activity aimed at refining working hypotheses as more and more information becomes available. Lincoln and Guba (1985) called refining the working hypotheses negative case analysis, and described this activity as "a 'process of revising hypotheses with hindsight.' The object of the game is continuously to refine a hypothesis until it *accounts for all known cases without exception*" (p. 309, emphasis in original). This is closely related to the idea of grounded theory. How this study met the requirements of grounded theory has already been described in the sixth of Borg and Gall's 10 characteristics previously discussed on page 39.

An activity that makes possible checking preliminary findings and interpretations against archived 'raw data'. Lincoln and Guba (1985) called the testing of findings against raw data referential adequacy. They credited Elliot Eisner as the first to propose this activity. This activity requires that some of the raw data

be archived for use later for comparing to the findings. As I began to describe my observations in the field, I kept the field notes handy to refer to, to be certain my explanations matched what I observed in the field.

An activity providing for the direct test of findings and interpretations with the human sources from which they have come. Lincoln and Guba (1985) called the testing of findings with the human sources a member check. They stated that "the member check, whereby data, analytic categories, interpretations, and conclusions are tested with members of those stakeholding groups from whom the data were originally collected, is the most crucial technique for establishing credibility" (p. 314). This was the purpose of the focus groups, to probe for confirmation or disconfirmation of my understandings and explanations.

Transferability (External Validity)

Lincoln and Guba (1985) argued, "It is, in summary, not the naturalist's task to provide an index of transferability; it is his or her responsibility to provide the data base that makes transferability judgments possible on the part of potential appliers" (p. 316). However, Guba and Lincoln (1982) identified two activities to provide transferability: theoretical/purposive sampling and thick description.

Theoretical/purposive sampling. Guba and Lincoln (1982) defined theoretical/purposive sampling as "sampling intended to maximize the range of information collected and to provide most stringent conditions for theory grounding" (p. 248). This sampling was designed to account for as much variability as possible. Even though the case in this study was the course, I tried to cover as many sources

of variability as possible in choosing the courses I observed. I varied department, size, time of day, number of meeting per week, site, and academic level.

Thick description. Guba and Lincoln (1982) described thick description as "providing enough information about a context, first, to impart a vicarious experience of it, and second, to facilitate judgments about the extent to which working hypotheses from that context might be transferable to a second and similar context" (p. 248). Thick description is one of the means for transferring informed knowledge from the researcher to the user. The goal is to give sufficient information for the reader to decide whether the information is useful. As I have already mentioned, thick description is provided in each of the subsections of the Findings section. I have also tried to provide a thick description of the process of obtaining the data in the Research Procedures section beginning on page 55.

Dependability (Reliability)

Lincoln and Guba (1985) stated, "Since there can be no validity without reliability (and thus no credibility without dependability), a demonstration of the former is sufficient to establish the latter" (p. 316). Only if the observations are dependable can there be credibility; however, dependability is possible without credibility. If the results are not credible, then dependability is not important. That is, if the reader does not believe the results, it is unimportant whether there is dependability. Even so, Lincoln and Guba did identify three activities that help establish dependability. Those activities are the use of overlap methods, stepwise replication, and dependability audit.

Overlap methods. Overlap methods are essentially triangulation again. Multiple methods are used to, as Guba and Lincoln (1982) explained, "produce complementary results" (p. 248). These methods are also a way to see if the same results can be disconfirmed. I collected information by observing, conducting focus groups, and paying attention to what other observers in both the Com-Net system and other systems had to say.

Stepwise replication. Lincoln and Guba (1985) stated that "'stepwise replication' [is] a process that builds on the classic notion of replication in the conventional literature as the means of establishing reliability" (p. 317). I observed groups of classes during two different terms. I observed a set of courses the first term, and then repeated the process by observing a second set of courses the second term.

Dependability audit. The dependability audit is based on the same notion as the fiscal audit. Guba and Lincoln (1982) described the responsibility of the researcher: "The auditor must of course be supplied with an 'audit trail' which delineates all methodological steps and decision point and which provides access to all data in their several raw and process stages" (p. 248). In addition to being willing to share my data and thought processes with interested researchers, I continually discussed the process and data with my dissertation chairman and to the best of my ability tried to let him read what was in my mind about this study. The data are available for other interested persons with the exception of any information that would identify the students, instructors, or technical assistants (TAs).

Confirmability (Objectivity)

Confirmability is the term Guba and Lincoln translated from objectivity. This method is used to ensure that the offered description is as accurate as possible. Again, Guba and Lincoln's (1982) earlier article was more precise in identifying the activities used in this method. There are three activities for confirmability: triangulation, practicing reflexivity, and the confirmability audit.

Triangulation. Triangulation has already been discussed above. It can be used again here as evidence for objectivity because of multiple sources of similar findings.

Practicing reflexivity. Guba and Lincoln (1982) described reflexivity as "attempting to uncover one's underlying epistemological assumptions, reasons for formulating the study in a particular way, and implicit assumptions, biases, or prejudices about the context or problem" (p. 248). Because a human is one of the discovery tools, the tool and its functions need to be understood. I prefer to use the term being reflective because that is a term that is more familiar to most readers. There were several occasions when I had to make decision based on my reflective understanding of myself as researcher. Whenever I had insights into myself as participant or researcher, I made a note of them on the field notes, in a file for that purpose, or sent thought papers to my advisor.

Confirmability audit. Guba and Lincoln (1982) described the confirmability audit as "a counterpart to the dependability audit, in which the auditor takes the additional step of verifying that each finding can be appropriately traced back through analysis steps to original data" (p. 248). The results may be shown to come from more than one source. As I have already described, I tried as faithfully as

possible to understand where my insights, understandings, and answers came from. As much as possible, I tried to trace them directly back to field notes and focus groups.

Research Procedures

In the discussion to this point, I have tried to list and describe those guidelines I used for this research study, guidelines that were the overarching structure for this study. In this next section, I will take the procedures of a field study and use them as the framework to discuss the details of the study. I will discuss both the specific activities I used in my attempt to answer the research questions and the details of the physical and social setting of the study. I will discuss the procedures I used following the organization of the steps described by Adams and Schvaneveldt (1985). All the names of students, instructors, administrators, technical assistants, and receive sites have been changed to maintain confidentiality.

Entering the Field

One of the distance education delivery systems used by Utah State University is the Com-Net system. With this system, live instruction for 45-50 courses each term is carried out through audio-graphic teleconferencing. There are typically two classrooms at each of the 23 sites, one classroom for each of two networks, A-net and V-net. Not all the sites are receiving instruction at the same time. Only those sites with students attending for a given course are connected

while the course is delivered. The classes and classrooms are monitored and technically facilitated by technical assistants (TAs).

Instruction is delivered via voice and visual information. The audio transmission of the instructor's voice is carried on regular phone lines. The visual information is transmitted via a network using the MessageBoard created by LiveWorks (tm) commonly referred to as the Live Board. This Live Board can be used to transmit visual information from any site on the network to all the other sites. During this study, it was rarely used by anyone other than the instructor, and most instructors used it only as a writing board because the band-width of the transmission lines available to the network was inadequate for more sophisticated uses. It is possible, and did happen, that either the audio or visual portion of the system can fail, leaving the other portion usable. Generally the instruction stopped while the portion of the system that failed was returned to operation.

Some of the classrooms have a large screen, approximately 3 feet by 4 feet, which can be controlled and written to by a special pen. Some classrooms have only a television monitor connected to a computer, and a few have no visual contact at all. Each of the big screens or television monitors is connected to a computer that is connected to the network statewide and runs the MessageBoard software to display the visual information. Those units without the big screen and pen can input information to the system using the computer's keyboard. The equipment is being upgraded as it becomes feasible. Either classroom, at any site, may receive either A-net or V-net transmissions. This makes it possible for the site administrators and TAs to use the classroom with the best equipment for those instructors who make the most use of the visual capabilities of the system.

A single speaker is used for the audio portion of the instruction. Students interact with the instructor and students at other sites by pressing a switch on microphones on the tables in the classrooms.

A majority of the instruction originates from Utah State University in Logan, Utah, but some instruction originates from a few other sites that are normally receive sites. Multiple departments provide graduate- and undergraduate-level instruction. Some of the classes are held once per week, some twice per week, and a few are held three times per week. Classes are held during the day and the evening.

I observed 11 of the courses offered by the Com-Net system during two consecutive terms. Table 5 summarizes some of the basic information about the courses I observed. The information contained in the table will be discussed in more detail in the following sections.

The Observed Receive Sites

I attended classes at four receive sites in Utah. I will call these sites Woodruff, Bridger, Fremont, and Central City. Most of the classrooms are stark or dreary. The light level is typically kept low to assist the viewing of the screens, and the walls are generally plain and white or light beige. Students sit at long tables that hold the microphones, and there is little other furniture in the room.

Table 6 summarizes the delivery equipment at each site. The A-net or V-net room designations note the room used most often for that network. As mentioned earlier, sometimes a room would be used for the other network, depending on the instructor's use of the technology.

Table 5

Demographic Information About the Courses that I Audited

Course	Course level	Class size	Start time	Times per week	TA	TA visible	Site
Agriculture education	Graduate	3	3 p.m.	1	Elaine	no	Fremont
Art	Sophomore	2	8 a.m.	1	Elaine/ Jill	no	Fremont
Business	Junior	2	1 p.m.	2	Jill	no	Fremont
Elementary education	Senior	2	5 p.m.	1	Sally	yes	Bridger
English	Senior	9	1:30 p.m.	1	Dean	yes	Central City
History	Senior	3	11:45 a.m.	2	Stan	yes	Woodruff
Human env.	Graduate	3	3 p.m.	1	Jill	no	Fremont
Math	Freshman	8	8 a.m.	2	Pat	yes	Woodruff
Psychology	Junior	11	8 p.m.	1	Laura	yes	Bridger
Science	Freshman	10	8 a.m.	2	Laura	yes	Bridger
Sociology	Senior	6	8 a.m.	1	Pat	yes	Woodruff

Woodruff. This site is used as a send site for a majority of the courses and is on a university campus. The classrooms are at opposite ends of a building and have no windows. Both classrooms have the large screens.

The TAs were present in the classrooms for nearly the entire class periods. They generally sat at a desk in the rear of the rooms and read or studied for their own classes. The TAs at Woodruff were responsible for the coordination of all the

Table 6

Equipment at the Four Observed Receive Sites

Site	A-net	Number of A-net classes attended	V-net	Number of V-net classes attended
Woodruff	Large screen	2	Large screen	1
Bridger	Large screen	1	Television	2 (one switched networks)
Fremont	Television	2	Television	2
Central City	Large screen	0	Television	1 (switched networks)

sites to access the network, and so they had to be present at all times in case there were technical difficulties.

The A-net room at Woodruff is about twice as large as the V-net room. Both rooms are equipped with older tables and straight-back padded chairs. The A-net room has three rows of four to six tables each from the front of the room to the rear with an aisle between the rows. Each table is intended for two students and has a microphone. The V-net room has four long rows of tables stretching across the room with one aisle down one side. During my observations, the microphones were spaced throughout the room, but tended to migrate to areas where the students grouped themselves.

Bridger. This site is in a shopping center on the edge of a small town. About one half of the stores in this shopping center are vacant. The classrooms are positioned so that they share a common rear wall. There is a sliding-glass window connecting the two rooms, and the TA's desk is in the V-net room. The TA can respond to both rooms from that desk.

Bridger was the first site I observed to direct the instruction from one network to the equipment in the other classroom. This happened because a course was scheduled to be held in the V-net classroom with the television screen during a time when the A-net room was not in use.

Both rooms have two rows of tables from front to rear with an aisle down the middle. Each table has at least one microphone. The A-net room is slightly larger than the V-net room and has five tables in the row closest to the door and six tables in the other row. The V-net room has four tables in each row and the TA's desk in the rear.

Fremont. This site is in the basement of a busy downtown shopping center in a small city. The front of each classroom shares a common wall, and both classrooms have only the television monitors connected to a computer. Near the doors to the rooms is a small office with a sliding-glass window to each room. This was used by the TA during the first term I observed at that site. However, the TA's office was moved to an office across the main reception area. Students had to leave the classroom to get the TA if there were difficulties with the delivery system. The office originally used by the TA became a student room with a sofa and telephone.

One of the first courses I observed at this site was in the A-net room and the instructor was present and originating from this site. Because this classroom did not have the big screen and pen, the instructor used the computer keyboard to write information to the system. She typically prepared a computer file of information for the class session ahead of time to use during the class period.

Both rooms have four long tables in two rows each direction and a total of two microphones in each room. These microphones were typically on the two tables in the front, but they could be moved to the two rear tables. The rooms are large and the tables and monitors take up less than half the area in the room. Computers on carts were wheeled in for classes that required computers. There are connectors in the walls to connect the computers to the local area network for using printers, and connecting to the Internet. From this location, I was able to read and respond to my e-mail on my university account. I discovered, as this study progressed, that I was behaving as many of the other students did who had e-mail at school. There were several students who used the opportunity provided to them to communicate with friends and occasionally instructors using their student e-mail privileges.

In addition to the windows to the original TA's office, both classrooms have a window to the outer, main reception area. The V-net classroom has a large rear window to a public area that is shared with another university's distance education classrooms.

Central City. This site is in an office building across a busy street from an industrial park in a large metropolitan area. The A-net room is twice as large as the V-net room, but both rooms have two rows of tables with an aisle down the middle. Central City is the only site of the four that I observed that had windows to the outdoors. The windows provided a sense not being isolated in these rooms, but were occasionally a distraction. Both rooms also have a window to the room used by the TAs. Their room contains the computers used for computer courses and the V-net room is accessed through the their room.

The microphones in the A-net room migrated around the room because some of them were not working. The more vocal students moved the working microphones nearer to themselves, rather than moving themselves nearer to the microphones. This custom resulted in a criss-crossed tangle of cords draping from table to table around the room and in the aisle.

The TAs at Central City easily switched the delivery system from one room to the other. The big screen is usually used by A-net, but was used by V-net for the course that I observed. During another term, I observed a course at Woodruff while the instructor taught in Central City's A-net room, and he wrote directly to the large screen with the pen.

Administrative Details for Getting Registered for Courses

The Assistant Vice President for Extension and Dean of Continuing Education approved and encouraged this project and served on the advising committee. During the first term of my observations, I sent him a weekly report of the students' reaction to new technology that had been introduced that term. In return, he gave me insights into the technical aspects of the system.

In order to avoid alerting the instructors, students, TAs, and site administrators that there was an observer, I was registered as an auditing student. We also wanted my name on the instructors' class roles so that I could be free to participate in the courses. Because I was also an employee of Utah State University at the time, my audit credit fees were included in my benefits package. In order to keep the audited courses from appearing on my transcript, my chairman and I

worked with the University's registrar. The registrar placed my name on the class roles and then, after the class was over, he removed all traces from my transcript.

I had very little interaction with the administrators of the sites themselves. The administrator of Woodruff knew that I was there, but as far as I know, did not know which student I was. Because he was largely responsible for the implementation of the new technology, the weekly reports that I sent to the Dean of Continuing Education were shared with him by the Dean. I knew, from another context, the administrator for Bridger. She was at the site one day and did not recognize me. After a few weeks, the administrator at Fremont would nod and acknowledge my presence as he did all the students. The administrator for Central City helped with some of the equipment in the classroom and interacted informally with all the students in that course. I did not have to explain my presence to the administrators, or seek their assistance in any way.

The students, TAs, and instructors who asked, were told that I was auditing classes. If they pressed, they were told that I was planning to write a dissertation in the area of distance education and my committee chairman and I thought it would be a good idea for me to have some experience in the classrooms to see what it was like to be a distance education student. Table 7 lists how much I had to reveal.

Gaining and Building Trust

In order to gain rapport and build trust, I wanted to appear to be a typical student. I chose to audit rather than take courses for credit, so that if I had to choose between using my time for homework or the procedures of the field study, the field study could take precedence. As noted earlier, I had a plausible cover

Table 7

Level of Disclosure of My Motivation for Attending Courses

Course	Level of disclosure
Agriculture education	TA and students knew I was auditing for experience
Art	TA knew I was auditing for experience, but student didn't
Business	TA and student knew I was auditing for experience
Elementary education	TA and student knew I was auditing
English	Only a couple of students and the instructor knew I was auditing
History	TA, instructor, and students knew I was auditing
Human Environments	TA, instructor, and students knew I was auditing for experience
Math	TA knew I was auditing, one student knew I was auditing for experience
Psychology	Some of the student knew I was auditing, TA knew I was auditing for experience
Science	TA knew I was auditing for experience
Sociology	TA knew I was auditing

story. I did, however, have to do enough of the work to appear to be interested in the content of the course. As a participant/researcher, I needed to experience what it was like to be one of these students. I also needed to appear somewhat knowledgeable if I was called on during class, which did happen occasionally.

I believe that if I had attended classes for an additional term that there was a likelihood that my motives would have been discovered. Some of the TAs were realizing that I was taking a lot of classes, that I was a graduate student, that I was

attending multiple sites, and that this began immediately after new technology was introduced. I do not think that they would have guessed the object of my observation, but would have suspected that I was observing something.

I had a variety of interactions with the people involved in this system. These people were the administrators, instructors, TAs, and students. I have already described my interactions with the administrators.

Interactions With the Instructors

My interaction with the instructors ranged from none to face-to-face interaction. In 9 of the 11 courses I voluntarily participated, at least once, with answers or comments during class time. Two of the instructors asked me about my status when I did not appear on their first class role. One instructor called on me more than once without warning. One instructor took attendance every class period. In one case, another student and I stayed after class to discuss a recent development in the content area with the instructor. There were no questions from instructors about whether or not I was actually a student. I did not observe more than one class taught by the same instructor. Table 8 shows the course for each instructor and the form of interaction between myself and the instructor.

I decided to stay in one class at Fremont after the instructor decided to originate from there, even though in this case, the instruction was not at a distance. I originally thought that this would give me a unique opportunity to see how much could be discerned about the students at the other sites. I was able to do that, but in addition, I attended another class the following term with the same group of students at the same site when the instructor was originating from Woodruff. This gave me

Table 8

Summary of My Interaction With the Instructors

Course	Form of interaction
Agriculture education	I volunteered a few times during class time.
Art	No interaction. Took in-class exams, but did not turn them in.
Business	I volunteered a few times during class time, took in class quizzes and exams, sent her an e-mail about why I was not turning in assignments or exams.
Elementary education	Instructor asked me about not being on his class role. I volunteered a few times during class, took exams but did not turn them in. He once asked my why he had not received an exam from me, and I told him via the microphone that I was only auditing and took the exams for my own learning.
English	Responded to class attendance. Early in the course she was listing those who had not turned in an assignment, I was on the list. The next day I left a phone message for her about my audit status. Volunteered only a few time during class time.
History	I participated in the class discussion of a book. The instructor was noting who had responded so that he could call on them later. I responded a couple of time early so that he would not call on me at the end.
Human environments	This instructor was in the classroom, so there was verbal as well as nonverbal interaction. The instructor visually encourage the students at her site to participate with the microphone, mostly by pointing to the student, then to the microphone.
Math	I took in class quizzes, but did not interact on the microphone.
Psychology	At the beginning of one class period, this instructor let me know that I was not on his role. I took all in class exams.
Science	I volunteered in class. Another student and I stayed after class one day to discuss a topic that had been on public TV earlier in the month. I took all in-class exams.
Sociology	I both volunteered and was called on. I took all in-class quizzes.

the opportunity to observe the behavior of the same group of students with and without the instructor present. The content of the classes was also similar.

Interactions With the TAs

I had regular interactions with seven TAs; two each at Woodruff, Bridger, and Fremont, and one at Central City. I have given fictitious names to each of the TAs to protect their anonymity. Information about the seven TAs and the courses that they facilitated is included in Table 5.

Pat at Woodruff. I think that this TA suspected that I was observing. Of the six TAs who knew that I was auditing, she and Stan did not ask why. Stan interacted very little with the students, and so, did not ask me any questions. A few times Pat grinned at me sheepishly when there were difficulties with the system.

Stan at Woodruff. Like the other TA at this site, Stan was in the room nearly all the time, but unless there was difficulty with the system, he was doing homework, sometimes with a friend. He did not interact much with the students.

Laura at Bridger. This TA was very involved with the students. She was very talkative, and knew about many of their families. When I first met her, she asked a lot of questions about me, then became friendly. After she had discovered that I was coming down from Logan, she would ask about the weather and the driving conditions. She grew up in my neighborhood and told me stories about the house I live in and some of my older neighbors. I encouraged her, because she would also share insights into the Com-Net system and other students. She was a great source of information. Even though she knew that I was auditing for experience, she seemed to accept me as a student and commiserated with me about the

assignments and exams. As a student, I felt cared about by the institution and less isolated. Laura was the mother to the students in the courses that she watched over.

Sally at Bridger. This TA behaved more like a proctor than Laura did. She was also a TA at Fremont when one of those TAs was absent due to an injury. She was pleasant and somehow already knew that I was coming from Logan. She also knew that I was auditing a class at Fremont. Her method was to respond to events in the classroom, but not add to them the way Laura did. She never questioned my motives or asked me any other questions about myself.

Jill at Fremont. This TA had more responsibilities at Fremont than being a TA. She volunteered her opinion of the new technology, and had a good attitude about the frustrations. She broke a leg early in the second term that I observed and was out for a couple of months. She returned only a few weeks before this field study was completed. She is the one who showed me how to get into the local area network so that I could connect to my e-mail. She was aware that I was taking at least one class at Bridger and Central City because at times I was either coming from one or leaving for the other. Because both of these terms were during the snowy season, she talked about the roads with me. She followed up on my cover story to ask if I was sitting in other sites, too, to see how sites are different.

Elaine at Fremont. Elaine was the TA only while Jill was out with her broken leg. She was intimidated by the computers and asked me for my assistance at times when the system went down. I had volunteered the first time when I could see that she was becoming frustrated. Before I volunteered, I asked myself what I would have done if I were really a student at this particular site. She and the other two

students knew that I was computer literate, so it would have seemed out of place to not offer to help. Elaine's main responsibility at this site was receptionist and secretary.

Dean at Central City. This TA moved slowly and deliberately. The first day that I was at this site, he followed me into the classroom and made sure that I was supposed to be there. At first he scowled at me and took his time managing the technology and paperwork for the students. He is hard of hearing and wears two hearing aids. I took him as a challenge. I do not know if he signs, but one day we needed a curtain closed in the classroom so that we could see the screen. Dean was standing in my way, looking quizzical and challenging. I told him that I needed to close the curtain and at the same time, I signed a manual expression for the curtain closing. He did not respond directly to the sign, but stepped aside to let me close it. From that day on he smiled when I entered the site and never questioned me again. Would I have done that as a student? Absolutely. As a student I wanted as much assistance and easing of a difficult situation as possible.

Interactions With the Students

Having been a student for so many years, it was easy for me to fall into the familiar behaviors. Not having to concentrate on my own behavior as much as perhaps I would had I been on unfamiliar turf made it possible to spend more concentration on observing others' behaviors. At first, I was very aware of possibly being caught, but then as I was accepted, I found myself from time-to-time losing myself in the role. In one instance I found myself wishing a group of students would be quiet so that I could hear the instructor. I had to think before acting to be sure

that I did not unduly influence the class, yet as a participant/observer, I also needed the feeling of being a participant.

The interactions with the other students varied from being nearly anonymous to being asked by fellow students to take more courses with them because we had so much fun together.

The agriculture education and human environments courses. The two students and I who were in the human environments course the first term continued on the next term in the agriculture education course. I will call the other two Anne and Judi. Both of them are close to my age, and they are teachers. The first term in human environments, the instructor was in the room, and we interacted as much with her as with each other. The second term in agriculture education, the student group was much more vocal in the classroom. The most common interaction involved expanding on what the instructor was saying. But, frequently the conversation strayed to what was going on in our professional and personal lives.

One especially rowdy day early in the second course with these students, Anne turned to us and said, "I had this horrible thought the other night. What if Beth is here to see if students pay attention in class!" Judi immediately responded, directing her comments to me but teasing, "So, you're a plant, a spy!" I felt color rising and managed to somehow remain outwardly calm as I responded, "Hey, I'm not paying attention either." I am not sure they were convinced. The last day of class, Anne grinned as she reminded me to change their names when I wrote about them. I reminded her that we had already talked about whether I was a spy or not. That was the closest I came to having my complete purpose discovered and revealed. These two students had been attending classes together for a few years

and even knew by sound some of the other students at distant sites who were in their program. I am sure that my behavior was somewhat different from those they were accustomed to. Since the end of this study, I have met Anne on the university campus a couple of times. Once, she joined another friend and me for lunch as she was passing and saw me. She has not asked about research, but has each time urged me to come take the course with her that she is taking at Fremont.

The art course. I attended the first art class period at Central City, but I was the only student there. Because it would be difficult to observe myself interacting with myself, I changed to Fremont. The only other student at Fremont had been alone. When she walked into the classroom and saw me, her shoulders slumped and she only mumbled a hello. Our interaction only improved slightly after that. During each class period, we usually only said a few sentences to each other, and those were usually remarks about the instruction, where in the text we were, or the response of another student at another site.

The business course. The other student in this course and I could have become good friends if I lived in her area. We had a lot in common. This was the first of a few other students that I could have been friends with. This raised, for me, the difficult issue of friendship in research. I was afraid that if I pursued a friendship, I would eventually feel compelled to reveal the study.

This class was a hands-on class and each of us had a computer to use. When either of us got lost, the other would tell her what to do to catch up. We would occasionally respond to the instructor on the microphone. We would hear a question with an obvious easy answer and one or the other of us would grin at the other, lean over, key the microphone and rolling our eyes with mischief, answer with

a straight voice. Both of us were computer literate, so this was not a difficult class and taking notes would have been obvious, especially to her.

One day she commented to me about the difference between our interaction and the interaction between the students in another business class that she attended at the same site. She was the only female in the other class. She made the observation that in our class we worked together as a team of individual students, but in the other class one student would not voluntarily help another and in fact were competitors. She was trying to figure out if the difference was with the students or the content of the course.

The elementary education course. Interaction in this course was required, but I participated with the single other student only as much as was necessary. Interaction with her was very time consuming. Her study processes were slow and deliberate, but she eventually reached an acceptable conclusion. Her common response to making decisions about how to spend class time was to look to me for guidance. My response was to ask her what she wanted to do. She would usually stare at me for a few unnerving seconds, but when I failed to give in and tell her what to do she would do something appropriate. I had to slow my normal pace to be able to interact with her in her world.

I volunteered that I was auditing to avoid doing the final project with her. I felt that my level of interest, the amount of time required to work with her, and the distance to the site would be more than I could accommodate given the amount of time that the other classes required as well. Another consideration was that this research was about interaction in the classroom, and much of this joint project would have taken place outside the classroom.

Because she was taking the class for credit, I believed that ethically it was best for her to do the project alone. There were other students at other sites that did not have more than one student who also did the project alone, so she was not penalized by my decision. I did look over her work and made some suggestions for cosmetic but not content changes.

The English course. The students in this course were the rowdiest of all the groups of students. From what I could hear over the system from other sites, during other classes, I believe Central City is probably the rowdiest site of the four that I observed. The instructor took attendance in this course. If a student was not present, but we knew she would be late, we informed the instructor. Usually, after attendance was taken, one or more of the students would leave for the day.

The students in this class could be classified into three types. There were those who were there for the instruction only, and interacted very little with the other students. The largest group of students were those who were there for the instruction but also for the fun. Then there were those students who were there only to get the credit, and mostly to have fun. I tried to fit somewhere between the first group and the second group. My usual behavior was to appear to be taking notes, but to play with the others when I was drawn in and most of the other students were playing. Class participation was noted for credit, so the usual practice was to make sure to say something during part of the discussion, then the remainder of the discussion was ignored. The last two class periods of the course, I could not hear the instructor for a majority of the class time because of the other conversations in the classroom. During those two classes, I patterned my behavior after the rest of the students. I would have seemed out of place if I had remained rigid.

Taking notes and changing the cassette tapes, which were used for backup to my field notes, while socializing became another unique challenge. My method was to make notes about what had already transpired when there was reason to seem to take notes on the content of the course. My tape recorder shut itself off automatically at the end of a tape, so it usually seemed natural to nonchalantly reach over and fix the tape. It would appear that if I was not paying attention, at least I had the tape to listen to later.

The history course. The first day, I was afraid that I would be alone, but another student joined the class the second week. This other student was fascinated by this method for taking classes. She had never had a distance education class before. Her major was history, so she participated in the statewide class discussion using the microphone quite a lot as well as sharing her knowledge with everyone else in the room, including the TA. Her mannerisms were very enthusiastic and active. She seemed to bounce throughout the class period and from the first day broke all the conventions about classroom behavior. She typically sat at the end of one of the tables, or on a table, or facing the rear of the room. She involved everyone in her surroundings in her experience. During week four, another history major joined us. This student became ill and missed nearly all of the last two weeks of the course, but did finish the course with the help of her mother, and the other history major. Those two students worked well together.

Because this course was on campus, they knew me as a staff member who was interested in this particular topic in history who was auditing a class during lunch time. I did not clarify their assumption. Because of their impression of me, my role was the older, professional woman who was only slightly educated in history, but

interested in the time period covered by this course. Therefore, they expanded on events for me, but mostly talked between themselves comparing what we were learning with what they already knew.

The math course. There were seven other students in this course. Two or three of them consistently came late, left early, or did not come at all. Those students sat near the door. I was on the opposite side of the room, so I did not have any interaction with them. There were four students who attended more regularly and sat closer to me. There was another student who sat near by, but she dropped the course after a few weeks.

Heather was a young woman who had difficulty getting up early in the morning for class. She typically wore a baseball cap to cover her hair and frequently fell asleep. Many times when she awoke she would look around to see what was happening and then get up and leave. Her interaction with me was to complain about how difficult it was to have a class this early. She eventually dropped the class.

Libby was a young woman who was serious about being in this course. She began the course sitting across the aisle from me. Megan was a young woman who had to be out of town quite a bit early in the term, and tried to get others to take care of her. The other students ignored her and the TA became firm with her. When her behavior did not get the results she wanted, she sat down with Libby across from me, shifting Libby to the other end of the table. Libby and Megan worked together before and during the class periods for the remainder of the course. Megan became an equal partner in that working relationship. They would interact with me only when they wanted to know about an assignment or test due dates and papers being

returned. They would also turn to me if they missed something that came over the speaker.

Donald was a friendly young married male, who was not proficient in math. He tried a couple of time to join Libby and Megan, but they ignored him, and he gave up. I sat one row back from the front of the room so that I could see the other students, but had to put my tape recorder on the front row. The position of the tape recorder was recommended by the TA, so it would have seemed stubborn if I had kept it with me. If I had sat in the front with the tape recorder, I could not have seen the other students. Donald migrated around the room during the course. For a couple of weeks he sat at the table that held my tape recorder. When the tape ran out he would turn to me, smile, then reach over and flip the tape. He also tried to form a working partnership with me, but I did not encourage it. I thought about letting it happen, but first, I would never have formed a partnership with him if I were truly a student, and second, I did not want him reading my field notes over my shoulder. He tried a couple of time to see what I had written about what the instructor was saying. As it turned out, he tried to form a working relationship with Libby and Megan and they ignored him. Thus, my behavior toward him was like the rest of the students.

The psychology course. These students were the second most rowdy group of students. There were 10 students besides me. Class was held at night, and these students were surprisingly physically and mentally active for that late. There was nearly always something going on in the class room in addition to the instruction. The attitudes of the students ranged from very serious to sarcastic. I positioned myself as interested in the material, considerate of the instructor, but still

with a good sense of humor and energetic. Few, if any, of the students knew that I was auditing. I sat with my tape recorder in the back left corner of the room where I could see everyone. I was one of two people who taped the class.

I had the most interaction with a woman about my age, Sherry, who is a homemaker getting her degree slowly while she raises her children. This was her first psychology class, and the instructor let her remain in the course even though she had not completed the prerequisite. She was fascinated by the content and discovered that I would point her toward information that she needed to fill in the holes in her understanding. Those holes would have been filled if she had already had the prerequisite course. Sherry was active on the microphone with questions, and examples from her life. Even when others were hostile toward the instructor, she remained enthusiastic.

I tried to maintain a position in the class closer to Sherry than the other students, without closing off my connection with those who were hostile and bored in the classroom. It was easy for students to ridicule the instructor, so I tried not to encourage or join, but not criticize their behavior. Most of my daily interaction with the other students was the usual student behavior of commenting on assignments, passing things around, comments about events outside the classroom and occasionally clowning around.

The science course. The classes for this course were held in the same room as the psychology classes and had nearly the same number of students. I sat in the same place, in the back of the room with my tape recorder.

Classes were held early in the morning, and the students were more serious about the material than the students in the psychology course. Because the

students were more serious, there was far less off-topic interaction between the students during class time.

Like the psychology course, one of the students, Rose, moved back to join me at my table. She was working on a business Information degree at Bridger. She and I formed a team when assigned tasks to do in class. We helped each other understand concepts, and keep track of where we were in the text.

Late in the term, some of the other students discovered that I was doing well and understood the material, so occasionally they would turn to me for a quick explanation. I was aware of my responsibility to be sure that I knew what I was talking about. Before answering, I asked myself how sure I was of my answer. I had to be more sure in answering the other students than I would have been to answer only for myself, or to answer students in a class that I was taking for academic credit and not observing. I did not want my interaction to be detrimental to the observed students.

The sociology course. Five other students were senior-level students taking a course in their major, and as a group they were more serious and silent than average. There was almost no interaction going on between the students, and between the students and the instructor. I was possibly the most interactive student in the room.

The instructor tended to call on students by name, or to call on someone from a specific site to answer. Whenever I got called on, I answered and did fine. When Woodruff, where I was observing, was called on, no one wanted to answer. I tended to volunteer to answer if the question was about things like the weather and

how many students were present. But I tended to only answer content questions if I was called by name.

Early in the term Woodruff was called on with a fairly easy content question. I looked around and no one was answering. I could have answered, but chose not to dominate the microphone. So, when I could see that no one would, I pointed at another student in the classroom and he answered. I believe that because, to that point, I had been the only one in the room to answer a content question, he felt that I had some authority to demand that he answer.

Because I was willing to participate, I became a leader. This made me a little apprehensive because I do not know what would have happened if I had not been there. However, it is possible that if I had not been there, someone like me would have been in a class like this one. A small part of this research was also to see how I saw myself as a student in this situation. If I had imitated the behavior of the typical student in this classroom, I would have had to do some extensive acting.

During one class period, we were given the task of forming pairs and playing a game. Interaction between the students ended immediately after the game was over.

Obtaining and Preserving the Data

There were two forms of data, field notes and tape recordings of the courses and the focus groups. Information for this report of the project are taken mostly from the written field notes and supplemented by information that I received in the focus groups. The tapes were archived to be used in case my notes were lost. They may

also be used in future research provided that the researcher is interested in only audio information and will maintain the participants' anonymity.

Field Notes

In some of the courses it was possible to keep minute-by-minute field notes. In some, due to the nature of the class or course or the nature of the lecture, it was more appropriate to keep notes on notable events but not about minute-by-minute specific behaviors. In courses with fewer students, it was more difficult to conceal continuous note taking. In courses where the instructor used a lot of student interaction or told stories, or went on long rambles, or built concepts, it was also difficult to take continuous notes. In those cases where continuous note taking was not possible, I took quick abbreviated notes to myself. I tried as much as possible to save thoughts to write when the instructor made a point that would seem to other students to prompt a note, then I wrote field notes.

In some courses certain behaviors were so ubiquitous that it was impossible to record each event. In those cases, I noted that the behavior was on going, and noted exceptions to those behaviors. For example, in the English class, there was so much constant socializing by nearly everyone, that it was impossible to record who was talking with whom. In addition, I was included in the social interaction, and it would have seemed out of place to take notes when I was obviously not listening to the instructor. Each of the courses had its own culture and so the form of the notes and my ability to record notes tended to be consistent during the term. Table 9 indicates the form and influencing factors of the field notes for each course and

Table 9

General Form of the Field Notes and the Influencing Factors for the Precision of the Field Notes

Course	Form of field notes	Influencing factor	Ranking of specificity of field notes
Science	Specific behaviors	Size and activity	11
Math	Specific behaviors	Size and activity	10
Sociology	Specific behaviors	Activity	9
Psychology	Specific behaviors	Activity	8
History	Notable events - fairly specific	Size and activity	7
Art	Specific behaviors	Size	6
Agriculture education	Notable events	Size and activity	5
Elementary education	Notable events	Size	4
English	Specific behaviors as possible	Activity	3
Human environments	Notable events	Size, activity, and instructor	2
Business	Following class period	Size and activity	1

my ranking of the depth of the information in the field notes, from 11 being the highest to 1 being the lowest.

Reflexive (Reflective) Notes

Notes to myself about my responses to the experiences and general observations about the situation were written alongside the field notes, and written to a computer

file while I was working on the field notes. I have tried to report on my thinking and responses as I report on my observations.

In addition, I wrote eight short pieces that I called sidebars to integrate what was happening to me in the outside world with the world that I was observing. These pieces helped me to explore how being the observer and performing qualitative research influenced me. All the sidebars are descriptions of actual events that took place on the many long drives to and from the field. The descriptions were then related to the research experience. These pieces originally began as a sharing, via e-mail, with my advisor of experiences that interested me and seemed related to the field experience. A copy of the e-mail sidebars and the original thought piece that introduced them is in Appendix A. A few words have been changed to disguise the locations of the receive sites.

Audio Tapes

The audio taping was probably the easiest and least useful part of the whole project. It is not uncommon for students to tape in these classes. As long as I was consistent, no one seemed to notice. There was only one time when anyone wondered. This happened the last day of the English course. As I turned on the tape at the beginning of class, the student in front of me asked, "This is the last day of class and we don't have a final, why are you taping?" I responded, deliberately looking sheepish, "Habit, I guess", but I did not turn off the tape. Shortly after that, the students who remained in the classroom moved to the other side of the room. I moved with them, but left my tape recorder running at the other table. I managed to change tapes without apparently being noticed.

There were only a few glitches. One time I forgot to push the buttons on the tape recorder until 45 minutes into the class. Another time, I had the tape recorder on during an exam, and was afraid that I would alert the other students when I turned it off, so I simply pulled the plug and put it in my briefcase.

There was one occasion when the tape recorder made another student nervous. This happened in the psychology class. The student sitting directly in front of me had turned around and was complaining about the class and the instructor to Sherry and me when the tape recorder reached the end of that side of the tape and clicked off. She jumped and asked if what she had just said had been on tape. I replied that yes, it was on tape, but nothing to worry about and proceeded to change the tape. She looked a little suspicious but continued with her complaining.

Focus Groups

Focus groups or interviews were conducted with the site administrators as a group and with instructors, students and TAs at three sites where I had not attended courses. These additional sites were Clifton, Buffalo Creek, and Claymont. The questions used for these focus groups are in Appendix B. All the focus groups were taped and I took some notes. Students, instructors, and TAs were assured that their comments would remain confidential, and that only I would hear the tapes, and that if necessary my advisor might hear them.

I arranged with the site administrators to have focus groups brought together at three sites. Clifton is in a small community. There are two small cities close together that have a regional education center. Classes are not only held using the Com-Net system, but there are instructors in residence at that site. Instructors from

the university campus are also sent to this site on a weekly basis. They either drive or are flown in the university's airplane. Buffalo Creek is in a town that began as a mining town. There is a community college there and the receive site is on that campus. They are careful not to compete with the local college. Claymont is a small town a few miles from a major metropolitan area. There is a regional education center there that shares a building with a vocational center.

I requested that the administrators try to form groups of five to eight people for the student groups, as many as possible of the TAs because there are few TAs at each site. There are no resident instructors at Buffalo Creek so I only asked for instructors at Clifton and Claymont. I asked that the instructors not be instructors who had taught courses that I had observed. Asking and receiving are sometimes unrelated as I discovered when I arrived at the sites. Table 10 lists information about the focus groups.

Administrators. The administrators gather together on the university campus at least once each term. During one of these gatherings, I was allowed time for a focus group. I had an experienced peer conduct this focus group for me, because several of the site administrators knew me as a student at their site. Three more of the administrators had been instructors of courses that I had attended. With this focus group facilitator, I sent my tape recorder and hired a note taker to go along.

The Dean of Continuing Education had arranged for me to speak with the administrators of the three sites where I wished to conduct the other focus groups after the administrator's focus group was conducted. However, after the focus group, the administrators had a few more items on their agenda that needed to be covered before they broke for lunch. Consequently, I had to walk into the room with

Table 10

Overview of the Instructor, TA, and Student Focus Groups

Site	Instructors	TAs	Students
Clifton	5 (three taught courses that I had observed)	3 (one had been a student)	8 (one was also a TA)
Buffalo Creek	1 (unplanned and volunteered by site administrator)	1 (and one in the student group)	7 (four in a group with one TA) and two groups of two students each with one of the students being the same person.
Claymont	2 (the site administrator and an instructor who taught one of the courses that I attended	4 (two married couples)	12 (all from a class that met after lunch--some came late and one left early)

the entire group present. This was the instant that this became no longer a covert research study. Now, I and everyone else could talk about it.

The first person to speak to me when I walked into the room was the site administrator from Bridger. She and I had been in a graduate class together many years before. The site administrator from Fremont nodded to me as he always did at the site. The site administrator from Woodruff, who had received the weekly reports the first term, was absent, but I had already interviewed him to pilot test the questions to be used with this focus group. The administrator from Central City was also absent, but I had an opportunity later to interview him as an instructor when I conducted focus groups at Claymont.

Various administrators asked if I had observed more than just rural students and whether I had observed courses that originated from locations other than the

university campus. The administrator who asked about origination sites was the science instructor who had originated from Clifton. He was startled to know that I had been in his class, and smiled about it. Later, when I conducted focus groups at his site, he and I talked about that class.

Instructors. The instructors were eager to talk about their experiences teaching on the Com-Net system. There was an instructor visiting Buffalo Creek while I was there and I interviewed her. I wanted to interview her, and she was volunteered by the site administrator.

Both of the other focus groups, at Clifton and Claymont, contained one or more instructors who taught courses that I observed. The focus group at Claymont consisted of only two instructors, including the site administrator. I would have been concerned about there being an unequal status between the two, but I had already heard the instructor chiding the site administrator earlier and so I did not worry that she might hesitate to say what she thought.

The instructor focus group at Clifton consisted of five instructors. Three of them, including the site administrator who taught science, had taught courses that I had observed. This happenstance produced another interesting set of events. One of the students from Buffalo Creek had visited our classroom at Woodruff while one of the instructors who was in the focus group at Clifton was teaching. The student from Buffalo Creek was also in the student focus group at Buffalo Creek. She had a different perspective on this instructor than we did at Woodruff and only mentioned it during the focus group. It was interesting to get a three point view.

TAs. The TAs are an unusual bunch. Some of them are also students, so at both Clifton and Buffalo Creek I had overlaps. At Buffalo Creek I had one TA to

interview, but another TA in the student group. At Clifton I had a student who had been a TA, and in the TA group I had a TA who was also a student. At Claymont the four TAs consisted of two married couples.

Students. The students at Clifton were collected from the halls, promised muffins and orange juice, and sent to the conference room where I was waiting for them. That was a good group of eight students, and the most representative of what I had asked for in a focus group.

The students at Buffalo Creek were asked to come back after supper, and so there were only 4 of the 12 who had promised to come. One of those students was also a TA. However, an instructor was visiting for consultation with some students, so the students who were waiting to talk to her were volunteered for interviews by the site administrator. The site administrator was in the room during those interviews, but appeared to be occupied by other things. Also in the room were a couple of other students working on final projects for one of their courses. Everyone at that site was eager to talk.

The students at Claymont were members of a class that was held right after lunch. They were bribed with pizza to come in early to talk with me. There was a total of 12 of them but some came late, and one left early to prepare for class.

Validity, Reliability, and Objectivity

I am using methods of Lincoln and Guba (1985) again to organize the discussion of the validity, reliability, and objectivity of the findings of this study. They have translated validity, internal and external, into credibility (internal validity) and transferability (external validity). They have translated reliability into dependability,

and objectivity into confirmability. I am using their terms, but remind myself and the reader of the more commonly used terms. The specifications for each of these techniques have been discussed in the section on methodology.

Credibility (Internal Validity).

Lincoln and Guba have five techniques for achieving credibility. Those techniques are:

> Activities increasing the probability that credible findings will be produced ... an activity that provides an external check on the inquiry process ... an activity aimed at refining working hypotheses as more and more information becomes available ... an activity that makes possible checking preliminary findings and interpretations against archived 'raw data' ... an activity providing for the direct test of findings and interpretations with the human sources from which they have come - the constructors of the multiple realities being studied. (Lincoln & Guba, 1985, p. 301)

The first technique, increasing the probability that credible findings will be produced, has three activities associated with it, bringing the total of activities recommended by Lincoln and Guba to seven. Table 11 lists those seven activities used in this study to meet their recommendations and the results.

Transferability (External Validity)

External validity is sometimes called generalizability. However, when using qualitative methodologies there is a difference between generalizability and transferability. During the time that I was originally writing this section, a discussion erupted on the QUALRS-L electronic discussions group about generalizability in qualitative research. I think David Tripp (personal communication, December 26, 1996) did the best job of describing the difference that I see. He wrote the following:

Table 11

Activities Performed to Provide Credibility.

Recommended activity	Activity performed	Result
Prolonged engagement	Prolonged time in the field	Slightly more than 5 months in the Com-Net classrooms.
Persistent observation	Continuous observation	Attended the entire quarter for 11 complete courses.
Triangulation	Multiple sources of information	Sources are my observations in the classrooms, focus groups, conversations with other observers, students, and instructors.
Peer debriefing	Talking to others not directly involved in the study	Conversations with other observers, discussed and described my observations to interested persons at two conferences, and continuously with my advisor.
Refining working hypotheses	Categorizing the interactions	Expanded both the types of interactions and parallel learning to fit the observations.
Referential adequacy	Checking findings against the data	Found the location in the field notes for each finding.
Member check	Talking to others involved in the study	Focus groups of administrators, instructors, TAs, and students.

> One aspect of QualR [sic] that everyone on this list seems to agree on, is that QualR is not primarily about generalisation, if at all. I've been wondering about that recently, and it's now seeming to me that if QualR is really to be bound to the here and now, then what's the point? Is there any point in learning anything that has no application anywhere else? Surely QualR is just as much about generalisation as

> QuantR [sic], all that's different is how the generalisation happens, the key differences being (1) that the generalisations are made by the reader, not the author in QualR, vice versa in QuantR; and (2) that the 'knowledge' being generalised in QualR is vicarious experience, in QuantR it is 'facts'. ...Cheers, David. ...David Tripp, School of Education, Murdoch University, Western Australia, 6150.

The researcher must provide as much information as possible so that the reader can decide for themselves how much and whether the results apply to their situation. Guba and Lincoln (1982) described two activities designed to provide the information needed by the reader. These activities are purposive sampling and thick description. Like the previous section, Table 12 lists those activities used in this study to meet their recommendations and the results.

Dependability (Reliability)

Guba and Lincoln (1982) recommend three activities for demonstrating reliability. Those activities are overlap methods, stepwise replication, and dependability audit. Table 13 lists those activities used in this study to meet their recommendations and the results.

Table 12

Activities Performed to Meet the Requirements of Transferability

Recommended activity	Activity performed	Result
Purposive sampling	Picked cross section of courses	Obtained cross section of sites, academic levels, number of meetings per week, number of students, academic content, time of day.
Thick description	Wrote findings section	Gave examples of findings from the field notes with as much appropriate detail as possible.

Table 13

Activities Performed to Demonstrate Dependability

Recommended activity	Activity performed	Results
Overlap methods (like triangulation)	Multiple methods	Observed two quarters, observed different sites and groups of students, talked to students in focus groups.
Stepwise replication	Multiple repetitions	Multiple quarter, multiple sites, multiple courses.
Dependability audit	Provide access to another researcher to critique decisions and observations made	Continually shared ideas, decisions, conclusions, observations, and data with advisor who critiqued, discussed and questioned.

Table 14

Activities Performed to Demonstrate Confirmability

Recommended activity	Activity performed	Result
Triangulation	Multiple methods, multiple sources	Observed two quarters, observed different sites and groups of students, talked to students in focus groups.
Reflexivity	Reflections on the research, the data, and the process	Reflections written in field notes, sidebars.
Confirmability audit	Tracing results	As I wrote the findings section, I found the location(s) in the field notes that applied, for confirmation and to use some of them for examples for thick description.

Confirmability (Objectivity)

Guba and Lincoln (1982) recommend three activities to demonstrate confirmability. These activities are triangulation, practicing reflexivity, and confirmability audit. Table 14 lists those activities used in this study to meet their recommendations and the results.

Summary

This research was driven by three questions about students' interactions in the classrooms of a distance education system. Those questions pertain to what interactions are there, what starts and stops them, and what are the outcomes. To answer these questions, I chose to directly observe these students in the field, using qualitative methodologies.

DATA ANALYSIS

The primary source of data from this study was the field notes. The information that I recorded in my field notes during the courses was augmented, explained, and, to my relief, confirmed by the focus groups. The focus groups added to my understanding, and even though I watched for them, there were no contradictions to my understandings. The information acquired from the focus groups is incorporated throughout discussions in the Findings section beginning on page 102.

The Classification of Behaviors

I classified learner interaction events in the classroom using two existing descriptions of learner interactions and, based on my observations in the field, I expanded on those. First, I used Moore's (1989b) three types of interactions: learner-instructor, learner-learner, and learner-content. I added to that the learner-interface type discussed by Hillman et al. (1994). Based on what I was observing during the study, I found that there was one more interaction type that was not covered by these four types. I added learner-environment interaction. All five of these interactions are defined beginning on page 102.

Second, I used the concept of parallel learning (Burnham, 1995), which is a collection of subsets of the five interactions to classify classroom behaviors. In observing these courses, true to the theme of grounded theory, I began to develop a matrix of four types of parallel behavior and used these to further classify the

students' interaction behaviors. This matrix of parallel learning types is discussed in the Findings beginning on page 231.

Types of Data, Types of Analysis

This study is a field study and the field notes are a cohesive body of data and a story of what happened. I analyzed the data for this study in two ways: verbal/observational and numerical/comparative. Neither kind of data by itself provides a complete picture of the reality of student behavior in the Com-Net system, though the verbal data do the most complete job. The verbal data alone are anecdotal and broad. The view of this field using only verbal description is a river a mile wide and an inch deep, great for wading but not navigating.

The numerical data alone are incomplete and narrow. It was impossible for a single researcher to note every kind of event simultaneously in every situation at each site for 5 months. But, the numerical data that are available from the field notes provide some insight. The numbers provide depth and illumination to the verbal data. This study began as a exploration of the field without preconceived behavior categories even though those categories became apparent early in the course of the observations. However, because the data were recorded in the field notes, it was possible to count and classify the recorded events. With both kinds of data there is a river, still a mile wide, but with a narrow inner channel for sailing and outer banks for wading. By looking at the behaviors exhibited by these students as completely as possible, there is a foundation of information for recommendations that can be made about what needs further exploration.

Verbal Data

In the Findings section, I have written verbal descriptions of the interaction types based on my classroom observations and provided examples of behaviors that fit these interaction types. These examples are the stories of the events. The purpose of these descriptions and examples is to give the reader, as carefully as possible, an inside look at these classrooms.

The descriptions were compiled by reading through the field notes and writing to a computer file short phrases about the interactions that I used as prompts. Then I organized the phrases into groups of similar events for the verbal description. Each of the discussions of concepts surrounding the interaction types is provided with examples that were recorded in the field notes.

Other descriptions of the setting, classroom events and student behaviors are included in the Research Procedures. Those descriptions in the Research Procedures section (beginning on page 55) are about my process of interacting in the field to obtain the data. They give more insights into what the field was like.

Numerical Data

For the numerical comparisons, I used 9 of the 11 courses. First, I eliminated the human environment course because the instructor was present at the location where I attended, and so it was not a distant classroom. When I use this course in the verbal discussion, I look at how the presence of the instructor might make the results different from those courses in which the instructor was at a distance.

Second, I eliminated the business course from the comparison. This course was atypical of the courses offered by the Com-Net system. This course also has the least reliable field notes because of its structure. When I do discuss this course in the verbal description, it is to use it as an example to support generalization of findings or as a counter example of what might make a difference in the findings.

Coding the Field Notes

I typed the field notes that I wrote during the class periods in the nine courses into separate files for each of the nine courses. The events that I noted were listed in the order in which they happened. Separate files were made for general observations, the events that related to the Com-Net system itself, and for observations about all the students listed by course.

I actually analyzed the data twice as my understanding of interactions changed. During the first analysis, I went through several steps in preparing the field notes for comparative analysis. First, I wrote an abbreviation for each of these interaction types to the left of the line of field notes in which they appeared based on the definitions. Second, I created a coding sheet for each course. A blank coding sheet can be seen in Appendix C. Third, I entered the counted number of each type of behavior and the number of students attending in their columns on the coding sheet for each class period throughout the term. The sheet allows for two class periods per week, and each class period has a week identification.

For the second analysis I took the field notes and, line by line, created a "case" (a record line) in the SPSS statistical software package for each interaction event. I also made separate entries for attendance counts. For these cases I noted

the type or types of interaction, the subject category of the interaction, and the parallel learning category if there was one. I used SPSS to tabulate frequencies for each of the variables for each of the courses for each of the weeks. I tried looking for relationships among the variables using a Cramer's V, but as I looked at the results I was concerned that the numbers that I had were not as precise as I wanted for that analysis. So, I made the decision to limit the numerical analysis to only the frequencies and percentages of events recorded in the field notes. The relative ranking of the precision of the notes was noted in Table 9.

For both the analyses I then entered the frequency data into the Excel spread sheet software. To keep the courses equal, I wanted to be able to compare the courses based on weeks. For those courses that held classes twice per week, I added the number of events for the two class periods and entered only a total for the week. Because a term may start in the middle of the week, a week, for example, may consist of a Thursday then a Tuesday class period. The numbers for missing class periods were further adjusted as discussed below. Using functions provided by the software, I divided the number of events for each of the classification types by the number of students attending that week and created new columns for number of behaviors per student for each classification category. This was to equalize the courses again, so that those courses with more students or more class periods did not carry more weight.

Creating Profiles of the Interaction Behavior in the Courses

I used the trend graphing function in Excel to create visual representations of the weekly change in the amount of each type of behavior per student across the 10

weeks of the term. These profiles, which are discussed in the Findings section, are profiles only, and the graphing function smoothes the profiles to reflect this. In some cases due to the rounding that is done in Excel, the profile lines actually drop below the zero line. The profiles are visual representations of the relative trend of interaction behaviors from week to week for the courses individually and are not intended to indicate specific numbers. Nor are the profile amplitudes intended to compare one course to another. The collections of profiles for each course can be found in Appendix D.

Adjusting the Numbers of Events

Of the 130 class periods that were scheduled in the nine courses, I missed 10. I missed two for academic reasons, three for work-related reasons, three for bad weather, one for a family reason, and one because I began the art course at another site where I was the only student. Three additional class periods were canceled by instructors.

Student behaviors happened whether I was there to record them or not. Profiles continued across the term. Consequently, I needed some way to adjust for the missing data in the profiles. My method was to average the number of events for the week before and the week after the missing data, and then decide if the number made sense for this course based on my other observations. There were a few other adjustments based on the observations. Thus, in this case the numerical data were informed by the verbal data.

The art course. I could assume that because there was only one student at Fremont before I came that there were no observable behaviors that required more

than one student. I knew that there was one learner-instructor interaction behavior, because I heard it from Central City. I based other assigned numbers on what was typical after I began to attend at that site.

The agriculture education course. This course was only 9 weeks long because of a holiday. I could have, perhaps, adjusted the data to fit it to 10 weeks, but instructors and students were assuming that week nine was the final week of the term and so, responded that way. It is possible that the profiles for that course peaked earlier than they would have in a full 10-week course, but there is no way of knowing.

The history course. One of the class periods that I missed in the history course was the midterm exam. Based on talking with the other two students about what the exam was like and what other classrooms were like during an exam, I could make an informed guess about what happened during that class period.

The psychology course. There was one week in the psychology course that I had to leave early because the weather was getting bad. I left almost exactly half way through the class period. Based on my knowledge of the typical behavior of the students in that course, I believed that doubling the number of events in the first half of the class is the best representation of the number of actual events. Another class period I left slightly early and adjusted those numbers accordingly.

Summary

When I began this study, I went out with a blank tablet, a pencil, a tape recorder, my textbooks, and my Com-Net camouflage. I began to record everything I could without blowing my cover. When the study was completed, I still had my

cover, my textbooks, my pencil, and my tape recorder. But, I also had many tablets full of writing and no stunning revelations. While waiting for the bolt of lightning/understanding to hit me, I thought that I would at least type up the notes to condense them, organize them, and remove them from the clutter of course content notes.

I was already aware of the classifications of interaction and parallel learning from the literature that I had read. Early in the study I had described the matrix of parallel learning, discussed beginning on page 232, as the way to best classify the parallel learning that I was observing. As I was typing, I found myself looking for any different classifications or events that did not fit the ones already described. I found that there were interactions that seemed close to the learner-interface interaction, but really were not interactions with the mediating technology. That is when I decided that there was a fifth interaction, the learner-environment interaction.

To be certain that I had not missed anything, I penciled codes beside the field notes to see if everything would fit into one of the classification schemes. That was when I noticed that all of the parallel learning behavior categories would overlap one or more of the interaction categories, but because they primarily involved the learning process and related sets of interaction types they were useful categories by themselves.

Now, I had classification categories. Classification categories are useful for counting and sorting. So, I decided to see what I would find if I counted events in each of the categories. Hash marks did not help much. Thus, the coding sheet was born. The next natural use of coding sheets is entering the data into data manipulation software. So, I did.

I had plenty of stories to tell about these courses. I could describe for readers what these events looked like, but I wanted to see what my numerical data looked like. So I graphed it. By now I had to acknowledge that I did not have absolute precision in my numerical data. This study was not designed to quantify; it was designed to describe the field and point to interesting artifacts. The numbers could only serve to illuminate the verbal descriptions and point to areas of interest for further study. So, I removed the hard edges by using the trend function to get visual, compressed profiles of what had been happening from week to week in the classrooms.

In the description of the findings of this study, the verbal portrait is more precise, realistic, and comprehensive than the numerical schematic. For that reason, I have organized the sections in the Findings section to move from the specific descriptive representation of this field to the abstract numerical illumination.

FINDINGS

The findings of this research are reported in sections for each of the interaction types and for the special subsets of interactions. The answers to the questions that drove this study are the contents of this section. A compiled answer to each of the questions will be found in the Interpretation section beginning on page 275. A table of categories of each of the interactions can be found in the Summary section on page 290.

Interactions

It might be well here to review the definition of learner interaction, to review the Hillman et al. (1994) definition of learner-interface interaction, to introduce the definition learner-environment interactions that is added because of the results of this study, and to review Moore's (1989b) definition of learner-instructor, learner-learner, and learner-content interactions. These are the definitions that guided my interpretation and categorizations of the behaviors. The early, original definition of learner-environment interaction (Walden & Burnham, 1996) was revised following a conversation with a class of graduate students and writing about the results of this study. The new definition better reflects my internal understanding and criteria for classifying certain behaviors as learner environment.

> **Learner interaction** is either the reciprocal action or mutual influence between the learner and the object of the interaction or the influence of the object of interaction on the learner.

Learner-interface interaction is "interaction that occurs between the learner and the technologies used to deliver instruction" (Hillman et al. 1994, p. 30).

Learner-environment interaction is that reciprocal action or mutual influence between a learner and the learner's surroundings that can either assist or hinder the learning.

Learner-instructor interaction is "interaction between the learner and the expert who prepared the subject material, or some other expert acting as instructor" (Moore, 1989b, p. 2).

Learner-learner interaction is "inter-learner interaction, between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor" (Moore, 1989b, p. 4).

Learner-content interaction is "the process of intellectually interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learners mind" (Moore, 1989b, p. 2).

Learner-Interface Interaction

Learner-interface interaction is the interaction that is necessary between the learners and the mediating technology or system that provides the instruction (Hillman et al. 1994). This interface can include the hardware, software, or people who are part of the educational system. In the Com-Net system, this interface includes the delivery system and its classroom hardware, site administrators, and technical assistants.

The Students' Interactions With the Live Board

When my observations began, the hardware that provided the visual portion of the delivery system was new to this university. I observed the first term that it was being used in the Com-Net system. I had an unexpected opportunity to observe students' initial reactions to the new system. The first day of class, and the beginning of my field study, I had gotten a light case of food poisoning during lunch. Following the afternoon classes at Fremont, and before the night class at Bridger, I needed a place to sit quietly. I found a chair in the lobby at Bridger and made myself as comfortable as possible. Students were coming and going between classes and on breaks. I began to listen to their conversations. They talked about what grades they had gotten the previous term, what the instructors were like, how close they were to graduation, what the university requirements were. I noticed that not once was the new technology mentioned.

The next morning, at the same site, in the science class, the students seemed apprehensive. When something new happened, or the instructor had some difficulty, some of the students would turn around and look to the TA. As the term progressed, they became more comfortable with difficulties with the system. Still, not one student mentioned the fact that the visual presentation was different than it was the term before. It was several weeks before anyone, in any of the classes mentioned it. Then, it was only a mention that we didn't have a picture of the instructor anymore.

Not all of the receive sites had the new hardware. All the sites at which I observed had either the large board or a television monitor attached to a computer, so they were alike in that way.

In all the sites it was the responsibility of the TA to make sure that the system was running properly before the class began. Occasionally, at some sites, when there was an error in the system, a student would remove the error message from the board by pressing one key or clicking a mouse button. During one of the focus groups at Buffalo Creek, I talked with Peter. Peter had a job that required him to travel. If he had to be away from his home site when he was scheduled to attend class, he checked to see where the nearest site was and attended there. He told me that the classrooms were almost identical in atmosphere, but that each site was a little different in the amount of interaction that the TA allowed the students to have with the hardware. Some TAs did not allow a student to touch the system, like Laura at Bridger, while some TAs allowed student to log back onto the system if it crashed. This was the case at Buffalo Creek.

The Students' Interactions When There Were Problems With the System

When the system failed, students sometimes became involved. During the first term, the same site would become disconnected at approximately the same time every day. I was in two classes (math and science) that met twice a week during that time. So I saw this happen four times a week from two different locations for several weeks. As the situation progressed, students began to create their own ideas about why it was failing and called the TA at the university. A possible solution was found that required action on the part of the site with the problem. So, then in the math class, various students would remind that site to take action as the time approached. The problem was eventually solved, but before that, the students took an active role in interacting with the technology to help solve the problem.

Sometimes the board would pause and then catch up with the instructor. In my field notes, I called it choppy. It would hesitate, then quickly speed up and display what the instructor had already written. At times, students were unsure whether the board was choppy or simply not working. If there was no writing for a little while, one of several things would happen. Most commonly the students would get uneasy, looking to the TA, bouncing a pencil in the air between their fingers, making a quiet comments or groaning, and turning to each other to see if someone else was going to do something. Eventually, someone would ask the instructor if they were writing or else the system would either fail or correct itself. On a couple of occasions, the instructor thought they were writing, but they didn't have their pen turned on. When the board got choppy, it frequently meant that some site was about to become disconnected. As soon as that happened the board would show what had been written earlier, but now hidden behind the disconnect message displayed in the middle of the board. Students soon learned that when the board was choppy something disrupting might be about to happen.

Another example of students' involvement coinciding with system difficulty occurred in the human environments class, where the instructor taught from the site that I was observing. I was asked by the instructor to help her because I am IBM knowledgeable and she was not. This instructor would type a file for the classes and then transfer that file to the computer at the site from which she was teaching. I had another class right before this class and so, I was frequently there early. I had seen this system operated and I was able to give her advice about getting her graphics to display on the system. This is another form that the learner-interface interaction could take, and one of the levels in the range of student involvement that

Peter, a student in a focus group, described. Some students were allowed almost no contact with the technology, and some were allowed to do almost anything.

Yet another example occurred at this same site, during the next term. The regular TA, Jill, was on leave due to a broken leg. The secretary and secondary TA, Elaine, was trying to run the system. She was not computer literate at all. She could follow the directions, but if something happened that was unexpected, she was lost. By this time, I had seen the system work enough and had a pretty good idea about what to do. I waited until I could see that she was beginning to get frustrated, and her inability was affecting all the other sites on the system while they waited for her, then I volunteered to help.

I saw other students hesitate and then offer to help during other difficult times at other sites. I generally waited to see if others were going to offer, if the technical assistant would eventually figure it out, or if the person with the controls was going to ask for help before I stepped in. Again, I can say that my behavior was typical based on what Peter said in the focus group.

When the system was down, the time was used in a variety of ways. In the science class several of the students worked on problems, or discussed an exam. In the human environments class, the other two students, the instructor, and I talked about educationally related issues, those things that were happening in our lives at other educationally focused locations, for example, at other schools. In the math class the students either waited quietly, or worked problems. In the business class, the other student worked on homework assignments, and I quietly checked my e-mail. Many times, if the visual portion of the system went down, the audio portion was still operating and the instructor would go on without using anything visual.

The Students' Interaction With the Audio Portion of the System

Most of the students did not like to use the microphone. This was true at both the sending and receiving sites. At the sending site it was common for the student asking a question or making a comment to direct the comment or question to the instructor without using the microphone. Typically the instructor would ask students to key the mic and repeat themselves for the benefit of the students at the receive sites. If the instructor forgot, it was not uncommon for a student at a receive site to ask the student to repeat what was said.

The first time that I used the mic, I found that I was shaking when I finished. That surprised me because I seldom feel nervous about answering questions in a classroom. Perhaps it was not being able to see most of my audience and their body language. I was unable to tell whether I was answering the question in the way the instructor wanted until I had finished and he responded. I was unable to see whether other students were agreeing with me or confused by what I was saying. In the normal face-to-face classroom setting, it was possible for me to judge the course of my answers based on conscious or subconscious reading of the facial expression and body language of instructors and sometimes of the other students. When it was not possible to read the small indicators, it was impossible to adjust my answer on the fly. I had to make a statement and let it stand or fall by itself.

Another time, I was sitting next to another student during one of her first times using the mic. When she finished, there was moisture on the table from her sweaty palm. She had not appeared nervous while she was speaking.

The Students' Interactions With the Technical Assistants

Early in the field study I asked myself who "owned" the classrooms? Who was responsible, whose turf was it? In a typical face-to-face setting, the instructors "own" the classrooms. In this Com-Net setting, it is not the instructors who are responsible for the classrooms. They are not physically present, are instructing students they cannot see, and are instructing multiple groups of students distributed across the state. It is not the students who are responsible. They are the receivers of the education, not the providers or owners. It is not the site administrators, even though they manage the building and the staff; they are not usually present during the class time. An administrator may wander into the classroom and observe, but they still are not part of the educational event. Even though they are deferential to the instructors and the administrators, the "owners" of the classrooms are the technical assistants. They manage the classrooms and the interface between the learners and the instructors. They are part of the interface between the learners and the instructors. They maintain the equipment and the connection, receive homework and exams from the students, return the papers, and are the ever-present face of the university. In addition, because they were given the responsibility for maintaining discipline, they are the authority figures.

During this field study the technical assistants differed in their interactions with the learners. As Peter described and confirmed my observation, some tolerated, even welcomed, the students' active involvement with the delivery system. Some behaved as though they were protecting the system from the students. Some technical assistants befriended and become interested in the families of the

students. Some scowled and grumbled at the students and some were consistently late in getting the delivery system working for class periods.

The learners interacted with the technical assistants no matter how they were treated. When the system failed, learners had to find the TA to get reconnected. Homework and exams went through the TA to the instructor and back again. When students needed to be absent, they could work with the TAs to get an audio tape of the class. TAs were still at the sites at night after the rest of the staff went home, and were the link to the university. TAs were usually the first stop for questions about schedules, books, and university policies. The interaction between the students and the TAs happened before, during, and after class time.

The Students' Interactions With the Institution

The students needed to interact with both the university and the site administrator. The interaction with the site administrators was the easier of the two. At most of the sites, the administrator was there at least part of the day. In fact, at two of the sites where I observed, Fremont and Central City, the administrator was in the classrooms several times during the term either looking at or assisting with the technology. At another site, the local administrator brought his dean to the classroom to show him the new technology in action. Unlike the typical face-to-face classroom, the local administrator felt comfortable entering a classroom where instruction was being delivered. In the typical face-to-face classroom, if another person from the building, another instructor or manager of some kind entered a classroom during a class session, it would be a very unusual occurrence. But, apparently when the instructor cannot see the administrator is present, the

administrator feels comfortable stepping into what is normally the turf of an instructor.

When the administrators at Fremont and Central City came into the classroom, the students joked and talked with them. Students got to know the administrators because the administrators provided some advising and interfacing with the university. In a sense they represented the provision of their education. They stood in place of the university.

The students usually grumbled when they talked about their direct interaction with the university. The biggest complaint from everyone, from students to administrators, was how long it took to get papers back and forth. Students at the receive sites felt they were second-class members of the university community, yet many expressed gratitude that they could get their education at all. This was especially stressed in the focus group at Buffalo Creek. During the focus group, after complaining about the technology and the cost, one of the students wanted to make sure it was plain that they were grateful they could receive a graduate degree without having to leave their families or relocate. Two of them agreed that they would not be getting a graduate degree at all if it were not for the Com-Net system.

After the instructor evaluation at one of the sites, some of the students kept the pencils because, in their words, they were better than the bumper stickers they get from the university when they graduate. They joked about wanting to get something useful from the university. Of course this was the class where they paid the least amount of attention to the instruction that was being delivered. But mildly disparaging remarks about the bureaucracy, and anonymity of students within the university setting were not uncommon.

The Profiles of Learner-Interface Events

The number of learner-interface events was not the same for each class period. The Data Analysis section discussed how the profiles were created from the field notes (see page 97). Figures 1 through 10 are the profiles for learner-interface interactions for each of the classes and for all the classes together. Because interaction with the media is necessary for nearly all the interactions between the instructor and the students, the learner-instructor interaction strongly influenced the profiles for learner-interface interaction. I am presenting both the profiles for total learner-interface interactions noted in the field notes and for the learner-interface interactions that did not involve the instructors. The discussion for each of the courses does so for those profiles that show the interaction events that did not include the instructor. Nearly all the events that included learner-instructor interactions also included learner-interface interactions. Learners used the technology to interact with the instructor. The learner-instructor interactions are discussed in the section on learner-instructor interactions beginning on page 143.

Agriculture education. The number of learner-interface interaction events per student in the agriculture education course peaked at week four (Fig. 1). There was another smaller peak around weeks six and seven. The peak at week four was the result of a system crash, and a conversation with the TA about the delivery system. When the system crashed, Judi went to get the TA to get us reconnected, and then while we were waiting for the rest of the sites to reconnect, we talked with the TA about the new technology. Later the TA came back to make sure we were still on the system and we talked some more.

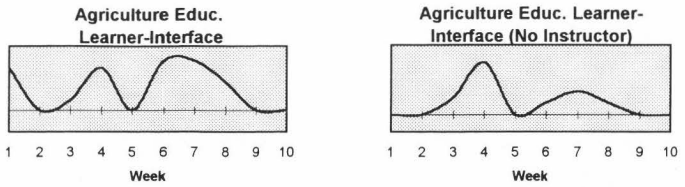

Figure 1. Profile of frequency of learner-interface interactions in the agriculture education course across a 10-week period.

Art. The art course didn't peak until week seven (Fig. 2). During the class period of week seven, the regular TA, Jill, came back to work from an injury for the first time. She came into the classroom more than once, and when she was in the room we talked with her. There was no learner-interface interaction the first two weeks of the course because, as mentioned, earlier I was at Central City the first week. The class for the second week of the course was canceled by the instructor.

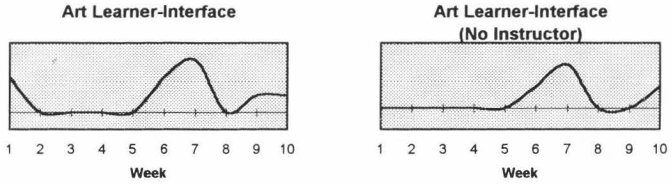

Figure 2. Profile of frequency of learner-interface interactions in the art course across a 10-week period.

Elementary education. The number of learner-interface interactions in the Elementary Education course started out high and stayed high for several weeks (Fig. 3). Two things were going on in that classroom. First, the other student had

not been in a classroom for several years and told me she was feeling insecure. She asked the TA, Sally, a lot of questions.

Second, the students in this course were to have purchased a set of videos for this course. The other student had hers, and we watched what we were assigned to watch during the first few weeks. The TA set the system for video and gave the remote control to the other student who found the correct location and played the portion we were assigned to watch.

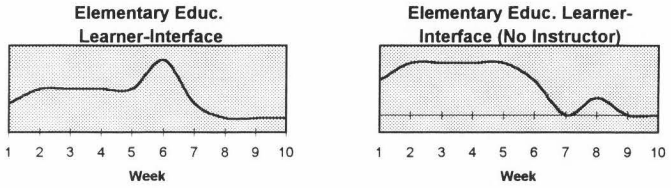

Figure 3. Profile of frequency of learner-interface interactions in the elementary education course across a 10-week period.

English. The English course had high points on its profile both at week one and week seven (Fig. 4). At the first class session, the students had to purchase guide books from the TA. There was difficulty with the delivery system several times during the first class period as well. The site administrator got us reconnected one of those times, and some of the students joked with him about teaching us how to do it so we could do it the next time we couldn't find the TA.

Early in the class period of week seven, one of the students had to try several microphones before she found one that worked. Finally after she found herself wanting to use a microphone several times, this student traded the one at

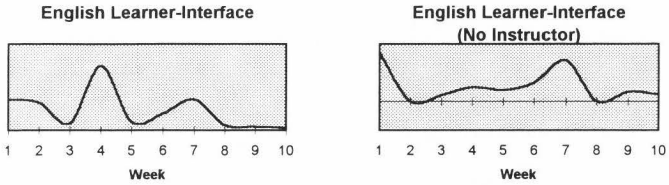

Figure 4. Profile of frequency of learner-interface interactions in the English course across a 10-week period.

her seat for one at an empty table that worked instead of changing where she was sitting herself. Another student during this class period removed a disconnect message from the board rather than try to find the TA.

History. The relatively high level of learner-interface interaction in the history course reflects only one or two events per class period (Fig. 5). The attendance fluctuated and so the profile fluctuates some. The typical event involved interaction with the TA, Stan. An exception to this was week four when Molly tried drawing a line with the pen on the big screen to see how it worked.

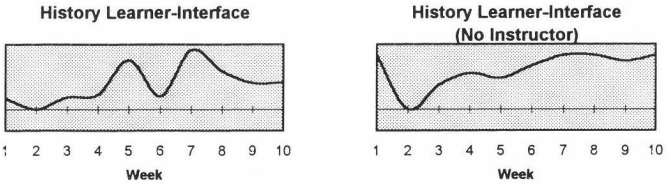

Figure 5. Profile of frequency of learner-interface interactions in the history course across a 10-week period.

Math. The learner-interface interaction in the math class peaked late, like the history course (Fig. 6). The class members in this course tended to become more and more animated as the course progressed. This is apparent in the other profiles for this course as well. The peak for these interactions happened around weeks eight and nine. The first class period of week eight, the TA asked Libby and Megan to stop working unrelated problems together during class and do them after class, Donald discussed the regular crash of the system with the TA, and the system crashed twice during the class.

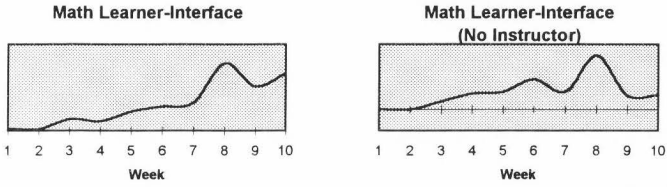

Figure 6. Profile of frequency of learner-interface interactions in the math course across a ten week period.

The second class period of week eight, Libby, Megan, and Donald discussed the instructor evaluations and exams with the TA. Later Donald observed it was about time for the usual site to disconnect and just then it did. Immediately all the sites disconnected one by one. The TA did a remarkable job of directing everyone to reconnect in a series (except one site that connected to the wrong network). When the last site was finally ready to reconnect, the TA was out of the room, and Donald went to find her. When he could not find her, I tried the one place he had not looked and found her, just ready to come back to the classroom.

Psychology. The peak of week six in the psychology course represents a very rowdy night (Fig. 7). The TA tried to quiet us down, even taking aside one of the worst offenders. During the break the TA handed back exam scores from the previous week. That is when things really got out of hand. Fran had the TA fax a copy of an example of a good study guide to the instructor because she felt it would have been helpful to have one for the exam and the students wanted one like it for the next exam. Finally, the Live Board part of the system crashed, leaving only the audio portion of the system to be used.

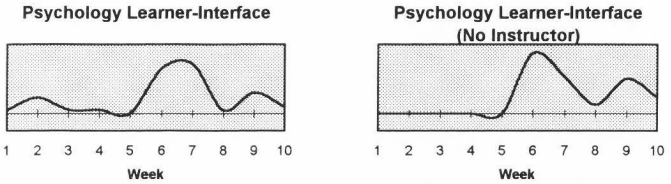

Figure 7. Profile of frequency of frequency of learner-interface interactions in the psychology course across a 10-week period.

The TA for this class was the most protective of the system, but this time, she had been up and down so often that she was tired, so she asked one of the students to remove the disconnect message from the board. Unfortunately this student had gotten one of the highest scores in the state on the exam, and because the TA finally allowed one of the students to touch the system, this student was called a teacher's pet by some of the more vocal and irritated students. This class period is discussed further in the section on learner-learner interaction event.

Science. The learner-interface interactions in the science course peaked at week eight (Fig. 8). The first class period of that week, the TA used the microphone to ask the instructor about the instructor evaluation forms, and then she stayed to joke with Sue and Sharon. Someone had complained about Sue and Sharon working together out loud and the TA had asked them to keep it down. She was good friends with Sue and Sharon and had watched them grow up. Later, I wondered if this was Laura's way of letting Sue and Sharon know they were still OK with her.

At the beginning of the second class period of week eight, I heard the instructor tell all the TAs to have us fill out the instructor evaluation forms at the end of class. Because I was the closest student to the window, I told the TA because she had been involved with the class in the other room. About the middle of that same class, the TA brought in our exam results and passed them around.

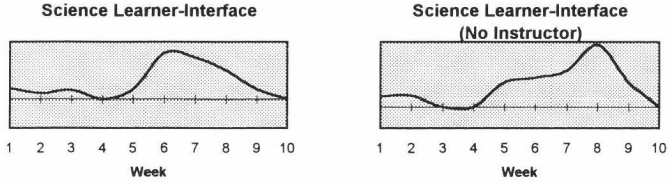

Figure 8. Profile of frequency of learner-interface interactions in the science course across a 10-week period.

Sociology. The students in the sociology course were the quietest of all the students I observed (Fig. 9). As I discuss in the section on peer groups in a later section, there was no apparent reason why these students were so passive. At

least half the time, we had a quiz at the beginning of class. All the but one of the learner-interface interactions involved giving quiz papers to the TA, Pat, or getting the exam the last week. The one learner-interface interaction that did not involve quizzes or the exam was the final week. I had to be gone week nine and when I returned Pat told me the instructor has called on me the week before and she had told him I was gone.

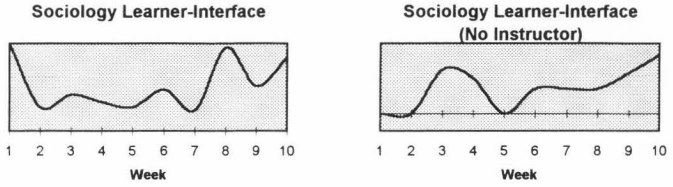

Figure 9. Profile of frequency of learner-interface interactions in the sociology course across a 10-week period.

All the courses combined. When all the courses are combined, the peak of the profile is at week six (Fig. 10). However, weeks four through nine are generally high. If I had drawn a profile that I thought would summarize these interactions without using the field notes, the actual profile would have been it. This profile is what I would have expected from sitting in these classrooms for a term.

The interaction starts out moderate the first week as the group becomes familiar with the system, and then the students settle in to learn. The interactions begin to increase again as the students become more comfortable with the technology and the TA. Week ten is down again because by that time the lecturing is over and there is a final exam during week ten.

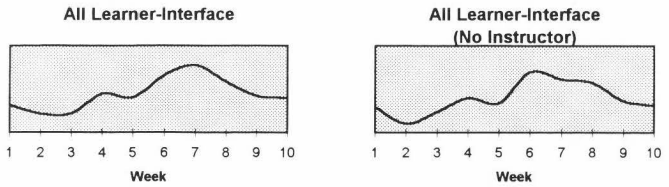

Figure 10. Profile of frequency of learner-interface interactions for all the courses combined across a 10-week period.

Summary

The technology and the people that are the interface between the learner and the instructor are not transparent nor static in the Com-Net distance delivery system. This is a dynamic system in which all parts must work together to provide the linkage between those who provide the knowledge and those who receive it. In the Com-Net system, the linkage is provided by the audio connections, the Live Board visual connection, and the technical assistant human connection.

The learners had varying degrees and forms of interaction with the components of the system. The learners had the ability to facilitate their audible transmission to the entire class statewide by interacting with the audio component of the system with the microphone and the microphone key. The learners interacted with the components of the system that provided the visual portion of the instruction to varying degrees. Some of the learners were allowed to actually use the technology. Some times this interaction was the one-way influence of the technology on the ability of the students to receive the visual portion of the instruction.

The interaction between the TAs and the students was the most common and the most varied. It was probably the most common because the TA was another human being. These students did not see the instructor face-to-face, but they did see the TA face-to-face. The focus of the interaction between the student and the TA involved the use of the mediating technology, the transfer of textual materials between the instructors and the students, and the provision of a human face for the university.

The interaction between the students and the interface was at best nearly transparent, when everything was working properly. At worst the interaction was the result of frustration when the interface seemed to get in the way of fluid instruction.

The mediating interface provides an education for the students they would not otherwise have. So, at its worst, according to the students, it is better than nothing. The interface is there, making its presence felt, and requiring interaction from the students.

Learner-Environment Interaction

Learner-environment interactions were those interactions that the learners had with their surroundings, their environment. These interactions did not include the mediating technology, other students, the content, or the instructor. The environment in which these students learned, whether it was natural or they created it, influenced whether they were able to learn or were distracted from learning. Their interactions with their environment controlled their learning either beneficially, or detrimentally.

Before I began this study, I pilot tested my ability to get into a course and take notes. The first night of my first-ever distance education course, I was especially struck by the informal body language of the students. They sprawled, they slept, they had visitors, they talked, they ate. Then it dawned on me, they did not have to appear a certain way for an instructor. Compared to a course held face-to-face on campus, the instructional methods were basically the same, the teacher's behaviors were about the same, the furnishings of the room indicated that it was a classroom, but the learners' behaviors in their environment were different.

Learners' interactions with the environment at remote sites happened individually and in groups. There were learner-environment interactions that gave certain flavors to specific sites.

Individual Behaviors

The individual behaviors of the learners served many purposes and can be classified by the purpose they served. I observed learners getting comfortable, relieving boredom, making the best of busy lives, and facilitating learning.

Getting comfortable. Long class periods in hard chairs after or during busy days contributed to discomfort for these learners. Behaviors that learners exhibited individually to get comfortable included eating and drinking, sleeping, changing seating position or location, stepping out to get food or a drink, going to the rest room, or dealing with their own medical situations.

Several learners used class time for regular meals. I got into the habit of eating breakfast during the math course, which was held twice a week, first thing in the morning. Yvonne, in the English course, took her lunch time to attend class, and

typically stopped off at Wendy's and brought her lunch with her. Evelyn in the psychology course was pregnant and always had something with her to eat.

At the beginning of the term in the math course, one of the students, Heather, fell asleep almost as soon as she arrived, and dropped the course after about 2 weeks. She explained to me that this 8:00 class was too early for her. At least two of the learners that I observed appeared to sleep when they were not feeling well. One day in the chemistry course, Rose, rather than her usual animated, participatory self, was pale and spent most of the class period with her head on her arms and her eyes shut.

After a while, hard chairs get uncomfortable. In the agriculture education course, about half way through the class we regularly moved another chair around on the other side of our table, took our boots and shoes off, and put our feet up. Most of the students, at some time or other, put their feet up on any chair nearby that was vacant. Occasionally, if the room was large enough, a student would get up and pace around the room for a while and stretch.

In the English course, several of the students sat in different locations in the room after break. They usually moved closer to the student they had been talking with the most before the break. One afternoon, a student moved so that she could see one of the male students in the other classroom. Usually the first thing these students did after they dropped their belongings on the table was to be sure that they had one of their favorite chairs. They moved chairs around until they had the one they wanted.

Only 4 of the 11 courses that I observed had male students. One of those courses had two men attending, but each of the other three courses had only one

male in the classroom. In three of those four courses, including the course with two males, the men sat in seats that were the nearest to the door. The young man in the math course moved for a while to one of the seats nearest to the door, but generally he sat nearest to the audio speaker in the front of the room. I wondered if this finding was typical or coincidental to the group of courses that I was observing. I began to look into the other classrooms. At Woodruff, I could not see into the classrooms. At Bridger, in the course for the pilot study, I remembered that the two men sat on the side of the room that contained the door, and one of them sat next to the door. I could easily see into the other classroom at this site, Bridger, because there was a window between them. In other classes in that room, it seemed to me that the men sat in seats that were at least in the half of the classroom that was closest to the door. At Fremont I saw one other class. There was one female and one male. Both were sitting at the same table on the far side of the room, but the male was between the female and the door. At Central City, in the only other class that I could see, the only two students were male. Both males sat at the rear table nearest the door. It appears that there is a trend for males to sit nearer to the doors than females.

The learners in these classrooms did not always stay in these classrooms during the entire class period. There was a lot of coming and going. Students went out for a variety of reasons. Usually students stepped out for food or something to drink. Occasionally students stepped out to make a phone call. When students left and came back, they were usually not gone longer that 15 minutes at a time, but sometimes came and went several times during the class period.

At Bridger, the computer room was across the hall from the room in which the science and psychology courses met. Both of those courses had a student who would leave the classroom to go over to the computer room. John, in the psychology course, would go get something printed, and Rose, in the science course, would go check to see if she had e-mail. John usually shut the door of the classroom behind himself, but Rose left it open to listen for important material.

At Central City the vending machines, telephone, and drinking fountain were in the rear of the classroom, so students did not need to leave the room as often as at other sites. When those students left the room, they usually stayed out for the remainder of the day. These students had two times in the class period when they were likely to leave. First, typically one or maybe two students would leave right after the roll call. The second most common time for leaving was during the break about half way through the class period.

A couple of students had injuries or illnesses that required that they exhibit learner-environment interactions to gain comfort. In the psychology course, Sherry had surgery on her foot, and several times had to leave the room for water to take a pain pill. In the history course, Lisa, who had missed several weeks for an illness, spent one class period lying on the carpet because she was in less pain in that position.

Relieving boredom. Boredom happens in all classrooms, but at the remote sites that I observed, the learners were freer to express it and do something about it than are students in a face-to-face classroom. One of the students in the psychology course, Bob, when he did stay for class, generally read a magazine that he brought in from the lobby. When he finished that one, he would go get another.

Bob usually only stayed for class when there was an exam scheduled for later that evening.

Frequently, other students in this course chatted about topics other than psychology. Someone always had one ear on the instructor, so that if someone was called on, the listening student could tell the class what the question was, who was called on to answer, and where to find it in the textbook. The questions from the instructor were customarily from the definitions in the outside columns of the text and the answers could be read from the book.

Molly, in the history course, frequently began class by reading the student newspaper. This student had a couple of other ways to relieve her boredom. One infrequent method was to borrow magazines from the TA, read them, and discuss the content with the TA. Her most frequent method to relieve boredom was to tell stories to whoever was there to listen. These stories would be sparked by something the instructor had said and revolved around her own family's history or other things she had studied while getting her history degree.

When students in the sociology course got bored, they left for the day. Actually a few of the students did not wait around to get bored. Frequently, the class began with an open book quiz on the readings that had been assigned. These quizzes lasted about half an hour. It was common for two or three students to pack up their books, place their quiz on the TA's desk, and leave. Following the quiz, the instructor lectured, but tried to encourage student participation. Occasionally he called on students by name, but I never heard him call on one of our missing students.

I do not know if boredom would have become an issue in the agriculture education course or not, because we always had something to talk about, whether it related to the content or not. Something the instructor said would set us off and after a few minutes of discussion among ourselves, we would return to the lecture.

One of the students in a focus group noted that if you enter one of these classrooms and there are three or four students and they are talking, then you know that the instructor is boring. That student could read students' reaction to their environment.

Making the best of busy lives. The learners at the remote sites seemed to be assertive in getting things done that they needed to do for themselves. If what was happening in the classroom was not making the best use of their time, they did something else. They made phone calls. They did homework for other courses. They wrote letters. One night Evelyn paid her bills. Another night Fran went into the other classroom and took an exam for another course. Some mornings, Jacob, who was an advanced placement high school student, read texts for other courses or wrote letters to someone who I assumed was his girlfriend.

When these adult students did not see any need to be in the classroom, they went to do other things that needed to get done. However, there was one exception to this generalization. Sheila, in the elementary education course, would sometimes stay in the classroom even when she did not have to. This course provided a lot of time for independent and site-based group study during the scheduled class time. She and I would finish watching the required video and I would have no further reason to stay, but she would stay and do her homework there. I was curious about

that, but early in the term she explained that she had three children at home and liked the chance to get away from them so she stayed as long as she could.

Peter at Buffalo Creek mentioned in a focus group that, at their site, when the lecture was boring, rather than leave they would socialize because that was their time to get together. He pointed out that courses on campus meet an hour at a time during the day, but his two courses meet for a total of 6 hours on the same evening, and generally the same students are there, so they got well acquainted.

Facilitating learning. The learners had interactions with their environment that had no other purpose than to facilitate their learning. The most obvious was sharpening pencils. Students in face-to-face classrooms seldom get up to sharpen a pencil during a lecture, but at the remote sites it happened quite often. They would run out to their car to get books or supplies that they had forgotten.

In the English course there were a couple of class periods, when the general environmental sound level was up due to conversations, when two of the students moved to the front of the room to be near the speaker. Sad to say, during subsequent class periods, they joined the conversation rather than the lecture.

Group Behaviors

When one student was openly interacting with the environment, it was frequently possible for other students nearby to be drawn into the behavior. There were two main purposes for groups of students to interact with the environment, social interaction and to facilitate learning.

Contrary to the rumors that I have heard, the courses at the remote sites that I observed were not one big potluck dinner. When one person brought snacks

instead of getting them from the vending machines, they usually brought enough to share with the others, but this was only common in two of the courses that I observed, the English course and the agriculture education course.

The other women in the agriculture education course were the most pushy about it. When they brought a bag of candy, they would pour some out on the table for the other two, whether they wanted some or not. If they brought cookies, they would hand each of the other students a couple or at least insist that they have some. They did the same thing to the instructor in the human environment course the first term, as well. When I tried my best to refuse what I didn't want, their insistence increased and assistance in changing my mind was elicited from the other women nearby, students, TAs, or the instructor in the room. The sharing of food became a vehicle for teasing each other. Months later, I was still finding M & M's that I had stashed in my brief case as an alternative to eating them. Other than the pretzels that I took a couple of times, I waited until the last class period, and then I got even for their teasing and insistence. I took a fresh loaf of bread from the university's bakery, butter, cream cheese, and honey. We ate it all even though, for once, they were the ones protesting that they shouldn't be eating that much.

The group of students in the English course was the other group that liked their snacks. Their snacks tended to be healthier. They usually had pretzels, carrot sticks, dried fruit or nuts and only occasionally, candy.

Other forms of group learner-environment interactions were evident at Central City in the English course. These students made full use of the classroom. They sprawled and spread their stuff around each other, wandered back and forth to

look at something someone else had, sat on tables to have conversations, and borrowed each others books and assignments to look at.

Site Specific Behaviors

Each of the sites had their own atmosphere. The atmospheres were created by students, TAs and sometimes administrators. Many of the students knew each other from other classes, and the atmospheres from those classes carried over.

The atmospheres at the sites. The students at Woodruff, on campus, tended to be sober, quizzical, and generally shy. Even Molly was overwhelmed the first day that she walked into the Com-Net classroom. However, she was the only student that I saw play with the Live Board. During the math and especially the sociology course, the students were almost silent. Students in those two courses, generally, with the exception of Libby and Megan, came in, sat down, listened, took notes, and left. Even those two students who worked together did so quietly.

Bridger was large and business-like. Even the rowdy psychology class was efficient when one of the students was called on by the instructor. Their rowdiness tended to be a response to their impression of the course and instructor, and served to meet their social needs. They could socialize with each other while they waited for the instructor to require a response from them in the form of an answer to a question or performance on an exam. As a student in one of the focus groups said, "Where there is no accountability, there is limited response."

Fremont was small and at first appeared to be cliquish. But after being there a few days, I was drawn into the friendliness of the staff and the students, all of whom had taken multiple courses at that site. Both the administrator and the TA felt

comfortable wandering into the classroom during the courses that were taught from a distance to talk with the students. The TAs and administrator did not wander into the human environment course. That was the course where the instructor taught from Fremont, and so was present in the classroom.

The fourth course I had there was the least like the other three. This was the art course where the other student had been by herself the first class period. When she walked into the room the first day that I arrived, her body slumped and she scowled. From then on, the only conversation she and I had alone was about art. The day she brought her daughter, she introduced me to her. When the TAs and/or administrator came into the classroom, the other student and I would have a three- or four-way conversation.

Central City was the rowdiest of the four sites that I observed. Even though I only observed one course there, I could hear them on the system from the other sites during other courses. It was common to hear chatter and laughter in the background when a student at that site was speaking on the microphone.

Changing sites. Sometimes it was necessary for students to attend a class period at a site other than the one where they usually attended. Generally, the students felt at home even when they are somewhere else.

Molly has family members that live near another of the receive sites. One week she and her husband went there to visit. She attended class at the other site. When the instructor was calling on sites to see who was out there, Molly told him she was there when he called on that site. When she returned to our site, she said that it felt the same to her to be at that site instead of her home site.

One week a student from Buffalo Creek attended the history class at Woodruff with us. Later when I was conducting focus groups at Buffalo Creek, that student was included in the student focus group. She told me that she felt nervous at first that we might ignore her, but she quickly felt like she had been with us all term. It did become clear in the focus group that her site dealt with the boredom in that course differently than our group did. At Buffalo Creek, the students did a lot of grumbling and complaining about both the instruction and the quality of the sound. That site asked the instructor to try to do something about the sound. At Woodruff the students carried on their own class discussion and ignored the difficulties.

I met another student, Peter, during the focus groups at Buffalo Creek. He had to travel around the state for work. When he was on the road, he attended his classes at the site that was nearest. He stated that all the sites that he had attended were about the same. He did confirm that Central City was the rowdiest.

Early in the term in the math course, I thought I had a new student to observe. This student already knew one of the regular students and sat with her at her table. The TA was concerned that she had not been informed that a new student was joining the course. It turned out that this new student was attending this course at another site and was visiting her friend who was attending at Woodruff with us.

The Profiles of Learner-Environment Events

The number of learner-environment interaction events was not the same across classes during the term. The Data Analysis section (page 93) discussed how the profiles were created from the field notes. Figures 11 through 19 are the profiles

for each of the courses and will be discussed individually. Figure 20 is the profile for all the courses combined.

Agriculture education. The number of learner-environment interaction events per student in the agriculture education course peaked at week four (Fig. 11), but there were only two of us attending that class period. Then, as discussed in the section on learner-interface interaction, the system crashed. This left us with less to do than normal, so we found something to do. We wandered around, took our boots off, and threw things in the trash.

Art. The profile for art had peaks at weeks six and nine (Fig. 12). Both peaks reflect only one interaction event. The peak at week six was the result of being locked out because the lock on the door to the site had broken. There was nothing to do but wait, joke with the guards, and pace about until the mall security guards could break in. The ninth week, I addressed cards during the lecture.

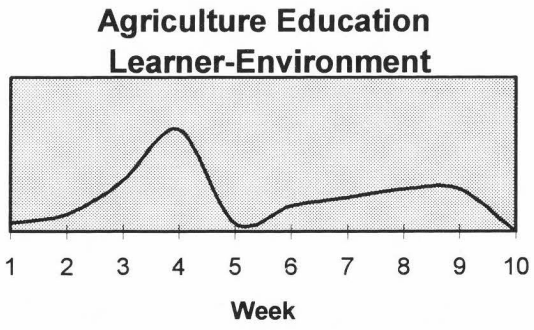

Figure 11. Profile of frequency of learner-environment interactions in the agriculture education course across a 10-week period.

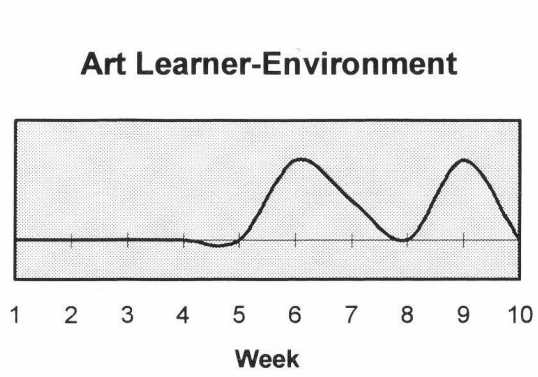

Figure 12. Profile of frequency of learner-environment interactions in the art course across a 10-week period.

Elementary education. The number of learner-environment interaction events per student peaked at week six in the elementary education course (Fig. 13). The peak was the result of a couple of events. The instructor lectured that week. This resulted in more time spent in the classroom and the subsequent addition of extra behaviors. Also, during the class period, two of the students that I knew from the psychology course came in to talk to the TA and we had a short conversation.

English. The profile in the English course was generally upward with the highest peak at week nine (Fig. 14). There was general hub-bub, students coming and going out of the room and to the vending machines and phone in the rear of the classroom. At one point the room got so noisy that the TA jokingly warned us not to wake the site administrator. That was his way of trying to get us to settle down. I don't think any of us heard much of the lecture. There was joking around about

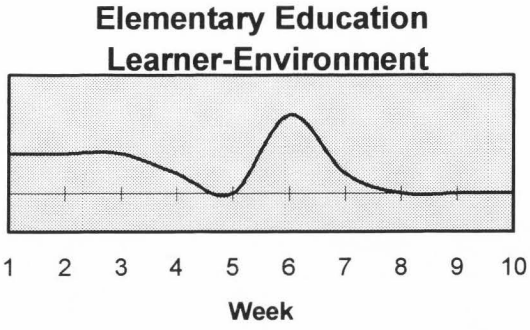

Figure 13. Profile of frequency of learner-environment interactions in the elementary education course across a 10-week period.

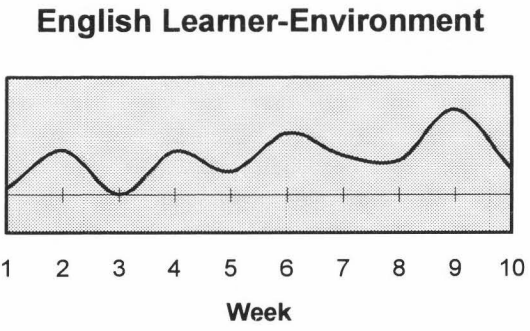

Figure 14. Profile of frequency of learner-environment interactions in the English course across a 10-week period.

Marla and Terry, in the other classroom. One of the students, Yvonne, delivered a note from Marla to Terry. As he was leaving, he dropped a note on Marla's table. She read it to us, we laughed about it, and shortly thereafter she left for the day.

History. The learner-environment interaction events peaked at week ten in the history course (Fig. 15). This was the week that Lisa was back from being ill and lay on the floor for most of the second class period of that week. Lisa also took several medications during the class.

Weeks five and eight also had peaks. During week five, several unrelated events added up to a peak. Lisa sorted all the stuff in her backpack. Molly was bored and went out get a newspaper and Lisa went out for a snack. During week eight, both Molly and I were more active than usual, going out for newspapers and snacks. Molly used the TA's telephone to call student health during the lecture.

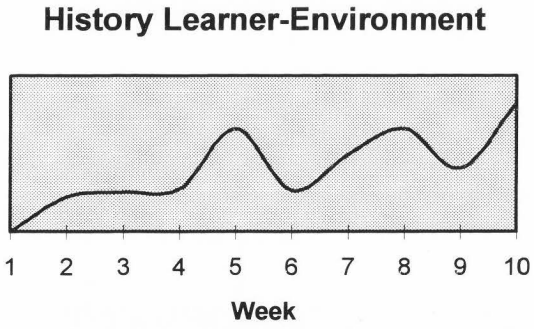

Figure 15. Profile of frequency of learner-environment interactions in the history course across a 10-week period.

Math. Weeks six and seven were the high point in the profile for the math course (Fig. 16). During the second class period of week six, several of the students left early. Again the first class period of the seventh week, several students left early. The second class period of the seventh week, the male in the course was more active than usual, sharpening his pencil, and wanting to change the tape in my tape recorder for me.

Psychology. The psychology learner-environment profile took big jumps at weeks seven and week ten (Fig. 17). Week seven was a holiday, and there were fewer students, and those who were there seemed agitated. The instructor began the class responding to the complaints that he received the week before. One of the students commented that he seemed to be getting even for the students' behavior last week. This was the night that Fran took her math exam in the other classroom.

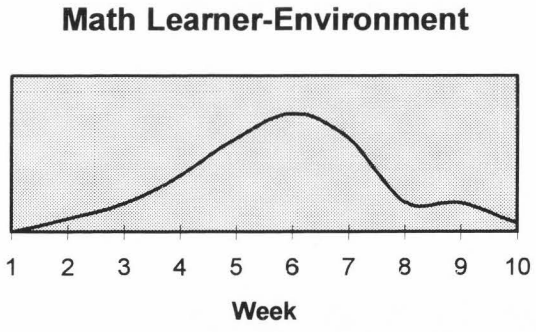

Figure 16. Profile of frequency of learner-environment interactions in the math course across a 10-week period.

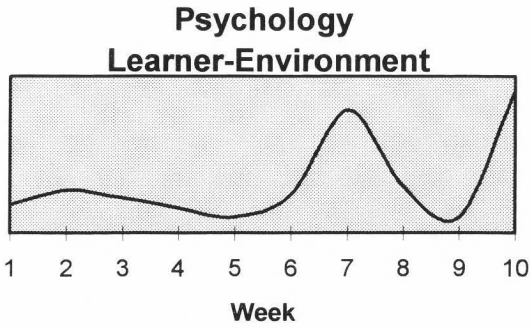

Figure 17. Profile of frequency of learner-environment interactions in the psychology course across a 10-week period.

Week seven was the first week after Sherry had surgery on her foot, so she had to hobble out to take pain medication. Evelyn was also not feeling good. She spent much of the first part of the class period with her head down; then during the break, she left for the night. Several students packed up before the class ended and left immediately.

During week ten, I saw the effects of a room that was too warm. One student was falling asleep, and several stepped out to get something to eat or drink. The general noise level in the room was down, even though conversations were still happening. Finally someone went to the TA and asked her to turn the heat down. The TA turned on the air conditioner and opened the door. Almost immediately the whole class perked up and were back to their usual noisy selves.

During week ten, the students were the busiest. The room almost looked like it was on break the whole night. People were coming and going from the room and conversing with each other about topics other than the course content. One of the students left for the night during the break. When the instructor started again, no one seemed to notice that he had started. The conversations that started during the break continued.

Science. The first class period of week eight was the class that pushed week eight to the peak for learner-environment interaction in the science course (Fig. 18). This week Rose was ill and made several trips out. She also make a couple of trips to the computer room. One of the times that Rose went to the computer room was when the instructor was reading from the text book. This instructor seldom read from the book, but he did that day. Several of the other students were rolling their eyes in frustration and disbelief. When the break was about to begin, one of the students went and waited by the door and another left. The student who left for break early was late returning from break.

Week five had a smaller peak. This was partly caused by there being fewer students in the room, thus the activity per student was greater. Rose was there and as usual she was stepping in and out of the classroom.

Sociology. During the class period of week eight in the sociology course, the instructor had us play games in pairs to teach us sociological concept (Fig. 19). These games required us to move ourselves around the room so that we could play in pairs. As soon as the game was over, all those who had moved returned to their original locations.

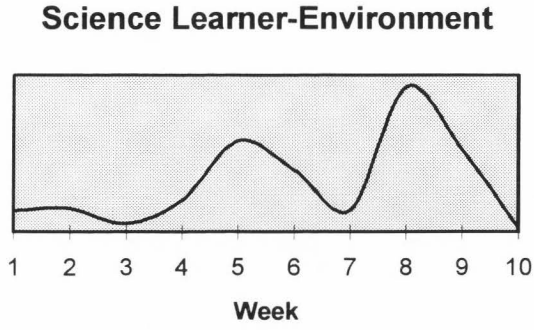

Figure 18. Profile of frequency of learner-environment interactions in the science course across a 10-week period.

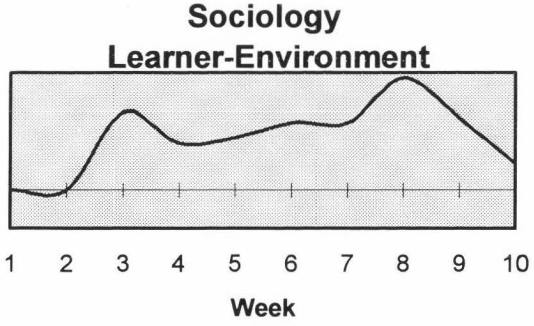

Figure 19. Profile of frequency of learner-environment interactions in the sociology course across a 10-week period.

Many of the students in this morning class tended to leave class early. Those that stayed had difficulty staying awake. After the games of week eight, more than half the class left early, and of those that stayed I was the only one who did not eventually put a head on the table, but I found something else to occupy my time in addition to listening to the lecture.

All the courses combined. The profile for all the courses combined shows a steady increase until week eight and then a slight decline (Fig. 20). This is what I would have expected before I began the study. The students started out paying attention to the instruction. As the term progressed, they were more easily distracted.

One of the students in a focus group said, "It's easier here for us to become detached collectively." Then, near the end of the term they began to worry about the final exam and final projects and their attention was back on the course again.

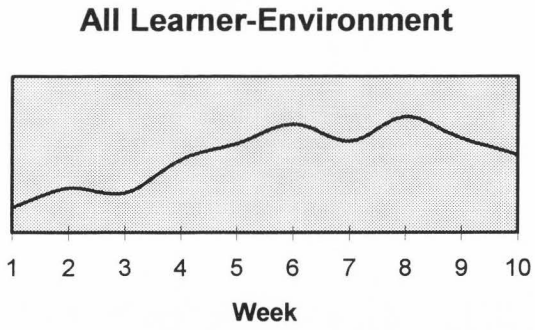

Figure 20. Profile of frequency of learner-environment interactions for all the courses combined across a 10-week period.

Attendance

Students who are not in the classroom are not receiving information from the instructors. That is not to say that they are not learning. The choice to be absent seems to me to involve learner-environment interaction because the student is deliberately choosing not to be in the environment. The choice of the students to be present or absent is another aspect of their control of their own interactions that deserves to be observed. Figure 21 shows the profiles of attendance for each of the courses and for the courses overall throughout the term.

The most notable artifact of these profiles is that many of them have a one-week drop in attendance near the middle of the term. Three of the courses show this drop at week five. One of these courses was held during the first term, and the other two were held during the second term of my observations, so this drop in attendance cannot be explained by a holiday or other out-of-class event. Two courses, art and history, did not show a one-week drop like the others, and the peak reflects the week that we had a visitor from another site. There seems to be a tendency to be a week during which fewer students attend. It appears to me that around the middle of the term when they are more comfortable with what is happening in their courses and before the end of the term rush starts is the time when more students choose to be gone.

Summary

In the receive site classrooms, the students behaved more like autonomous adults than submissive children. They took care of their own needs and did not ask for anyone's permission. The general trend was to start out the course focused,

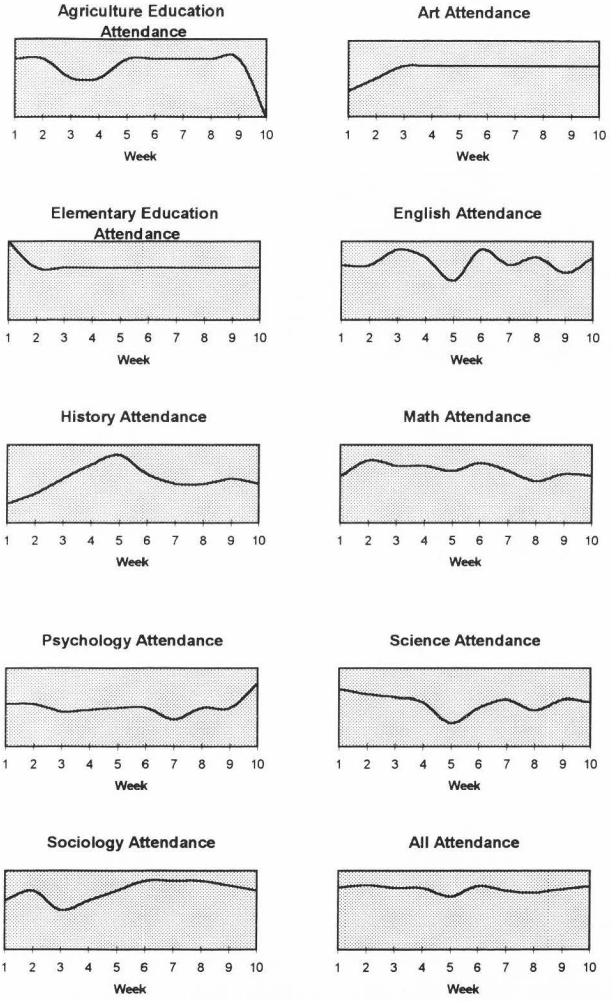

Figure 21. Profiles of attendance for each of the courses and all courses combined.

disintegrate into nonproductive activity mixed with useful activity, then become focused again near the end of the course, when the consequences were in sight.

Instructors lost the students' attention by being predictable. If they always lectured, read from the book, or did not demand that students answer questions or participate, the students could take the time to do other things. Instructors could lose the students' attention if they lost their respect. Instructors lost students' respect when they did not quickly and enthusiastically respond to a student's question, told anecdotes that did not apply, retold a story that only tangentially applied, left the students to do something on their own and left the send site, or treated the students as though they were children.

The students seemed comfortable with this set of learner-environment behaviors. Students could move from one site to another and not feel out of place. These students found the level of learner-environment interactions that accomplished what they wanted. They could both meet their own needs and meet the requirements for the course.

Learner-Instructor Interaction

The interactions that happened between the learners and the instructors can be looked at in several ways. There were those interactions that were encouraged or influenced by the mediating technology. There were the class-time interactions during lecture time of questions from the instructor and questions or responses from the learners. There were the behind-the-scenes interactions of homework, exams, and consultations that were in evidence during class time. There were interactions between the instructor and individual students, between the instructor and specific

sites, and between the instructor and the entire class statewide. I was also able to observe a group of students and their interaction with the instructor present and again with the instructor at a distance during the two terms.

Influences on the Interaction by the Mediating Technology

The mediating technology frequently influenced the interactions between the instructors and the learners. In a variety of ways, the interface provided a means of enhancing instruction, a hindrance to an instructor's usual mode of instruction, a blind for learners to hide behind, or one more thing to keep in mind when getting or providing an education.

Enhancing instruction. Probably the most important thing the mediating technology did to assist the interaction between the learners and the instructor was to provide a means to copy the notes on the board for the learners. The writing that the instructors put on the board could be saved at the remotes sites and printed out for the students.

Laura, at Bridger, normally printed the board notes for each of the students in the science course. She made sure that everyone, including those that had missed the class, got a copy. This method of printing board notes was also used to assist the students at those sites that did not have the Live Board, and so could not see what the instructor had written. Pat, at the university, would print the notes, then fax them to the "blind" sites.

The instructor in the business course used this process in reverse. She prepared her graphics ahead to be displayed during class. She had them printed and faxed to the "blind" sites before class began so that they could follow along.

Hindering the usual mode of instruction. Instructors in the focus groups reported that those instructors who, in face-to-face classrooms, used slides or overheads, demonstrated laboratory principles, or made use of visual feedback from students found the Com-Net delivery system to be a hindrance. The system for displaying slides and overheads was improved the term after I finished my observations, but it was still in its infancy during much of the observation period.

Two of the instructors who used slides and overheads found another way to continue with their usual method. The instructor in the art course, rather than being able to show a slide, limited himself to referring to photographs in the textbook. Rather than being able to point to a section of the painting or picture of a sculpture to discuss a specific feature, this instructor had to make more use of verbal descriptions of pictorial information.

The agriculture education instructor provided copies of all his overheads in an extended syllabus which the students purchased. Whenever the system permitted, he tried to display the overheads on the delivery system so he could write on them. When the Live Board went down, he could still refer to the syllabus. However, without the visual system, he could not annotate on the board like he normally did. The advantage of the syllabus to students was that they did not have to copy what was on the overhead before they could add his additional notes or add notes of their own. They already had most of it in front of them. His extended syllabus allowed flexibility in his interactions with the learners.

The instructor for the elementary education course had laboratory assignments that were to be done by groups at the remote site in the remote classrooms. Because the instructor was in a different location, the TAs became the

facilitators of the laboratory experiences. The instructions for the students were written explicitly in a workbook that the students had purchased. All the necessary samples and equipment were sent to each site prior to the start of the term. The students followed directions, made observations, and wrote results and responses in their workbooks. These workbooks were graded at the end of the term. I believe it would have been more beneficial if the whole class had been able to see the experiments as a group and had the instructor present to guide the observations and answer questions. But both the instructor and the students did the best they could.

Hiding the students and instructors. Without visual interaction with each other, the students and the instructor could hide from each other, deliberately or accidentally. Each could respond in ways that they would not want seen. They sometimes forgot that the others couldn't see the visual communication they were projecting.

Students hid deliberately when they were not prepared for class. Sometimes this required the collusion of fellow classmates. The instructor would call on a student by name, there would be a long pause, then someone would say that the student wasn't there. I saw it happen in one of the classes that I observed. The student who was called on shook her head and another student keyed her mic and reported that the student wasn't present. On one holiday evening, in the psychology course, we got a good laugh. The instructor called on a student at another site by name. A female voice responded that the student wasn't present. So, he asked for another student at the same site, same female voice, same response, "She's not here." The instructor called on another student at the same site, same response. The instructor repeated the process one more time. Now, the female had a problem.

There were only four students enrolled at that site, obviously someone was there, and this was the fourth name. So, she had to answer the question, but we heard giggling in the background while she answered. Obviously, others were there, too, but she got stuck with the question.

Normally, instructors did not call on students by name. So, sometimes the instructor would get no response at all. When there was no reply to a question, instructors used a couple of methods to respond to the situation. The sociology instructor first called on a specific remote site; if still no response, he then called on a name at that site. Another instructor waited a few seconds, then answered the question himself. The science instructor did a couple of things. If he called on a site, someone usually responded. He sometimes prepared the students for response by assigning problems to be done, giving some time to do them, and then asking for the answers.

Sometimes the students did not hide deliberately; it was just convenient to not be truly present with the instructor. For example, during class discussions, it was common for the groups of students at each site to have their own discussion. Then, they shared the ideas that they thought were the best or most pertinent to the existing statewide discussion. As another example of convenient hiding, it was common for students to say something to the instructor without opening their mic. Of course the instructor did not hear them, but the other students at the same site did. The speaking student responded to the instructor but not so that the instructor could respond back. It was, in a sense, a way of talking to their fellow students, but not directly to any of them. Sometimes, it was done with humor in an attempt to get a laugh. Sometimes, it was a way of showing knowledge to the others.

Without seeing the instructor, it was easier to forget that there was a person attached to the voice. One day, in the agriculture education course, I brought a newsletter from another site to show my fellow students. There was a picture of the instructor in the newsletter. When we were finished looking at it, I laid it aside on the chair next to me. A couple of times I caught his picture out of the corner of my eye and discovered that when I could see the picture of the instructor, I felt guilty about talking out loud in class, no matter what the content of the conversation was.

Sometimes students said things to the instructor that I have never heard in a face-to-face classroom. In two of the courses, elementary education and psychology, after an exam, students were quite rude to the instructor. They were blaming the instructor for their poor exam scores. For example, in the psychology course, after the first exam, Evelyn commented to the instructor, "I'm a 4.0 student, and I got a C+. I think there is something wrong with your test." It was only females who spoke directly to the instructor. The males at our site had some things to say without the mic, and encouraged responses from the most vocal female at the site where I was observing.

During the insulting discussion that happened after the first psychology exam, a mic at another site got accidentally locked on. A male voice could be heard making a loud disparaging remark. Everyone else on the system was dead silent. The students at the site where I was observing were the quietest they had been or would be all term. They waited to see what would happen. After a second or two, the instructor quietly said that there was an open mic. He had to clear his voice and repeat it before the offending site closed their mic. No one on the system said a word about it.

When one of the students was hostile to the elementary education instructor, he laughed self-consciously, responded that what she had to say wasn't very nice, and went on to something else, taking control of the class, again.

Hidden students sometimes made demands of the instructor that they would not otherwise make in a face-to-face classroom. Several times in various courses, someone would arrive late at their site, and demand to know what problem we were on, or what we were discussing. Once in the science course, one of the students had to leave early and demanded that the instructor give him the answer to a problem that the whole class was working on because he had to go.

Instructors sometimes do things they do not want seen, too. When the instructor was present in the human environments course, she would sometimes turn her mic off and say something to the three of us there in the room with her. She also made faces of encouragement or disparagement about something a student at a distance was saying.

An unintentional consequence of the instructors and the students not being able to see each other is not knowing when the other is ready to begin, ready to continue, or even in the room. During the history course, the instructor sometimes lectured on for almost an hour without any response from the students. When this happened, he would suddenly stop and ask if anyone was out there, and sometimes asked if the system had crashed. Someone usually answered, "We're here", or "Site x is here." He would then continue right on where he left off.

Of the 11 courses that I observed, only 4 of the instructors gave regular breaks during class. Those courses were English, psychology, science, and sociology. The usual way to begin again after a break was to announce beforehand

how long the break would be, then when it was time to begin class again, the instructor announced that it was time to begin. But, there was no way of knowing if everyone was back in the classroom, or if they were out of the classroom, and no way to know if the instructor was back and about ready to begin.

Keeping the interface in mind when interacting. The mediating technology seemed to always be in the back of the mind for both the instructor and the students when they interacted. First, many of the instructors were tethered to the system by their microphone cord. They were literally tied to the students. Second, the students, in order to interact with the instructors, had to press down a switch on their microphone. They had to make an effort to respond. Both students and instructors in the focus groups mentioned the technology in the same sentences with comments about their interactions with each other.

I did not observe or hear any indications that the technology made the instructors nervous. But, I do know that the students sometimes were nervous, especially if it was one of the first few times that they had used the microphones. There was an imaginary sea of faces out there in addition to an instructor that they created in their imaginations.

Instead of body language to give clues, vocal mannerisms became important. One day in the math course the instructor had difficulty with one of the problems. I heard her voice drop and become almost monotone. She sounded discouraged. Then I listened as her voice became more and more animated until she was back to her usual enthusiastic self. We could not see her distress, but we could hear it.

Instructors found themselves making use of the writing board differently than they would a regular white board in a classroom. Several of the instructors

commented on how nice it was to have colors to delineate categories in their notes. Instructors in the classrooms where I have taken courses seem to use one color until the pen runs out of ink or they tire of the color. Then they change colors. There are a few who make use of the visual delineation of color. However, this was more common in the distance courses than I saw in my face-to-face courses.

One of the biggest differences that I noticed was that the instructors did not add to portions of the information that they had written earlier and already scrolled passed. They rewrote, or redrew the portion they needed. This preserved the sequence of the notes for those students whose visual contact with the instruction happened after class when the notes were faxed.

Student Groups in Interactions

Interactions happened between individual students and the instructor, between the group of students at a site and the instructor, and between all the students in the course statewide and the instructor. There was a variety of purposes for interaction between the students and the instructors. Some interaction was related to the content, and some was related to the process of acquiring the content. This differentiation in the subject of the interaction will be discussed in a later section. Most of the interaction between the instructor and the students involved questions and answers whether the topic was the content or the process. The only difference was that some of the process issues were handled before or after class if it related only to specific sites or students and not the class as a whole.

Many times, a student would ask a question of another student, and only if the other student did not know the answer would the first student ask the instructor.

One of the students in a focus group remarked, "On campus if you have a question, you go to the instructor. Here we usually can resolve the questions among ourselves without even opening the mic. Sometime we ask a question on the mic and another site has an answer or a reference." At other times several students at a site would want a question answered and would convince one of the students to ask the question for them. Even after the instructor answered the question, sometimes one of the students would explain the answer to one or more of the other students at their site. Students interacted with the instructors both as individuals and as members of a site.

The instructor and individuals. The most common interaction between the instructor and an individual student was question and answer. This went both directions. Students asked questions of the instructor, and instructors asked questions of the students.

Asking questions by the students was the most common in the math course. The math instructor was extremely flexible and graceful. She could complete the material planned for the day and answer all the detailed questions that arose at the same time. It never slowed her stride to redo an example with a different explanation to help a student. In return, her students did not hesitate to ask their questions.

The male student in the math course had a history of difficulty with math. One day he reported to the TA that he had just gotten the highest score he had ever gotten on a math exam. That day he participated more on the mic than he ever had, but it tapered off over the next few class periods to the previous level.

Perhaps the best instructor for asking detailed questions of the students was the science instructor. Some of his students actually began competing to see who could answer first. In our classroom, we had one student, Sharon, who was willing to use the mic and speak the answer, but she could not always come up with the answer the fastest. Her partner, Sue, and others helped by pointing out the answer or telling her quickly. Their competition was with a student at another site who usually had the first answer, and sometimes volunteered answers when questions were not asked. But, the method the students used at the site where I was observing was competition with the other student at the other site through interaction with the instructor.

Questions that required thought were asked most often by the students in the history course. Those students asked a lot of why questions. The history instructor seemed to enjoy answering these questions, and the answers were usually interesting. The sociology instructor asked the most questions that required thought on the part of the students. But the students seemed to be hesitant about answering. This may have been because, as I noticed, his sense of humor sometimes poked fun at an individual student. This did not seem to happen when a student answered a content question, but it did happen to me once when I answered a general question about events at the site where I was attending. I know that I felt some pressure to have good answers so that he would not laugh about me. And I did not respond sometimes because I did not think that my answer was good enough.

The English instructor encouraged the most interactive exchanges of ideas between herself and students and between students at different sites. She

sometimes called on students at other sites and asked them what they thought about what someone else had just contributed. She was very good at remembering her students and what they had talked about in the past. Yvonne at our site was from another state, and the instructor would ask her questions about the culture in that other state when it had a bearing on the discussion.

The instructor and students at a specific site. Sites seemed to have within themselves a general demeanor in their interactions with the instructors and in the content of that interaction. Sites as units could have differing opinions of the instructor. I became very aware of this in my student focus groups. The students at the site where I was observing the history course were enthusiastic in their liking for the instructor. When I conducted a focus group at Buffalo Creek, Linda, who had visited our site, reported a different opinion of the instructor among the students at her site. Without knowing of Woodruff's opinion, she spoke about how difficult it had been for us (collectively, statewide) to get the instructor to solve the problem of poor audio quality. She assumed that all the students statewide felt the same. I remembered during class that students at Buffalo Creek were the ones to interrupt the most often to try to get the instructor to speak more plainly. The instructor tried to improve the quality, but complained that he would have to stop being so enthusiastic about the subject matter in order to keep his voice at a monotone. The students at Buffalo Creek took that response on his part negatively; the students at Woodruff, where I was, took it as kidding.

In general, students at Clifton thought that the instructors considered the distant students to be less capable. They told me, during their focus group, about one instructor who actually called the distant students "hicks." Those students

further reported that they proved the instructor wrong. They told me that the mean scores of the students at a distance were better than the mean scores of the students on campus in the same course.

The students at Buffalo Creek seemed to think the instructors and the administrators who assign instructors do not care about the distant students. They told me stories about trying to reach instructors outside of class time. The told me that instructors do not return phone calls. They told me, "They must tell grad students that they have to teach this course because they are the low man on the totem pole. Generally the teachers with seniority don't want to teach." Consequently they believe they get instructors with poor English and speaking skills and have difficulty understanding them. One of the students summed it up this way, "They make the investment in the technology. You'd think they'd make the investment in the level of instructors."

The students at Claymont did not seem to have a strong opinion about the instructors in general. They were grateful to be able to get their education without leaving their community. They spent as little time as possible at the site. Most of them had small children at home.

In listening to the students who were in the courses that I was observing, I could discern the general attitudes of the site. Students at Woodruff, when they expressed an opinion, seemed to like their instructors. However, because most of these students were in face-to-face courses most of the time, they were used to a variety of instructors. Students at Fremont have other universities near by, and their attitudes seemed more like those of the students at Woodruff.

Students at Bridger seemed to tolerate the fact that they had to be at a distance and I got the feeling that they thought instructors were a nuisance. These students were the most demanding about turning in assignments at times different from when they were due, and taking exams at other times than when they were given in class.

The students at Central City had the worst attitude about the instructors and university as a whole. However, they had a good opinion of the instructor of the course that I observed there. A few of the students spent quite a bit of time discussing and criticizing instructors that they had during their program.

Students at the origination site tended to ignore the students at other sites. They wanted to respond to the instructor without using their mic. Most of the instructors insisted that those students repeat their comment or question using the mic. If the instructor did not remind the student, a student at a receive site might ask for a repeat. However, sometimes we could hear short asides and jokes initiated by the instructor at the origination site that were not repeated. We found this to be the case as well in the human environments course. We sometimes said quick things or made faces at the instructor in the room with us.

A few instructors occasionally exhibited differences in their interactions with some of the different sites. These differences seemed to be based on the familiarity of the instructor with some of the sites. The sociology instructor knew other groups of students from his travels around the state, and so, he could personalize some of his comments to students at those sites. The science instructor was the most likely to assign responses by site, but typically, each site was assigned a problem and

given a few minutes to work it out. Then he would go through the problems, and ask the site responsible for that problem for the solution.

The instructor and students statewide. It seemed to me that in general, instructors treated the entire group of students statewide as a unit. However, the students responded as individuals or sites. Unless the student was in the same room as the instructor or the instructor knew the student by voice, there was no way for the instructor to know who a specific student was. The students were the most familiar with the students in the room with them. There were a few students who knew students at other sites by voice, but in general it was the local site versus the rest of the state. The students knew who they were and where they were.

The English instructor took attendance regularly. Rather than seeming to isolate sites, it seemed to bring the class together. We knew who and where the other students were. The history instructor asked each site how many were and sometime who was there. This gave him a audio survey of his class.

A consequence of this delivery system was the typical inability to sense the consensus of the entire class. Sometimes an instructor would ask if the class wanted to do something or wanted something handled a certain way. If the question was especially important, a large proportion of the students would simultaneously give one word answers or sound effects to indicate their opinion. For example, if the instructor wanted to know if the students would rather get an exam over with by having it as scheduled, or would rather postpone it a week to have a review, the instructor might ask if the class wanted to postpone the exam. The consensus could be measured by groans or cheers. One night, the psychology instructor, when the

students complained about his exam, suggested that he give them an essay exam. There was a general statewide clamor of NO!

Focus of Interactions

At the beginning of the courses, when instructors were discussing what would happen over the span of the term, students began to ask for clarification on a few topics. These questions were related to what exams would be like, how they would be graded, and what assignments they have to do and when. Most of their questions had to do with the out of class time interactions. The interactions that happened outside of class time involved homework, exam results, and instructor/student consultation.

Homework. The transfer of paper from the sites to the instructors and back to the students was probably the most frustrating part of the whole system for both the students and the instructors. Frequently, by the time the students had feedback on the first assignment, they did not have time to make use of that feedback for the second assignment.

I have heard instructors say that they assigned less homework because of the amount of time that it took for one assignment to go back and forth. But, I had some instructors say that they assigned the same amount of homework as they do when they teach the course in a face-to-face classroom. Those instructors that assigned the same amount of homework were still frustrated by the turn-around time. One of the instructors in the instructor focus groups told me that she gives her home address to the students, so that the homework does not have to go through the university system first. She then grades homework as she gets it and returns it

to the students immediately. She pointed out that she had to grade based on criteria rather than comparing one student with the other students.

The history instructor solved the problem for one of the critical assignments that required feedback before the next could be started. The students had to write a description of the paper that they wanted to write for the term. One class period after he had received all the assignments from the students, he asked each student if they were willing for him to give them his feedback over the system with everyone statewide listening, or if they preferred to wait for the paper to come back to their site. Nearly all wanted his input right then, rather than wait. They were willing to have everyone hear their idea, and the instructor's feedback so that they could begin their papers immediately.

Exams. The problem is the same for exams. I heard more than one student complain that they did not have the results of the first exam before they had to take the second. They did not know whether they had done well, and met the instructors expectations, before the second exam date arrived a few weeks later. Apparently this happened often enough in this system that even though I only saw it happen a couple of times, as the day approached for another exam without the results of the first, the students would begin to make worrying comments to each other, the TAs, and the instructor.

Those exams that required more thought and explanation on the part of the students took longer to get back. The exams that came back fastest were those that used objective questions and computerized grading. Scores were faxed to the sites, and the actual test form came back a few weeks later. Between the two events, the instructor could go over the exam and explain which answers were correct.

Perhaps the worst problem of turn-around time was for students in the elementary education course. This instructor had a tight grading scale. Only a few points could be missed for the entire term to get an A. However, exams and homework could be "recycled." That is, the exams and homework could be corrected and returned for a new grade. When the course was taught face-to-face, it was possible to return the papers more often and so those students had more chances. These students at a distance were limited in the amount of feedback that they could get.

Instructor/student consultations. There did not seem to be much interaction between the instructors and the students off the system. Students could call or e-mail the instructors, but most of the instructor/student consultations, questions, and clarifications seemed to happen on the system before or after the class period. In one of the student focus groups, one of the students wished out loud that some of the instructors would have some of the students call them outside of class rather than take up the time of the entire class statewide. In another case, a student waited until class was almost ready to begin to ask the instructor if he had gotten her e-mail. She told him she was wondering because she had not gotten a message back from him, yet. At yet another site, a student who was not in the focus group, but happened to be in the room during the focus group, told about two instructors of the course she was preparing for. They had said they would be at the site frequently and for extended periods of time so that the students could talk to them. Not only did they not come often, they left right after class, and were impossible to reach on campus. That student was smiling cynically.

In focus groups, students complained that some of the instructors were slow about returning phone calls or e-mail. According to one of the students at a focus group, one instructor did not return phone calls all term.

The Interactions With and Without the Instructor Present

Because of serendipity, I was able to observe the same group of students at the same site in two similar courses: human environments and agriculture education. Both of these courses dealt with adult education. The first term in human environments, the instructor delivered the instruction at a site distant from the university but at the site where I was observing. There were several other receive sites across the state. The second term in agriculture education, a different instructor delivered the instruction from the university campus. I was observing the same group of students at the same remote site. The interactions between the learners and the instructors were very different.

When the instructor was present, the students looked to her for guidance and leadership. They responded to her rather than to each other or to students at other sites. The instructor had to remind and urge the students to use their mics.

When the instructor was at a distance, the students found their leaders in each other depending on the reason. Some students were better leaders when it was time to figure out how to do the homework assignments. Some were better when it came to getting assistance from the TA. The students responded mostly to each other within the room. The mics were not used any more often, but the students were discussing more. The students were talking to each other.

The biggest difference was that without the instructor in the room, more conversations were carried on. It was a much noisier room. This was not necessarily bad. When the instructor was there, any conversation was limited to specifically what was being said on the system. Without the instructor present, the conversation usually expanded on the topic of that week's course material. With the expanded syllabus, and one ear tuned to the instructor not much was missed. The material was augmented by the conversations.

The Profiles of Learner-Instructor Events

The amount of learner-instructor interactions was not the same for the courses across the term. Figures 22 through 30 are the profiles, discussed in the data analysis section, for each of the courses and these will be discussed individually. Figure 31 is the profile for all of the courses combined.

Agriculture education. Week one was actually the week with the most learner-instructor interactions per student in the agriculture education course (Fig. 22). During this week, in addition to the usual interactions, all the students across the state introduced themselves to the each other and the instructor.

There were two other weeks in which the learner-instructor interactions were high. Those weeks were six and seven. During week six, Anne decided to see how many responses of "good" from the instructor she could get, rather than having him just go on with the lecture. She told Judi and me that she had been feeling like either she was giving the wrong answer and the instructor was too nice to say so and went on, or that her input was unappreciated, so she decided she would respond until either she got a "good" or he told her to stop talking. She got three

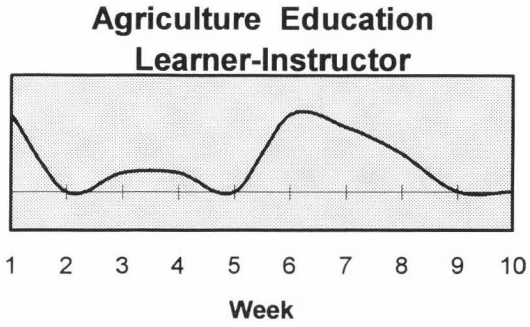

Figure 22. Profile of frequency of learner-instructor interactions in the agriculture education course across a 10-week period.

"good"s. And she had fun. During week seven, we all were more participatory than usual. Even I responded on the mic.

Art. The peak at week one in the art course was the result of having only one student in the room, and that student having at least one interaction with the instructor (Fig. 23). The remainder of the term, there were two students in the room and never more than one interaction with the instructor during a class period.

Elementary Education. During week six of the elementary education course, the instructor spent more time than usual lecturing (Fig. 24). He also called on sites to offer ideas for him to choose from to use as an example for further development of the principle he was trying to teach. Consequently, week six had the highest peak because of the increase in opportunity for interaction with the instructor, and the instructor's call for interaction. Overall the instructor spent more time with the students during the last half of the term than he did during the first half.

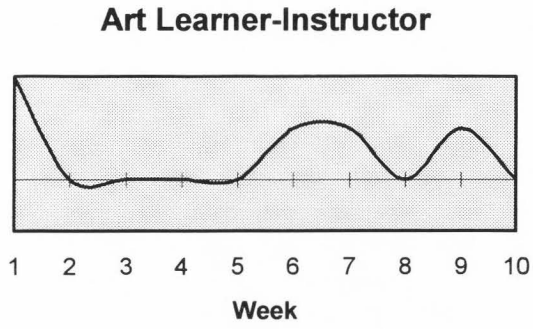

Figure 23. Profile of frequency of learner-instructor interactions in the art course across a 10-week period.

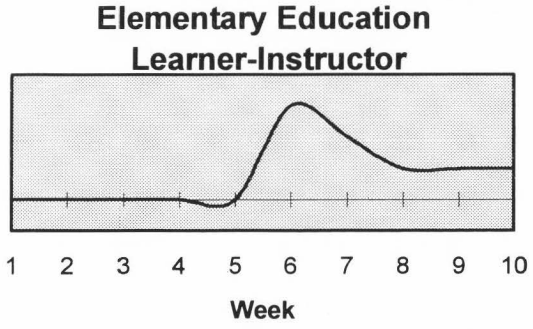

Figure 24. Profile of frequency of learner-instructor interactions in the elementary education course across a 10-week period.

English. The topic of the class for week four in the English course was occupational folklore (Fig. 25). It was a very interactive class because nearly everyone could tell a story about jokes and stories that go on at their work site. Nancy, a blond, got the statewide class going on blond jokes. Marla, a substitute teacher, got going on the way substitute teachers are treated by the regular teachers. Other teachers around the state joined in. This site, being an active, distractible, and fun-loving site, interacted more when one of the facets of the content was humor.

History. Weeks five and seven were the highest in the History course (Fig. 26). The midterm exam was given during one of the class periods on week six, or that week might have been the highest week.

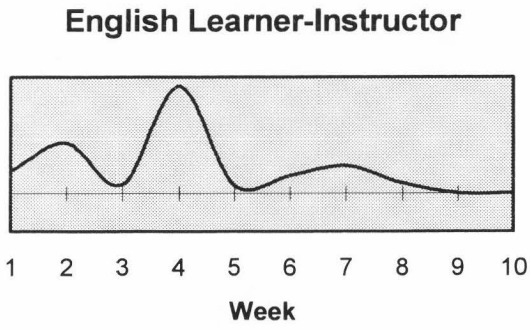

Figure 25. Profile of frequency of learner-instructor interactions in the English course across a 10-week period.

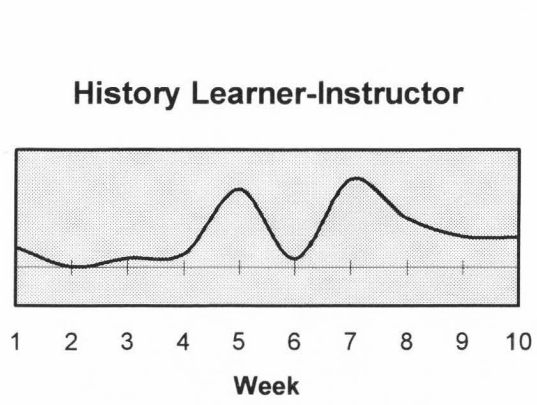

Figure 26. Profile of frequency of learner-instructor interactions in the history course across a 10-week period.

One of the class periods of week five was the class period that Linda was visiting from Buffalo Creek. She informed the instructor where she was. But, it was the second class period of that week that was the most interactive. That class period, we had a class discussion about a book we had been assigned to read. The instructor had a list of the names of the students that were present at each site and threatened to call on those who did not participate. I participated twice early on. I had not been able to read the entire book and wanted to talk about the part of the book that I had read. Molly was even more vocal than usual, but because of the discussion much of her contribution was done with the mic open.

The first class period of week seven was the day that Lisa's mother came to class for her. Lisa was in the hospital and her mother came to take notes for her. That day, Molly talked more on the mic and less to the rest of us at the local site. I

know that she likes to talk a lot and tell stories, so I wonder if she felt that it was more appropriate to talk on the mic that day than to the local students. She may have felt a little shy around the middle-age mother.

Math. The interaction in the math course rose steadily with a big upswing near the end of the course (Fig. 27). The students at this site began to ask more and more questions of the instructor. These questions were both about content, how to work problems, and about process, when exams were coming back and what page was being discussed.

During the first class period of the final week, Megan asked a question on the mic. Before the instructor could answer, Donald prompted the instructor by repeating the question. Donald tended to try to take care of the rest of us. During

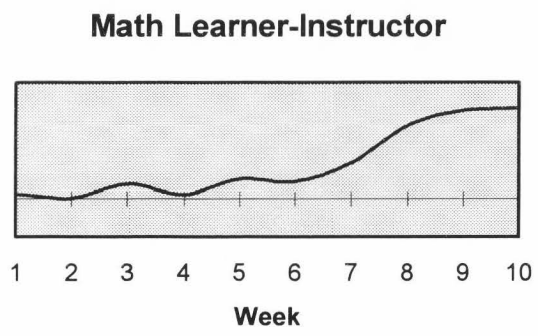

Figure 27. Profile of frequency of learner-instructor interactions in the math course across a 10-week period.

class periods that late in the term, questions about all the material for the term were being asked in preparation for the final exam.

Psychology. It was week six, after the first exam, the week we got the exam results back, the week the students were hostile to the instructor, that the students had the most interaction with the psychology instructor (Fig. 28). The exam scores were given out right at the beginning of the break and the students had all of the break to build up steam. When class started again, they exploded across the state.

There was even interaction via fax. Evelyn had the TA fax a copy of a study guide that another instructor uses on campus for the same course.

By the end of the class period everyone that I could observe was tired. A mic got left open at another site again. That was the third time that night. This time, rather than the other site sounding like they were in chaos, too, the students were

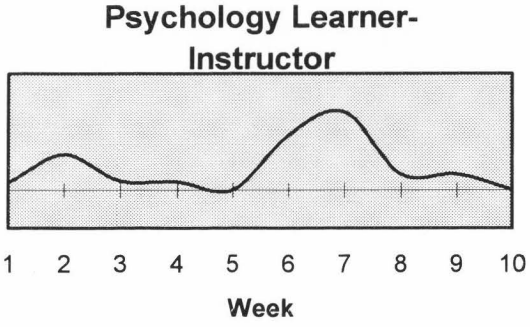

Figure 28. Profile of frequency of learner-instructor interactions in the psychology course across a 10-week period.

quiet. The students at the site where I was observing were quiet and deflated. Even the TA let one of the students remove a message from the board rather than get up and come in herself. She had never let anyone do that in that class before.

The next week, week seven, was almost as busy. That was the evening of a holiday. The instructor had given all the sites a problem, and we were to respond. There were fewer students in the room that night, so more opportunity for higher per student interaction ratios.

Science. The learner-instructor interactions peaked during weeks six and seven in the science course (Fig. 29). The two students who worked together most of the time and responded to the instructor the majority of the time were absent during week five. The last of that series of four classes during weeks six and seven prompted two of the quieter students to complain to the TA after class about the distractions in that room.

One of the interactions was a method of sending a message to the male student at another site who always had an answer. He had taken class time to try to show that there was an error in a diagram in the text. The instructor convinced him, and the rest of the class, that there was no error. Sharon's response to the time taken on this useless task was to ask the instructor if this information was going to be on the exam.

Sociology. The first week of the sociology course, the instructor made an effort to get to know who his students were and how many he had (Fig. 30). He asked for more interaction that week than later in the course.

I was called on by name during weeks one and two. During week five, one of our students asked about getting our quizzes back. Woodruff was called on

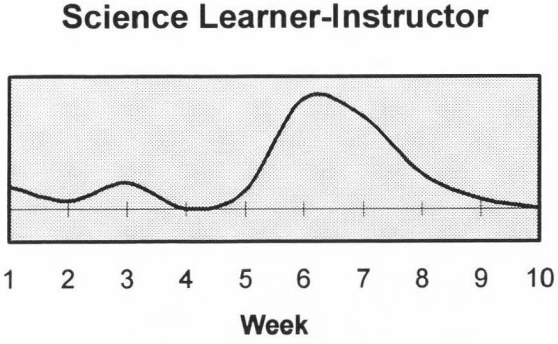

Figure 29. Profile of frequency of learner-instructor interactions in the science course across a 10-week period.

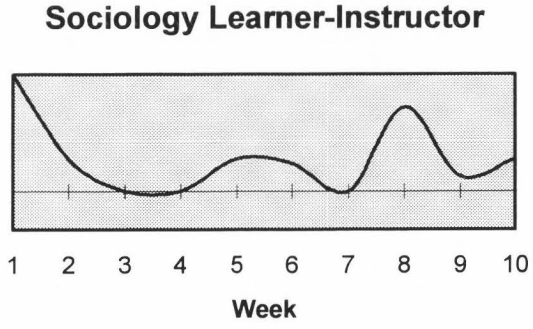

Figure 30. Profile of frequency of learner-instructor interactions in the sociology course across a 10-week period.

during week six. I nodded to one of the other students and he answered. I was prepared to answer, but I had already done more than my share. Week eight was the week that we played games in class. I prompted another student to respond during the last week of class again. These students were the shyest of all the groups that I observed. It was hard for me to keep myself that reserved so that I did not interfere with what would happen naturally.

All courses combined. I would not have expected the learner-instructor interactions to taper off the last 3 weeks of the course (Fig. 31). If I had predicted what would happen before I began the observations, I would have predicted that the last 2 to 3 weeks would have been the highest because students were trying to get ready for final exams.

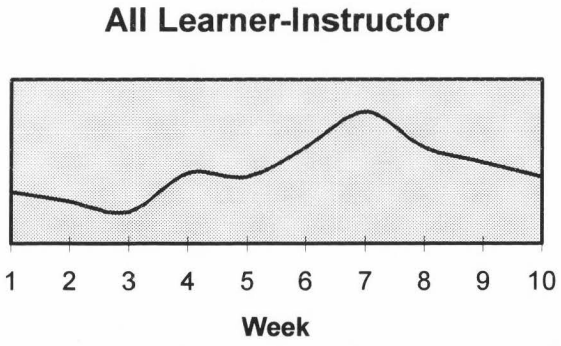

Figure 31. Profile of frequency of learner-instructor interactions for all the courses combined across a 10-week period.

Six of the nine courses, agriculture education, elementary education, English, history, psychology, and science, all tapered off the last few weeks of the course, bringing the overall profile down. Only math, art, and sociology remained the same or went up.

The first two weeks of the term, students were eager to know what would be required of them, then by week three they were trying to get any papers or projects started. By the middle of the term, they were beginning to ask about exams and the results of homework.

Summary

Students' interactions with their instructors at a distance were influenced both positively and negatively by the mediating technology. Students and instructors both used the abilities of the technology and hid behind it. For the most part, they made the best of a substitute situation. The students could not attend courses on campus so they were grateful to get what they could.

Interactions happened most often during class time. The time it takes for homework and exams to go back and forth meant that homework and exams were used for an assessment tool rather than a teaching tool. Direct contact between the students and the instructors required extra effort and was irregular between the class periods.

Learner-instructor interaction may further be described as individual-instructor interactions, site-group-instructor interactions, and state-class-instructor interactions. Each was influenced by the others.

Based on what I observed, there are things instructors can do to increase both positive and negative interaction with their students. Positive interactions can be fostered by giving a little time to prepare an answer, calling on students by name, involving the non-school lives of the students in the discussion, or encouraging site discussions with reports of the best responses. Negative interactions are inflamed when an instructor gives a poor exam, seems to waste the students' time, calls on students out of the blue during a boring lecture, or does not wait for a student to respond but instead, gives the answer.

Both instructors and students are responsible for starting and maintaining the interaction between them, because they both benefit.

Learner-Learner Interaction

In a face-to-face classroom, there is at least one instructor and usually more than one individual learner. In the Com-Net system, there is one instructor and more than one classroom, each containing one or more learners. The learners I observed were not as independent of each other as students who have an instructor present and instantly available. The students in the Com-Net system relied on each other more regularly and for more reasons than learners in a face-to-face classroom. There were multiple communities moving down the same path. Each of the sites that I observed had its own flavor and each of the groups of students had its own culture.

In a face-to-face classroom, any discussion or behavior in one part of the classroom influences the rest of the group. That is not the case in the Com-Net system. Students, for the most part, only influenced the rest of the students at their

own site. The social structure of the students in the Com-Net system had two layers to it. The outer layer consisted of all the students statewide. The inner layer was all the students at each site.

There were several facets to the learner-learner interactions at the sites that I observed. The categories of the subject matter of their interaction fall on a continuum from the current topic of the course at hand to life in general outside of the course. Learners interacted for a variety of reasons. Throughout all the learner-learner interactions, some interactions were helpful to the learners and some were harmful. There were cases where the same interaction was helpful to some students and distracting to others.

Interactions Within the Layers

Interactions for these students happened between themselves and other students statewide, or between themselves and other students at their site. The students preferred to interact with someone at their site, and only then, if necessary, with another student in the state.

Statewide interactions. Learner-learner interactions statewide were discussions, arguments, and assistance. Occasionally the interactions were originated by the instructors, but generally all the interactions were short, spontaneous, and initiated by a learner.

Discussions were the interactions most commonly originated by instructors. The instructors tried to have discussions across the interfacing technology. But, most of the discussion happened at the sites. The history course was a good example of this occurrence. While the whole class was discussing a book, each site

was having its own discussion and reporting what they considered to be the best responses to the entire class statewide.

Helpful, but short, discussions were initiated by the English instructor. She started discussions by hearing what someone had to say, then, knowing her students, she would call on a specific student to respond to what the first student said.

Individual presentations and discussions across the mediating technology were required by the instructor in the human environments course. These presentations were assigned during the first class period for delivery throughout the term and could be presented by single students or small groups of students. All the students who chose to present in a group, chose to present with others at their own site, not with students at other sites, even though that would have been possible and acceptable. The presenters were required to involve the rest of their classmates statewide in both the discussion and the evaluation of the presentation. That course seemed to participate in the most interaction between all of the students statewide than any of the other courses I observed.

Arguments across the sites usually followed a criticism of the instructor by a learner at a receive site. This happened in the psychology and the elementary education courses. In each of those two courses, one student was rudely criticizing the instructor's exam when another student asked the offending student to drop it so the entire body of students could get on with the course. The argument in the psychology class was short but sharp. The first student, at the site where I was observing, was complaining and criticizing the exam, while the second student at some other site asked if our student would stop because "Some of us are here to

learn." The student at our site responded sharply, "That's what I'm trying to do." The offending student at our site did stop.

In the English course, one student asked another student to not butt into the discussion so much. It was not said very tactfully. The students at the site where I was observing were stunned by the sharpness, but expressed to each other agreement with the request. They then spent the next few class sessions waiting for the reprimanded student to come back to full strength. She did come back to full strength, much to the delight of the students where I was attending.

One of the students, at another site, in the science course tried to assist the rest of the students statewide to understand the material, and, from time to time, help the instructor organize what should come next. I will called this student Steve. The students at the site where I was observing found Steve's behavior to be disturbing. Many times when they heard his voice they looked at one another and rolled their eyes in disbelief. Once, Sharon answered a question the instructor had asked. The instructor asked her for clarification. She was about to answer when Steve jumped in and explained her answer for her. If this had been a face-to-face classroom, Steve would have heard Sharon hissing.

One night in psychology, the instructor was calling on students to answer questions, and lecturing in between. As usual, the questions were all asking for definitions. All these definitions could be found highlighted in the margins of the textbook and he asked them in the same order as they were presented in the text. One night as he was lecturing, a student at another site interrupted and asked the instructor which page he was on. He chuckled and responded that he was "just talking about stuff." That was not a good enough response for a male student at

another site. He quickly keyed his mic and gave the page number to all the students statewide. Pages flipped at my site. We had all been lost, too.

Site-based interactions. Learners in the Com-Net system identify with their site and with their community. One of the TAs in a focus group told me that when students from the various towns around this site come to the center, they tend to sit together by town in the classroom. I talked with some students who had attended a class or two at another site. They said they felt at home at the other sites. But, students generally did not choose to move around when they could, but did not have to. The students at a specific site seem to behave more like a class than all the students statewide.

Unless the instructor makes it an issue, students in the room with the instructor seem to forget there are other students in their course. When they speak to the instructor or to the class as a whole, they generally do not key their mics. The instructors are usually sensitive to this, and remind them to use the mics, but sometimes it takes a reminder from another student at another site.

As I have already discussed previously, class discussions took place at the local level first, and then were shared with the rest of the students. However, this was not only the case with formal instructor-planned and -initiated class discussions. This happened during spontaneous class discussions. Site discussions happened regularly in some courses at some sites even while the instructor was lecturing. The courses where this happened most often were agriculture education, history, math, and science. Sometimes the local students lost track of what the instructor was saying during these discussions, and sometimes they listened to each other and the instructor at the same time. The group I observed in the agriculture education

course was probably the best at this. We would be discussing what the instructor had been talking about, and all of a sudden one of the local students was making a comment about what had just been said by the instructor, but using the new information from our ongoing conversation. The students in the history course did this quite well, too. Molly had the ability to be talking to the other classmates at her site about her family's history, or what she had learned in her previous history courses. Suddenly, she would think of something to add to what the instructor was saying and key the mic and jump into the statewide discussion. That was a little startling at times.

Sometimes the conversations at the sites had nothing to do with the content of the course. This was the most common in the English and psychology courses. However, the students in both of these courses managed to interact with the instructor and other learners about the topic at a moment's notice. Some of the students seemed to have one ear on the lecture while carrying on other conversations in the room where they were.

Some of the learner-learner interactions happened within a site but between different classrooms. At Central City, students in parts of each classroom can see students in parts of the other classroom. Students leaving one of the classrooms pass through the other classroom. In the English course, one of the students, Marla, was interested in one of the students in the other classroom. Notes were passed back and forth, and faces made through the windows.

At Bridger, the TA's desk is in one of the classrooms, so if students from other courses wanted to talk with the TA to get papers back or schedule exams, for

example, they came into the classroom. Sometimes, if they knew the other students in the room, they stopped to talk for a little while.

The Focus of the Interactions

There is a continuum that describes the focus of the learner-learner interactions. This continuum moves from the course content currently being discussed by the instructor or the class to life in general, including jokes and gossip. I describe this continuum as having six steps: current course content, the course content in general (past and future content), information related to the course content, the process of obtaining the course content, the process of getting an education, and life in general.

Current course content. The best examples of this were the class discussions. The current content was the topic being discussed at the time. Typically any learner-learner interaction that remained on the current content at a local site during a lecture was very short and served to clarify what the instructor had just said. It was typical for a student to first ask a quick question of another student, and if the second student did not know the answer, then the instructor was asked. Most questions were answered by another student.

Future and past content. Other students answering questions happened frequently in the science course. Sue and Sharon worked out problems and compared their understanding of the material with each other. They would both take notes, then check to see if they had the same thing as the other. They would see if they could apply what they had just learned to the next step in the book. They

would decide together if what was said by the instructor was something they should memorize for the next exam.

Discussion about the course content not simultaneously being discussed by the instructor happened often in the agriculture education course. Both of the other students had a good background in the content and could relate what was being discussed to other parts of the content and their own experience. I probably learned more in that course from the other two students than I did from the instructor. Of course, I was paying more attention to the other two students.

Content related to the course content. Frequently the topic of the conversation in the agriculture education course strayed from the topic of the course to how the content related to home and work. Thus, the topic of the conversation became related to the course content, but was not exactly the same content as what was being currently discussed by the instructor or the content of the course.

On the way to unrelated content in the English course, the conversation commonly passed through topics that were related to the course content. For example, the topic of one class session was work-related folklore. Then, as an example of work-related folklore, the class statewide discussed jokes at work. Soon, the students at the local site were talking about blond jokes, and from there strayed to what it is like to be a blond.

The process of obtaining the course content. A necessary part of getting an education is the processes that are required along the way. Some of these process might be turning in and receiving back homework assignments, preparing for exams, or scheduling presentations.

In the English, agriculture education, and history courses, the students talked with each other to see if they had the same understanding about what was required for their term papers. In the science course, Wendy arranged with Sue and Sharon to have them tape a class when she had to be absent. Sharon arranged to have Sue tape a class and copy her notes when she had to be gone.

The process of getting an education. Late in the term, when it was time to register for the next session, students would talk with each other about what classes they were going to take, who the good instructors and advisors were, and what the work load was like for other courses. Earlier in the term, the learners discussed what other courses they were taking, what the instructors were like, and what the work load was like.

The evening I spent in the lobby of Bridger the majority of the conversation was about what courses they had completed, what grade they received, who to take a course from if possible, and what the assignments had been. Slightly less frequent were reports to each other about how close they were getting to graduation. Finally, when they ran out of things to talk about having to do with getting an education, they would talk about their families and jobs.

The students in the English course were a cynical group and had advisors they liked and those they did not like. They shared their horror stories and helpful stories with each other. The other two students in the agriculture education course had taken several courses with each other, and shared with me what they thought of the other instructors and how they taught their courses.

Life in general. These learners were adults with busy lives. They had families, and many had jobs and careers. They brought with them their own

experiences. Some of them have spent years together. So, it is not unusual that they would share information about their lives with each other. From conversations I heard, there was not very much socializing with each other going on outside of the sites. These learners were too busy to get together with each other anywhere else. So, all their socializing with each other happened in their classrooms.

It would have been easy for me to become friends with some of these students. In fact, I wonder how some of them are doing. I wonder how Judi's daughter's wedding was. I wonder if Sherry can get more time away from her teen-agers to attend courses. I wonder if Yvonne got accepted into the graduate program she wanted. I wonder if Marla ever did get a date with Terry. I wonder about Evelyn's baby. What did she have? Did Sheila pass the course? Did Sandy keep hiking all summer? What is Rose's e-mail address? If I felt this way, I can imagine how close some of these students must become when they spend years together in close and intense situations. I did not have to worry about passing or failing, but I had to worry about passing as a student.

Categories of Learner-Learner Interactions

To facilitate comparison of the courses, I have further condensed the six steps into three categories of learner-learner interactions based on observations and discussions. These three categories are course subject matter, course process, and topics not related to the course. Table 15 lists the courses and the percentage of learner-learner interaction that fell into each of the three categories. These three categories are further discussed in the section on subjects of interaction.

Table 15

Percent of Learner-Learner Interactions That Can Be Classified as Related to Course Content, Course Process, and Not Related to the Course

Course	Percent course content	Percent course process	Percent not related
Agriculture education	39	38	24
Art	64	18	18
Elementary education	38	58	4
English	32	21	47
History	61	22	17
Math	54	36	11
Psychology	28	36	36
Science	56	23	22
Sociology	42	42	17
All courses combined	47	29	24

The percentages of content interactions in the math and science courses that are higher than all the courses combined resulted from students who were helping each other with the content during the lecture. The percentage of content interactions in the history course was the result of the additional material Molly presented to her classmates. The content interaction percentages in art and sociology were the result of not much interaction going on at all in the classroom, so the interactions that were the most frequent were directly related to the content and not to each other.

The percentage of process interactions in the elementary education course that was higher than the percentage for all the courses combined was the result of those things we did when the instructor did not lecture. The process of deciding what we were going to do during the time specified as independent study boosted that percentage. Generally we watched the required videos, but sometimes we talked about the project and the lab assignments. The process interactions in the sociology course were again the result of a low percentage of interactions that were not related to the course content. In this case most of these interactions were the process of giving quizzes to the TA.

The relatively high non-content/non-process interactions in the psychology course shows the general atmosphere in this classroom. Even so, at least one student had an ear on the instructor, and could bring the students back to the instruction. It was necessary when the instructor called on that site or someone specifically at that site. Somehow, a student was able to quickly get the attention of the class, and describe the situation. For example, "Hey, he's talking about the exam." All conversations would stop, and attention was focused on the instructor.

The non-content/non-process interaction in the English course shows the general demeanor of that group of students. Much of the time was spent socializing.

The Purpose of Interaction

There were purposes for the interactions between the learners that could be seen or inferred from the learners' behaviors. These purposes included clarifying information, adding information, relieving boredom, socializing, and being guided to interact by the instructor.

Clarifying information. During lectures, if a learner did not quite understand an idea or concept, the usual practice was to turn to another classmate and ask quickly for clarification. Clarifying interactions were usually quick and initiated by the student who was confused. If the clarifying interaction was maintained for any length of time beyond one or two sentences, it was generally the confused student who asked another question. If no one in the classroom was able to assist the confused student, the student either decided to figure it out alone, or asked the instructor. This type of interaction happened most frequently in the math and science courses. The content in those two courses was delivered quickly and in small bites. It was easy to turn to another student and ask for a quick answer.

Adding information. In some courses some students had more knowledge and experience in the subject matter than others. Those with more knowledge added additional information to that being presented by the instructor. These conversations could go on for quite some time. Sometimes the listeners would ask questions of the other student, or add their own knowledge. Sometimes the first student would continue talking without much more encouragement than someone looking at them. This happened most in those courses whose subject matter accommodated stories such as history and English. Sociology and psychology might have seemed a natural for this purpose for interaction, but the students in sociology were more quiet than the students in the other courses, and the students in the psychology course talked about a lot more than the content.

Relieving boredom. Boredom did not necessarily mean the instructor or the course was boring. It may have been the time of day or night, or a single student was unable to concentrate, or the subject of that particular day's lecture contributed

to periods of boredom. Interactions that resulted from this boredom were usually initiated when one student found something funny or interesting to share with one or more other students. Sometimes the individual would make a couple attempts to start a conversation and give up when others would not join, but usually other students were in the same state and all of them would carry on a conversation until something else required their attention.

Socializing. These students not only spent hours together during a single course in a single term, but many of them also had spent more than one term together in their educational program. They came to know one another and socialize with each other. Because nearly all of them have busy schedules, the most time they had for socializing was during class time. Some of the socializing was carried on into the class period from a conversation started as they were arriving and class was starting or returning from a break. Socializing that began during the class period seemed to erupt almost spontaneously when some other event acted as a trigger. Almost anyone would start it, and anyone and any number of other students would join. The subject might be family, work, or other courses. The conversations that contained socializing sometimes started out being a discussions of the content, then drifted to how the content impacts their lives and then drifted to something else about their lives away from the content. Sometimes it would drift back to the content, but usually something else triggered a new interaction type or topic.

Guiding by instructor. A few instructors directed students to work on problems and projects together. Problems usually were short and the responses were reported quickly, usually within minutes. Projects generally took the entire

term. The science instructor had sites work problems together; then he started back around the sites and asked someone at each site to give the answer. If the answer was incorrect, he worked that problem on the board. The elementary education instructor had two group interaction methods. First, the lab sessions were done at each site. The students recorded their observations in their individual workbooks and turned the workbooks in to the instructor for grading. Second, there was a term-long project that was turned in by groups of students at the end of the term and the same grade was assigned to each student in the group for that project.

The students with me in the agriculture education course told me about another course they were taking. Students could choose to work independently or together in pairs on an exam. Those who worked together were expected to meet different, more difficult requirements than those who worked alone.

The purposes of interaction compared. Table 16 lists the purposes of the interactions between the learners, who initiated the interaction, who maintained the continuation of the interaction, and what stopped it.

Peer Groups

One of the observed dynamics of the learner-learner interaction was that in many cases interactions happened regularly within distinct groups of learners. These groups were almost like the cliques found in grade school and high school classrooms. I called these groups peer groups. These peer groups consisted of students at a particular site in the same course who learned or socialized together regularly. When I refer to the students in a course, I am only referring to those students at the site where I was observing unless otherwise stated.

Table 16

Interaction Purpose, Initiation, Maintenance, and Conclusion of Learner-Learner Interactions

Purpose	Who initiated	Who and how maintained	How stopped
Clarifying	Confused student	Confused student needing more information	Clarification or asking of instructor
Adding information	Student with additional information	First student or receiving student	Run out of information or other attention getting event
Relieving boredom	Bored student	All interacting student	An attention getting event
Socializing	Interested student	All interacting student	An attention getting event
Guiding by instructor	Instructor	Groups of students or instructor	Task completed

These peer groups formed early for working or socializing together and continued as a group throughout the term. Sometimes other students joined a group later in the term. All of the peer groups began as a pair of students. Because many of these pairs grew to form a larger group I began to think of the original pair of students as a nucleus. Groups grew from a two-person nucleus. In all but one case, when there were more than two students in the course, these pairs eventually included other learners, forming a larger group. For the purpose of this discussion, a peer group consists of two or more students. Some peer groups remained two students and some grew.

Of the 11 courses I observed, peer groups formed in 9. Only one of the peer groups formed because the instructor required group effort on some of the

assignments. The formation of the rest of the peer groups was voluntary. The required peer group was in the elementary education course. I do not know whether this peer group would have formed without guidance from the instructor. Of the nine courses in which peer groups formed, two had only two students in the course, at that site, and could not grow.

In the math course, which had more than two students, the initial pair, Libby and Megan, refused admission to another student, Donald. No one else attempted to join and that group remained a pair. Two courses, psychology and science, had two pairs in the course. In each of those two courses one pair grew and one did not grow. That is, in each of those two courses one pair of students had other students join them and one pair of students remained a pair. The two-person pairs that did not grow did not refuse admittance, but the location of the pair in the room did not encourage the inclusion of other students. Table 17 compares the number of students in the courses and the kinds of peer groups that formed.

Two of the courses did not form peer groups. These two courses were art and sociology. The art course had only two students at Fremont, one of those students was me. I was a week late joining that class, because I was the only student at another site at the beginning of the art course, and so, I changed sites. The other student at the new site had been the only student at that site until I arrived. She was well known to and friendly with the TA and did not seem happy to see someone else join her. When she walked into the room, and I was already there, her face tensed and her body slumped. She never did become very friendly and kept to herself most of the time.

Table 17

The Number of Students and Kinds of Peer Groups Formed in the 11 Courses

Course	Number of students at the site where I observed	Pair only, or pair that included other learners
Agriculture education	3	Pair with inclusion
Art	2	No group
Business	2	Pair only, no inclusion
Elementary education	2	Pair only, no inclusion
English	9	Pair with inclusion
History	3	Pair with inclusion
Human environments	3	Pair with inclusion
Math	8	Pair only, no inclusion
Psychology	11	1 pair with inclusion 1 pair, no inclusion
Science	10	1 pair with inclusion 1 pair only, no inclusion
Sociology	6	No group

The sociology course was a senior-level course and the students at Woodruff, where I was observing, were more familiar with face-to-face courses held on campus. The primary method of instruction in this course was lecture with some questions directed to specific students or to all the students at a specific site. There was no apparent reason why this group of learners did not form a peer group. Table 5 shows information about these courses which might be considered while looking for differences to account for the failure to form a peer group.

I thought perhaps these students did not form groups because, being on campus, these students were more familiar with being more independent of other students, but both of the other sets of students at the same site formed peer groups. I thought perhaps students about to graduate were more serious and withdrawn than other students, but all of the other sets of students in a senior-level course formed peer groups. I thought perhaps there were so many of them, that they did not feel a sense of unity, but all of the other collections of more than three students at a site formed peer groups. I thought perhaps 8 a.m. was too early to be animated enough to interact, but two of the three other sets of students who met at 8 a.m. formed peer groups. I thought perhaps meeting only once a week did not foster the continuity required to become a group, but nearly all of those courses that met once a week had a peer group. I thought perhaps having the TA in the back of the room inhibited interaction among the students, but all the other sets of students with a TA visible formed a peer group. I am left with no demographic explanation for the failure of this collection of students to form a peer group.

Types of groups. There were two types of peer groups. There were groups whose primary focus was the content of the course. I labeled these peer groups "content groups." These content groups, even though they were interacting with each other more than they were the instructor, were focused on the course material, and were paying attention to the instruction to some extent. The other type of peer group added a particular attitude to the classroom. These interactions were not focused on the content, but rather, provided a helpful and comfortable or distracting flavor to the classroom. The primary purpose of these groups was socializing. I have labeled these peer groups "attitude groups."

One of the content groups was evident from the first class session in the science course. The pair in this course consisted of two women in their late thirties sitting together in the middle of the right-hand side of the room. I knew by watching that they already knew each other. As I later learned, they had known each other since they were children. This course was the first college-level course for the younger of the two, Sue. Both were nervous about being in a science course, but the older more experienced one, Sharon, took the role of helping her younger partner. Throughout the course they were in almost constant communication with each other, and after the first few weeks, with other learners. Their communication consisted of answering questions for each other, clarifying and repeating what the instructor was saying, and checking the other's notes to see what was written. During the term, they began to involve other students around them. First they involved a high school advanced placement student, Jacob, who usually sat behind them. Sue and Sharon took a motherly tone with him and he shyly tried to answer their questions about science, but hesitated to be an authority on the subject.

The next student involved in this peer group was a student, Wendy, who sat across the aisle from this pair and who was frequently late for class because of her children and bad weather. Wendy began joining the peer group by asking the pair to help her catch up when she arrived. After a couple of weeks, Sue and Sharon automatically included Wendy in some of their frequent communication.

The next student involved was a young women, Paula, sitting in front of the pair. Paula was at first drawn into the peer group's conversations by overhearing them, then, as the term went on, she turned her chair partially side ways to be more continually involved in their group. Finally, by the seventh week of the course they

were beginning to involve me and the woman sitting next to me, Rose, by asking us questions when they did not understand a point being presented by the instructor. But, Rose and I did not become part of their peer group.

About midway into the term, Rose had moved next to me in the last row on the left, to be able slip out to the computer room to print assignments and check her e-mail. We began to work together when either of us felt it necessary or the instructor assigned problems to be worked in groups. We formed a quieter pair and did not seek to expand. A very few times the young woman in front of me turned around and asked for clarification, but she did not become part of a peer group with Rose and me.

In the psychology, like the science course, one of the students, a middle-aged woman, Sherry, moved back to the rear left row next to me a few weeks into the course. We were a quiet, content, pair-only group.

One of the most obvious attitude groups was in the psychology course. The nucleus of a peer group that set the atmosphere of the classroom began the first night. The two young women, Evelyn and Fran, had been classmates before. They sat in the front right corner of the classroom. From week one, they began to make sarcastic remarks about the instructor and students at other sites. Evelyn was the instigator. The second night the instructor was having trouble with his mic cord. He asked the TA at his origination site what to do about it. Evelyn's response, without keying the mic, was, "Maybe we could choke you with it." It was Evelyn who told the instructor that there was something wrong with his exam. It was Fran who was accused by the TA of giving her a dirty look when she asked us to quiet down.

During week two, a couple more students, who sat right behind Fran and Evelyn, joined them. During the class following the first exam, nearly all the students were involved and bonded to each other by their criticism of the exam and the instructor. Sherry, the woman sitting in front of us, Bonnie, and I were the three exceptions to the general negative chatter. Sherry was vocal about supporting the instructor. Bonnie had gotten one of the four highest scores on the exam in the entire state, and so, she was being teased by most of the other students in the room. I had tied her with one of the four highest scores, too, but after seeing what they were doing to Bonnie, I decided to keep my mouth shut, especially because some of them knew I was only auditing. I didn't want to draw unnecessary attention to myself. I didn't join, because like Sherry I knew a little about the instructor and gave him the benefit of the doubt, and I don't behave like that towards other humans.

Eventually, throughout the course, some of the students' attitudes began to soften, and they never became firm members of the attitude peer group. The group that remained throughout the course as the attitude peer group was Evelyn, Fran, and the two students who sat behind them. One of the males (Bob), when he was present, sat in the rear and responded to the remarks of the attitude peer group and initiated his own remarks. The attitude peer group did not usually hear Bob's remarks but when they did, they responded favorably to what he said. Table 18 lists the types of peer groups found in the nine courses in which peer groups formed.

Formation of the groups. There were two ways that a pair was formed. Some pairs were formed when one student saw another student who was able and

Table 18

The Type of Peer Group in the Nine Courses Where Peer Groups Were Formed

Course	Focus of peer group(s)
Agriculture education	Content & attitude
Business	Content
Elementary education	Content
English	Attitude
History	Content & attitude
Human environments	Content
Math	Content
Psychology	Attitude Content
Science	Content Content

willing to help them during class. Pairs were formed when two friends who knew each other from previous courses began the course as a pair.

One example of an ability pair was seen in the math course. One of the students (Megan), the young woman, who did some traveling early in the term, missed a few classes. She attempted to elicit help from other students, but most of the other students ignored her. Finally about the fourth week she sat down next to Libby, who was a serious student, and began to work with her in a serious manner. From then on, they were a pair, but they did not involve other students, and so, that peer group did not grow. As the pair in the science course did, they worked

Table 19

The Reason For the Formation of the Student Pair in the Nine Courses Where Pairs Formed

Course	Reason group formed
Agriculture education	Acquaintance
Business	Ability
Elementary education	Ability (required)
English	Acquaintance
History	Ability
Human environments	Acquaintance
Math	Ability
Psychology	Acquaintance Ability
Science	Acquaintance Ability

problems together. Only when one of them could not answer a question for the other would the confused student ask the instructor for help.

An example of a pair formed by acquaintances was the peer group in the English course. This was an attitude pair. When those two very young women (Marla and Debbie) walked into the room together the first day, the whole atmosphere changed. They talked and joked most of the time they were in the classroom. They interacted between themselves and when possible with other students. Two of other students (Yvonne and Carla) knew them and were quickly drawn into the peer group. All the students were influenced by them and

participated with them at some time during the course. However, the pair's behavior was more disruptive than anyone else's ever became. They frequently arrived late and left early. All of the other students tried to varying degrees to ignore them, but usually they failed, because this pair was very entertaining.

The growth of the groups. Not all learners were included or included themselves in peer groups. Two courses had only the two students that formed the pair and could not grow. Those courses were business and elementary education.

The pair in the math course excluded one learner (Donald) who tried to join. This pair usually ignored all the other learners in the classroom. Donald, the only male student in the course, saw the benefit of having other students to work with during class. About half way through the course, he moved to a seat behind the pair and tried to enter their conversation by making comments and asking questions about the content. Libby and Megan ignored his remarks as much as possible, and after a few class sessions he moved back to his original seat.

In the science course, three of the students refused to be included in the peer group. Two of the noninvolved students who complained to the TA separately that Sue and Sharon were disruptive during class.

In the human environment and agriculture education courses, which had the same students, the quantity and quality of the interaction changed from the first term to the second term. During the first term, the instructor was in the room. I was drawn into the peer group by the previously acquainted pair. The instructor was drawn into the interaction during times when other students at other receive sites were presenting and the instructor did not have her microphone open. The instructor joined with us in discussion of the presentations, ate snacks with us, and

Table 20

The Amount of Inclusion of Other Students in Peer Groups in the Seven Courses That Had More Than Two Students and Peer Group Pairs

Course	Inclusion of other students
Agriculture education	Total
English	Partial
History	Total
Human environments	Total
Math	None
Psychology	Partial None
Science	Partial None

shared stories during times when the system was down, or we were waiting for something. The second term, when there was a different instructor at a different site, our three-student peer group included attitude interactions in addition to the content interactions. However, the content interactions still remained the majority of the interactions.

Peer groups compared. There were two kinds of peer groups that commonly formed in these classrooms: content based and attitude producing. These peer groups were prompted by two different kinds of events. Of the four groups that began or behaved as attitude groups, three were started by students who were acquainted before the course began. Content-based peer started by students who

felt insecure in their ability to acquire the information alone or preferred learning while interacting with other students.

The attitude groups usually received some of the attention of the group of students as a whole. They are generally entertaining. While the content groups are beneficial for the students that are involved, they may be disruptive to other students nearby who prefer to learn alone. Table 21 summarizes the information about the peer groups.

The Profiles of Learner-Learner Events

The number of learner-learner interaction events during the terms varied within the courses. Figures 32 through 40 are profiles that show the relative amounts of learner-learner interactions for each of the courses. Figure 41 does the same for all the courses combined.

Agriculture education. In the agriculture education course, during week seven there was the most activity between the learners (Fig. 32). Oddly, for about 20 minutes during the class period, Anne was talking about an experience she had in the past week, Judi was actively ignoring her by leaning forward, keeping Anne out of her peripheral vision and listening very intently to the instructor.

I tried to find a balance between interacting with Anne and being impolite. At first, I felt that by encouraging her I was interfering in the interactions I was trying to observe, and interfering with her acquisition of the subject matter. Finally, I decided I would behave as I would if I were genuinely a student. If I was interested, I listened; if the instructor interested me more, I listened to him instead. Finally, Anne finished talking about her life and joined in on the course topic. She was as active

Table 21

Student Peer Groups and Their Demographics

Course	Number of students in course	Inclusions in pair	Focus of group	Source of beginning	Inclusion of other students
Agriculture education	3	Pair with inclusion	Content & attitude	Acquaintance	Total
Art	2	None	None	None	None
Business	2	Pair only	Content	Ability	Total
Elementary education	2	Pair only	Content	Ability	Total
English	9	Pair with inclusion	Attitude	Acquaintance	Partial
History	3	Pair with inclusion	Content & attitude	Ability	Total
Human environment	3	Pair with inclusion	Content	Acquaintance	Total
Math	8	Pair only	Content	Ability	None
Psychology	11	Pair with inclusion &	Attitude	Acquaintance	Partial
		Pair only	Content	Ability	None
Science	10	Pair with inclusion &	Content	Acquaintance	Partial
		Pair only	Content	Ability	None
Sociology	6	None	None	None	None

about the topic as she was about life. Most of the interactions that day were initiated by Anne. On most days the interactions were initiated almost equally among the students.

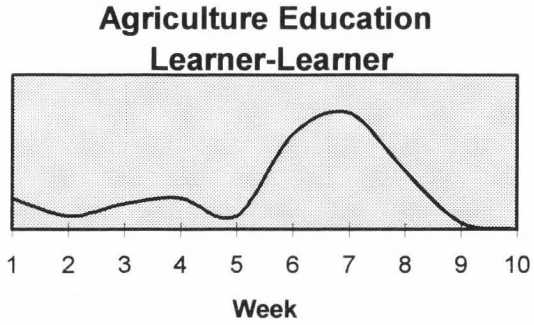

Figure 32. Profile of frequency of learner-learner interactions in the agriculture education course across a 10-week period.

Art. Week three in the art course was the week the other student and I first met (Fig. 33). I was at another site for the class period during week one. The class was canceled by the instructor for week two. Even though we were just meeting, nearly all of our conversation was about the content of the course.

Elementary education. The primary peak of the elementary education course came during week six (Fig. 34). Part of that interaction was guided by the instructor. He told each site to come up with an example of a use of crystals that had never been done before. He would use that example to continue on with his demonstrations of a course design to teach about crystals.

During this same class period, Sheila checked with me to make sure she understood how assignments were to be done and turned in. Sheila also loaned her copy of an article we were to read to me. I had the TA copy it for me.

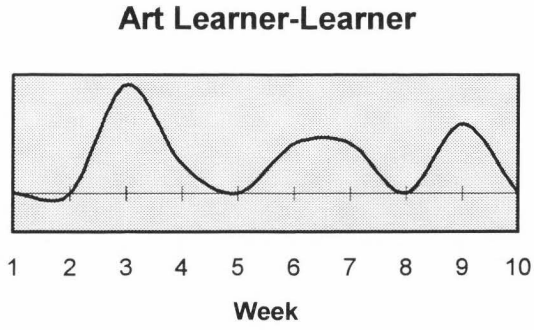

Figure 33. Profile of frequency of learner-learner interactions in the art course across a 10-week period.

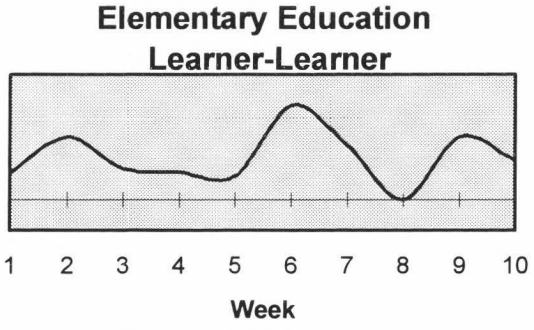

Figure 34. Profile of frequency of learner-learner interactions in the elementary education course across a 10-week period.

English. The learner-learner interactions in the English course started out at its highest point (Fig. 35). Most of the students knew each other from other courses and used this class period to catch up with each other. This class period set the tone for the rest of the term.

During week four, both the students who were usually the quietest and sat near the front so they could hear what the instructor was saying were drawn into the general socializing. Nancy is a blond, and was drawn into the blond jokes. She had heard a lot of them. One of the students had joined the course late, and had to miss several classes. She typically tried to pay close attention, but even she was drawn into the general interaction. At one point during this same class period, Yvonne encouraged and pressed Marla to make a comment on the mic. Marla did not think she should, but eventually she did, and it was received well by the instructor.

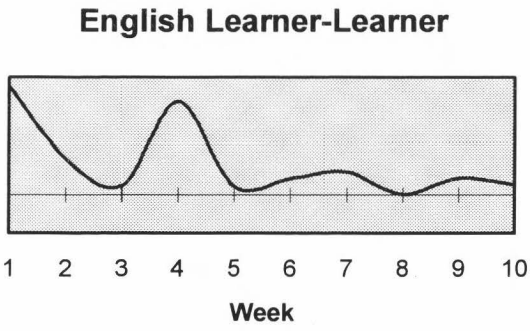

Figure 35. Profile of frequency of learner-learner interactions in the English course across a 10-week period.

History. In the history course, week six might have been the highest, but there was an exam during one of the class periods of that week (Fig. 36). Consequently, week five is the highest with week seven being high as well.

The first class period of week five we had a visitor from Buffalo Creek. The class members at our site got acquainted with her. The second class period of week five was a class discussion of a book we were to have read. Like the other sites I could hear when their mics were open, our site had its own discussion.

The first class period of week seven had all of the learner-learner interactions for that week. Lisa was in the hospital and her mother was there to take notes for her. Whenever there was someone new, Molly took them under her wing and made sure they knew what was going on. There were no learner-learner interactions during the second class period of week seven because I was the only one there.

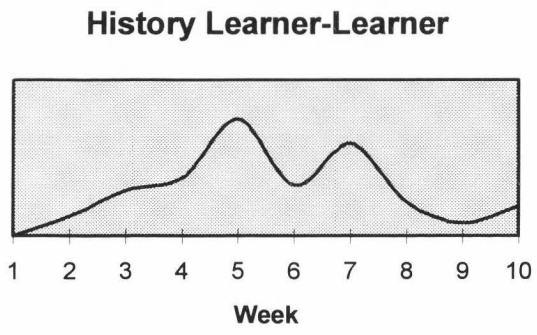

Figure 36. Profile of frequency of learner-learner interactions in the history course across a 10-week period.

Math. Most of the learner-learner interaction in the math course was between Libby and Megan (Fig. 37). Once they began working together, the frequency of their interaction increased as they became better acquainted with each other.

The peak class period was actually the first class period of week ten. The second class period of week ten was the final exam, and so only one class period had interactions to count for that week. Week nine had two class periods in which Libby and Megan were working closely together.

Psychology. The learner-learner interaction in the psychology course peaked during week seven (Fig. 38). Week seven was the holiday, and there were the fewest students of the term in attendance, but those that were there were active. I

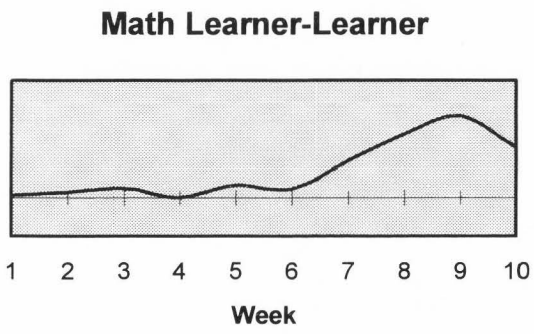

Figure 37. Profile of frequency of learner-learner interactions in the math course across a 10-week period.

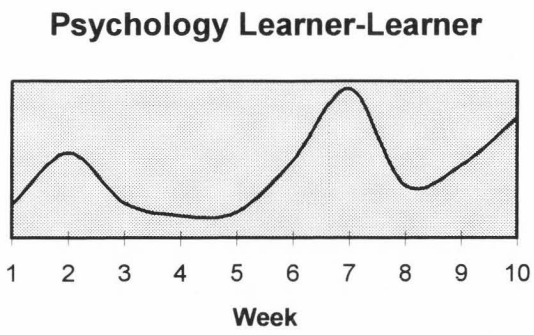

Figure 38. Profile of frequency of learner-learner interactions in the psychology course across a 10-week period.

even caught myself doing something disruptive without thinking about how it would affect the learner next to me.

Some of the interaction during this class period was instructor guided. He had each site form one or more groups and come up with as many uses for a drinking straw as possible. He then called on various sites to report their answers.

Science. The week after two students complained about Sue and Sharon being distracting was the week when there were the most learner-learner interactions in the science course (Fig. 39). The two most active students did start out week eight speaking more quietly, but they did not reduce their interaction with each other by very much. During the two class periods that made up that week, 60% of the learner-learner interactions were between Sue and Sharon. But, during the second class period they began including other students. During the first class

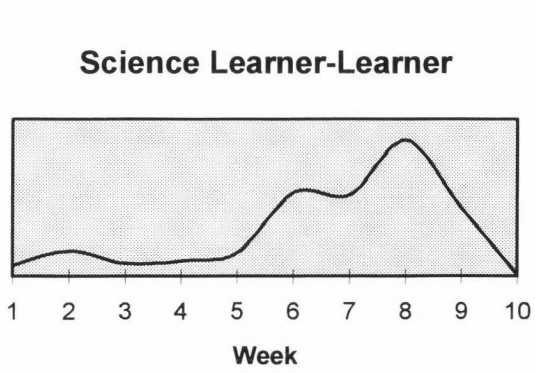

Figure 39. Profile of frequency of learner-learner interactions in the science course across a 10-week period.

period, 77% of the interactions were between only the two of them. The second class period only 47% involved only those two.

The increase from week five to week eight might have been smooth, but there was an exam during week seven. However, during the second class period during week seven, I recorded the highest number of learner-learner interactions of all the individual class periods. It was following that class period that two students complained to the TA.

Sociology. Even though the students in the sociology course were the quietest, they did have some interactions (Fig. 40). Week eight had the highest number of events. The interactions that week were instructor guided. We were instructed to play a game during the class period. As soon as the game was over,

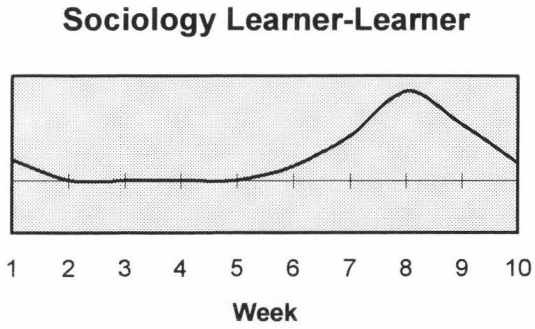

Figure 40. Profile of frequency of learner-learner interactions in the sociology course across a 10-week period.

two of the students left for the day and the rest went back to their regular seats and their regular quietness.

All the courses combined. The peak for all the courses combined happened during week seven (Fig. 41). The profile took the steepest incline from week five to week seven, then declined to nearly its week one level. The incline might have been smooth from week three to week seven, except for midterm exams.

I suspect the interactions declined after week seven as students began to pay more attention to the instructor in preparation for a final exam and for final projects to be completed. In fact, from week seven on, average attendance in class increased slightly, and the learner-instructor interactions did not decrease as steadily as the learner-learner interactions did.

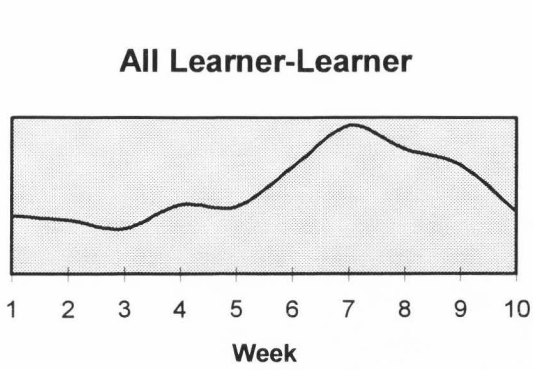

Figure 41. Profile of frequency of learner-learner interactions for all the courses combined across a 10-week period.

Summary

Students had a variety of interactions with each other. These interactions can be classified as related to the content of the course, related to the process of acquiring the content of the course, or not related to the content of the course at all. These interactions served to clarify, add information, relieve boredom, provide a social outlet, or respond to the instructors guidance. Interactions between students happened between students across the state, but more commonly they happened between students at the same site.

Interactions between the students were started by the instructor, students at other sites, or students at the same site. Other students asked questions about the content and talked about their lives. Some instructors assign problems and projects to be done by groups of students.

Many students formed groups to learn or play together. These groups always began as a pair of students. The groups had their own purpose, to learn or socialize.

The students at these sites were not static and quiet throughout the class sessions. They were active. They worked with each other to acquire an education, and they were more involved with each other than groups of students who meet in a face-to-face classroom.

Learner-Content Interaction

Learner-content interaction is not directly observable. Moore (1989b) described learner-content interaction as "the process of intellectually interacting with the content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learner's mind." He went on to call learner-content interaction "...when learners 'talk to themselves' about the information and ideas they encounter in a text, television program, lecture, or elsewhere." Consequently, because learner-content interaction is internal to the learner, it is not directly observable.

In order to identify incidences of this phenomenon, I had to observe behaviors that were indicators of this internal activity. How do learners behave when they are interacting with the content of the course? There were behaviors that were indicators that the students that I observed were involved with the content. Some of those behavioral indicators exhibited in the classrooms were discussing the topic of the course with each other or the instructor, reading in the textbook, working problems from the text book or from the instructor, participating in in-class projects

and labs, or taking an exam. Many of the learner-content interactions were implied by other learner-learner and learner-instructor interaction behaviors.

There were multiple sources of the course content in these classrooms: the instructor, texts, other students, and classroom experiences. Not all the content was intentionally conveyed or recommended by the instructor. Some of the content about the topic of the course was provided by other students intentionally or unintentionally, with or without the knowledge of the instructor.

Observable Behaviors

The students in these classrooms learned independently and, sometimes, in groups of two or more. Observing the variety of the behaviors of the students was the only means I had to identify their interaction with the content of the course in the classroom setting.

Discussing the content with the instructor. The agriculture education, English, and the sociology instructors were the most active in involving themselves in discussions with the students, and thus encouraging the students to interact with the content. The English instructor also tried to involve multiple students in discussions among themselves. However, all discussions in which the instructor was involved were short, only a few minutes long, and generally were of the question/response format. The instructor asked a question, the student responded, maybe the instructor asked a follow-up question, and so forth.

Discussing the content among the students. Discussions about the topic of the course among the students sometimes took up a large portion of a class session. This was especially true in the agriculture education, history, and science courses. The discussions in the science course were close to the exact content of

the instructor's ongoing lecture. The behavior in the math course was similar, but their discussion was even closer to the ongoing lecture than in the science course. The interaction between the students in the math course was less a discussion and more a side by side mutual learner-content interaction. The discussion in the history and even more in the agriculture education courses related the content to real-life experiences.

Reading texts. Reading of the text during class happened most often in the science course. Even though the text books were nearly always open on the tables, Jacob read the text more often than any of the other students in that course. He seldom read the portion that was being discussed by the instructor, and instead was reading ahead or behind.

In the agriculture education course, we read both the text and the extended syllabus during a class session. We read the text when we wanted to be able to answer a question the instructor had just asked. We read the extended syllabus when we wanted to refer to something in our student-to-student discussions.

One day in the English course, all the other sites watched a video. The system at the site where I was observing was not configured so we could watch a video. Many of us read the text while we waited for the statewide class discussion to continue after the students at the other sites finished watching the video.

Working problems. The science instructor asked students to work problems from the text and from practice exams. Sometimes he specifically instructed the students to work the problems in groups, and sometimes he told everyone to work the problems without saying whether they were to work alone or together. Given their own choice, most of the students worked the problems with others.

The instructor in the business course occasionally asked us to try things on our computers before she worked through them in class. At our site, this was a solitary exercise because both of us had a computer to use. This was not the case at all the sites. Some of the students at other sites had to share computers. All the other courses I observed were text book based. Students in the other courses did not have to share a text book much beyond the first week or two of the course. Consequently, in the business course, at other sites, there was a greater opportunity for students to be interacting with each other at the same time they were interacting with the content.

In the math course, Libby and Megan worked both the problems that were being worked by the instructor and other problems that were in the homework assignments. Sometimes one of them would not understand one of the problems. That student would ask the other for help. If neither of them had a solution, one of them would ask the instructor to work it out for them.

In the science course, Jacob sometimes worked the problems at the end of the chapters during a lecture. This working of problems was usually proceeded by another indicator that he was bored. He sometimes wrote letters, read books that were not about the content of the science course, or read chapters in the science text that were further on in the text than the lecture. When he interacted with the content, it was not always with the current content.

Participating on in-class projects and labs. There was an opportunity provided in the elementary education course for learner-content interaction that was experiential and observable. Laboratory assignments were done in each of the remote classrooms by the students who were there. This behavior was observable

because the students had to talk with each other about what they were discovering. In addition to the laboratory assignments that were to be done in class, there was a group project. There was enough time given in the class sessions to do the group project. I was only one of two students at the site where I observed. I did participate in the labs, but I did not participate in the group project. I have explained my ethical reasoning in the Research Procedures section beginning on page 55.

The human environments students made group presentations. The information they prepared outside of class sessions was then presented to the rest of the students state-wide. The group presenting had to first interact with the content outside of the class sessions, and then encourage the other students state-wide to interact with them and the content during the class session. Following the presentation, the students who were not making the presentation that day, gave a verbal critique of things they thought were good, and areas where there could have been some improvement. Because I was at the same site as the instructor, I could not know what discussions went on at sites before they stated their critique. The students at my site rarely discussed their critique before one of them offered an individual opinion.

Taking exams. Exams were a good example of learner-content interaction. Well designed exams provide opportunity for learning as well as assessment. This learner-content interaction did not involve learner-learner or learner-instructor interaction at the same time. None of the exams were designed to provide anything other than learner-content interaction. None of the exams were to be done by pairs or groups of students.

Combinations of Other Interactions With Learner-Content Interaction

Most of the time, when the learner-content interaction was observable, the students were interacting with other students or the instructor. Most of the learner-content interaction that happened was not observable. Table 22 lists the percentage of learner-content interactions that were observed in combination with other interactions and alone.

The substantially higher percentage of non-combined learner-content interaction behaviors in the art course was the result of a student muttering comments and answers to herself. The high learner-content interaction by itself in the sociology course follows directly from those students not socializing much. Even the percentage of learner-content interaction observed to be in combination with learner-instructor is higher than the percentage of learner-content interaction observed to be in combination with learner-learner interaction. That is, given learner-content interaction in the sociology course, more events were in combination with learner-instructor interaction than in combination with learner-learner interaction.

The percentage of learner-content interaction in combination with the learner-instructor interaction in the English course reflects the usual behavior in that course. When the learners were interacting with each other, they usually were not interacting about the content. The instructor, by asking questions and involving students in discussions, could bring the students back to the content.

The combination of Sue and Sharon in the science course, who worked together much of the time, is reflected in the learner-content interaction in combination with the learner-learner interaction percentages. If there were questions in that course, usually someone in the classroom could answer. The

Table 22

Percentage of Number of Learner-Content Interactions That Were in Combination With Other Interactions or Alone for Each Course

Course	Combined with learner-learner interaction	Combined with learner-instructor interaction	Learner-content interaction alone
Agriculture education	69	26	5
Art	66	9	25
Elementary education	71	11	18
English	44	53	2
History	66	28	6
Math	44	47	9
Psychology	56	26	18
Science	78	13	9
Sociology	25	40	35
All combined	61	29	10

learner-instructor interactions were mostly the result of answering questions given by the instructor.

Sources of Content

Learners may acquire the content of a course from a variety of sources. In the courses I observed, the students acquired the content from the instructor, from the texts, from other students, and from experiences.

Instructors. Instructors provided course content using various methods. Some instructors ordinarily lectured. Lecture was used a majority of the time by all

but the business, elementary education, English, and human environments instructors. The agriculture education, art, history, psychology, science, and sociology instructors used some questions and answers for short discussions. The math instructor answered questions for about a fourth of the time in each class session.

The business instructor guided the students through the process of using the software she was teaching. The elementary education instructor used laboratory exercises, video tapes and work books. He lectured very little. The English instructor used a lot of statewide class discussions. The class sessions in the human environments course were usually taken up by student presentations.

Texts. Texts were required in all of the courses. All of the courses had a syllabus. The syllabus in the agriculture education and history courses were extensive and included a lot of content material. The syllabuses in the other courses primarily provided a schedule of the course and homework assignments. The text in the elementary education course further functioned as a workbook the students sent to the instructor at the end of the term for grading. The English and human environments courses had more than one required text.

Other students. With or without the instructors' intention, students acquired content related to the course from or in partnership with other students. The instructor intended for students to learn from each other in the elementary education course. The laboratory assignments and group projects were designed for students to explore and discover together. The science instructor occasionally had students work on problems together. The English instructor encouraged discussion among her students statewide.

I suspect that the agriculture education and history instructors would be surprised to know how much more than they intended I learned about their topics from other students in the classroom. In the agriculture education classroom at the site where I observed, the other students had enough experience they could relate what was being presented by the instructor to their own lives and share their experiences. Molly, in the history course, frequently added additional facts, opinions, or interpretations to those presented in the lecture. I wonder how often facts not presented in a lecture startled the instructors when they showed up in responses on exams.

The Profiles of Learner-Content Interaction Events

The amount of learner-content interactions varied weekly as the courses progressed throughout the ten-week terms. Figures 42 through 50 show the relative number of events per week per student for each of the courses. Figure 51 does the same for all the courses combined. These profiles show how the learner-content interaction behaviors ebbed and flowed from one week to the next within each course I observed.

Agriculture education. The number of learner-content interaction events in the agriculture education course peaked at week seven, like the learner-learner interaction profile did (Fig. 42). The class session of week seven was the day Anne was very active. First she talked about an experience she had during the previous week. She talked whether anyone else was listening or not. When she finished that topic, she switched to discussing course content, but she did not slow down.

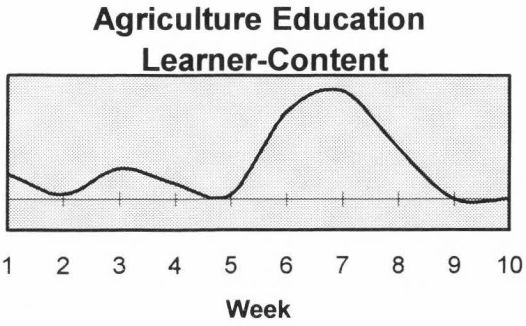

Figure 42. Profile of frequency of learner-content interactions in the agriculture education course across a 10-week period.

Art. Week three, the first week the other student and I were together in art, I noted the greatest number of learner-content interactions for that term (Fig. 43). Week three was also the most active for learner-learner interactions. This seems to me to be related because there was not much socializing between the two of us. Most of our interaction, when we did interact, was about the content.

A few of the learner-content interactions happened when one of the learners was answering questions or muttering to themselves. I noted that I looked at other pages in the book, and the other student commented or answered out loud. Perhaps, she knew she tended to learn out loud and felt self-conscious about doing that with another person in the room. I wonder if that is why she was disappointed to see another student that first day I arrived.

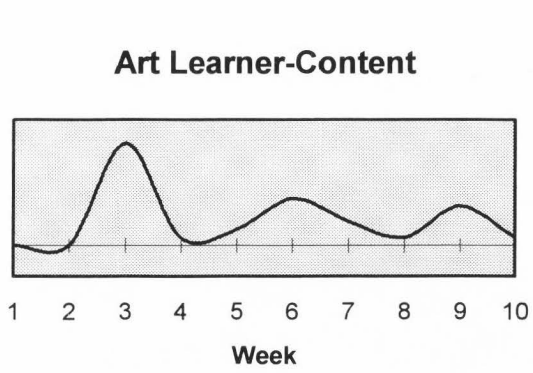

Figure 43. Profile of frequency of learner-content interactions in the art course across a 10-week period.

Elementary education. Week six was a week the instructor lectured in elementary education, and spent more time with the class than usual (Fig. 44). Both the learner-instructor and learner-learner profiles are also high. There were more opportunities for interaction because we were in the class room longer that night with more contact with the instructor.

Week two, another high point, represents another week when we watched videos together, and thus interacted with the content. The instructor lectured again during the class period of week nine.

English. The learner-content interactions in English peaked at week four like the learner-instructor and learner-learner interactions did (Fig. 45). The topic for that day was occupational folklore. Nearly everyone seemed to have an experience to contribute to the discussion, even though there was a lot of socializing going on as

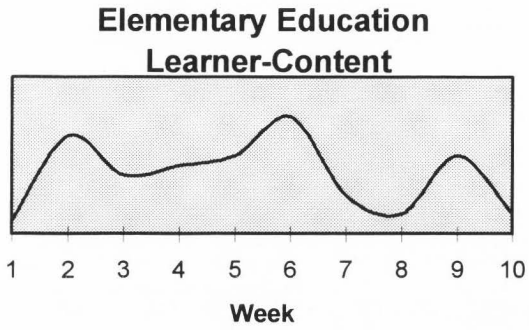

Figure 44. Profile of frequency of learner-content interactions in the elementary education course across a 10-week period.

well. The class session started out boring, to me that is, but about half an hour into the session the instructor got the discussion going.

Yvonne was on the mic a lot that day. Helen was attentive and using the mic more than usual, too. Usually Helen was somewhat quiet, arrived late, and was sarcastic. Nancy was also more actively involved in the statewide discussion. Nancy was one of the two most likely to sit near the front and pay attention, but normally when she commented on the content it was to the rest of us at the site rather than using the mic. She often gave ideas to other students who contributed them to the rest of the students across the system.

History. In the history course the peaks of the learner-content interaction imitated the peaks of the profiles for the learner-instructor and learner-learner interactions (Fig. 46). The midterm exam was given during one of the class sessions

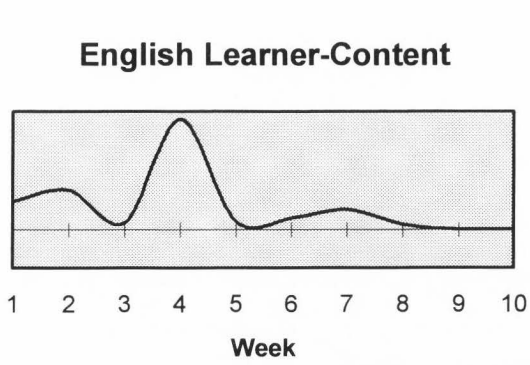

Figure 45. Profile of frequency of learner-content interactions in the English course across a 10-week period.

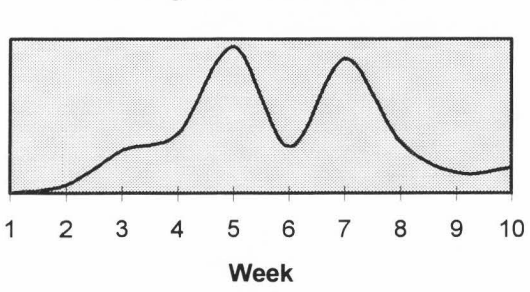

Figure 46. Profile of frequency of learner-content interactions in the history course across a 10-week period.

of week six. That is the reason for the slump in the profiles between weeks five and seven. A large portion of the learner-content interactions that occurred during these weeks was the result of Molly adding information to what was being presented by the instructor. Another large portion of the interaction was the result of the state-wide and on-site class discussion of the book we were assigned to read.

Week seven would have been even higher but both of the other two students were absent during one of the class sessions of that week. The TA was out of sight, and I used some of that class period to catch up on some reading.

Math. Like the learner-learner interaction profile, the learner-content interaction peak in math was at week nine (Fig. 47). Also like the learner-learner interactions, the class session with the highest number of interactions was the first class of week ten. The last two weeks the students were getting more interested in the content because the last class of week ten was the final exam. Libby and Megan had been doing well on the other exams, and were actively trying to keep the good grade.

Psychology. The profile for the psychology course has its highest peak at week seven (Fig. 48). This peak reflects an instructor led exercise with groups at each site. The instructor also provided a study guide for the exam to be held the next week, and students spent some time looking at and commenting about it.

The smaller peak at week two could be attributed to the instructor calling on students. These students had not yet figured out that nearly all the question came from the margins of the text book, so they were paying attention. The peak at week ten reflects Bonnie and the student in front of her reviewing together for the final

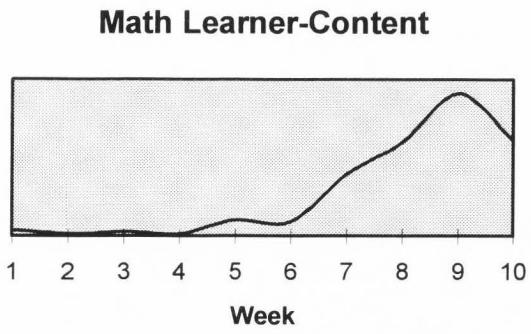

Figure 47. Profile of frequency of learner-content interactions in the math course across a 10-week period.

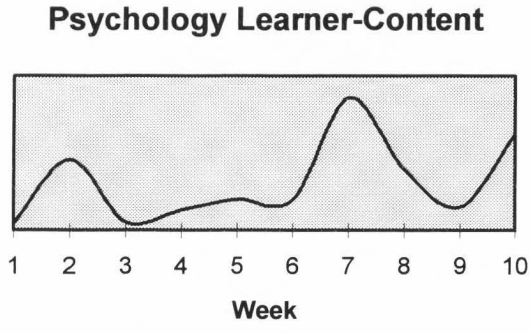

Figure 48. Profile of frequency of learner-content interactions in the psychology course across a 10-week period.

exam during nearly all of the pre-exam lecture. Other students were also preparing for the exam rather than listening to the lecture.

Science. Because most of the learner-learner interaction in the science course was about the content, it is natural that week eight be the peak for the learner-content interaction because that was the same week as the peak for the learner-learner interactions (Fig. 49). In fact the learner-content interaction profile and the learner-learner interaction profile are quite similar.

Sociology. In sociology, the learner-content interactions of week eight were exhibited as the students played the game assigned by the instructor to demonstrate a principle he was trying to convey (Fig. 50). Week one started out high because the instructor called on us for subject matter related questions more than at any other time in the term except for week eight.

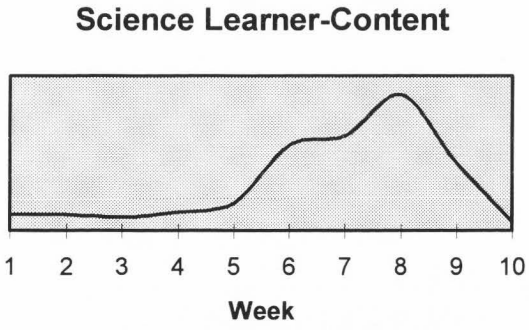

Figure 49. Profile of frequency of learner-content interactions in the science course across a 10-week period.

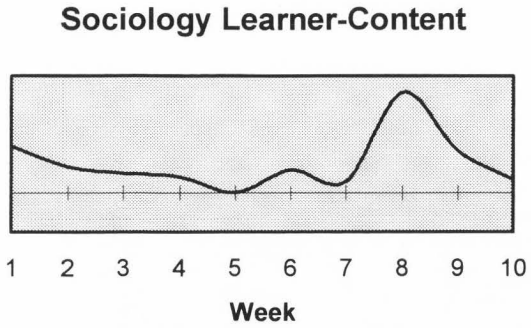

Figure 50. Profile of frequency of learner-content interactions in the sociology course across a 10-week period.

All the courses combined. The learner-content interaction profile appears similar to both the learner-learner and learner-instructor interaction profiles (Fig. 51). I would have expected this because learner-content interaction was not easily observed when it was not combined with learner-learner or learner-instructor interactions. The drop at the end of the curve is not what I would have expected. Because in seven of these courses the students were facing a final exam, I would have expected week nine to be higher, but I would have expected week ten to drop as they took their exams.

Summary

Learner-content interaction was exhibited in interaction with other students and instructors, and in individual contact with the content of the course. Students discussed the content with the instructor and other students. Students learned in

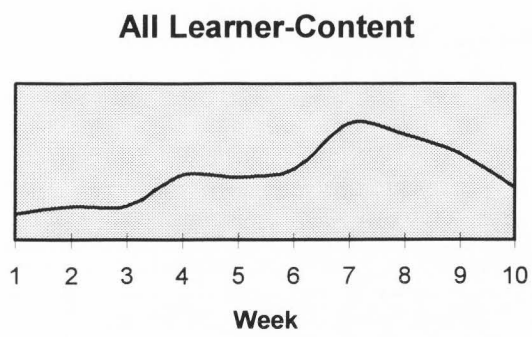

Figure 51. Profile of frequency of learner-content interactions in all the courses combined across a 10-week period.

cooperation with other students during laboratory experiences, projects, problem solving, and presentations. Students learned singly while reading, talking to themselves, working problems, and taking exams.

Students were provided with content by instructors, other students, texts and syllabuses, and videos. There were events that motivated the students to interact with the content. Instructors asked questions and encouraged discussion. Students competed with each other to demonstrate ability to handle the content. The content provided substance for social interaction. Exams required understanding of the content. Videos and experiences sparked curiosity.

Students learned both deliberately and unintentionally from instructors and from other students. Instructors intended to present specific course content, but content related to the course was also presented by videos and portions of the text that were not assigned. Students interacted deliberately with the course content:

preparing for presentations, discussing content during class sessions, studying for exams, and reading the text. Students learned information related to the course content by discussing how the content related to their lives, and listening to information other students shared about the extended course content.

Instructors, students, and materials were the sources of content. Students learned in concert with others and alone. They learned both what was intended and what was not intended. Content acquisition is both the most important part of an educational experience, and the least easy interaction to observe.

The Subject of the Interactions

Learners not only interact with something, they also interact about something. Even though it was impossible to record the topic of every interaction, there was a continuum of subjects that can be categorized into the following categories, which were discussed in detail in the section on learner-learner interaction. In descending order of relatedness to the content of the course, the categories are:

current course content,
future and past course content,
content related to the course,
process of obtaining the content of the course,
process of obtaining and education, and
life in general.

This continuum can further be categorized into three main subject categories. Subjects related to the content of the course include the first three categories. Subjects related to the process of obtaining the content of the course is the fourth category in the continuum. Subjects not related to the course are items five and six

in the continuum. It was possible to identify and count most of the interaction events using the three main categories. Table 23 lists the three categories and the percentage of identifiable content for each category.

Table 23

Percentage of Identifiable Subject Matter of the Interactions

Subject Matter	Percentage of Identifiable Events
Content related	41
Process related	23
Not related	36

Parallel Learning

There was a specific group of learner interaction behaviors that have a common element that I will discuss separately here. These learning behaviors were combinations and subsets of the five types of interactions discussed in the previous section, and were comprised of the first two main interaction subject categories (content and process). But, these specific learning behaviors had a common factor. The behaviors involved acquisition of the content, but were simultaneous with, but separate from, the ongoing instruction being delivered by the instructor. According to Burnham (1995), learning that takes place alongside the ongoing instruction is called parallel learning and is a specific form of learner interaction. Thus, learning in the content area was occurring, and content information was being presented, but the two were independent. In a face-to-face classroom, it is difficult for the learners to be interacting about the content at the same time as the instructor is delivering the

content, but independent of the instructor. The learners are aware of this. In one of the student focus groups, I was trying to get at the aspect of site discussions during class discussions. I got the following comment from a student:

> One problem though that I've noticed is that the professor will say something and the people in the classroom tend to get in this little discussion rather, because it's too hard to go over to the mic and stuff. You know. But, so you'll have this little discussion in your room, but the professor has no idea you're having your own little discussion. You know. That goes on and stuff too.

I saw this happen repeatedly in these classrooms, and thus it is of special interest in observations about distance learners.

Definition

For the purpose of this discussion, I am using the following as the definition of parallel learning. Parallel learning is that acquisition of the content that takes place concurrently with, but independently of, the delivery of instruction. I am making two assumptions. In their most rigid form, they are (a) the instructional delivery continues, and (b) the concurrent activity is related to the content of the instruction. But, the most rigid forms of these assumptions limit the parallel activity to only the subject matter of the course. The process of getting the information is necessary and I include these process behaviors in the definition of parallel learning. For example, discussion of the syllabus is related to learning the content, but is not the content itself. There was the logistics of providing and receiving the content. Because both an instructor and a student can be exhibiting behaviors related to either the content or the process of acquiring the content, parallel learning can be seen as a matrix of interactions.

The Matrix

Instructors and students can be dealing with the content or the process of learning the content. The matrix is formed by a horizontal dimension of instructor content or process and a vertical dimension of student content or process. The cells in Figure 52 represent the kinds of parallel learning that can take place. I abbreviate these events with a "c" denoting content and a "p" denoting process. The first letter denotes an instructor's behavior and the second letter denotes the students' behavior. I use "==" to show that the behavior is parallel.

	Instructor Content	Instructor Process
Student Content	content/content c==c	process/content p==c
Student Process	content/process c==p	process/process p==p

Figure 52. Diagram of parallel learning matrix to indicate the possible types of parallel learning.

Instructor content delivery that occurs simultaneously with student acquisition of content independent of the instructor's delivery is abbreviated c==c. For example, if the instructor is delivering a lecture, and one or more students are trying to solve a problem given in the book, this would be classified as c==c.

If, while an instructor is delivering content, a student is exhibiting behavior intended to facilitate the learning of the content, the abbreviation is c==p. For example, if while the instructor is lecturing, the students are clarifying among themselves the schedule for the next exam, this would be classified as c==p.

If an instructor is facilitating the acquisition of the content and a student is reading the textbook or in some other way acquiring content, the abbreviation is p==c. An example of the instructor facilitating the acquisition of the content might be a discussion of the requirements for a term paper.

If, however, an instructor is facilitating the acquisition of the content and students are also facilitating content but without interaction with the instructor, the abbreviation is p==p. This might happen when, for example, the instructor is discussing the syllabus the first day of the course while the students are discussing the availability and sharing of textbooks.

Parallel Learning and the Five Interactions

In order for parallel learning to occur, there must be an interaction. The five types of interaction are classified by the object of the interaction. These objects are media (the interface), environment, instructor, learner, and content. The subjects of interaction help define the construct of parallel learning: content and process. Table 24 describes the relationships between objects of interactions and the parallel learning forms.

In two cases a specific interaction is required because of the definition of parallel learning. Those cases are c==c and p==c and content interaction. By definition, the learners are interacting with the content. In the same way, the c==p and the p==p are impossible simultaneously with content interaction because, by definition, the learners are dealing with a process and not the content.

Parallel learning cannot be manifest in the learner-instructor interaction, because if the learners and the instructor were interacting, they cannot deal with the

Table 24

The Relationship Between the Objects of Interaction and Parallel Learning Types

Parallel Learning	Object of Interaction				
	Media	Environment	Instructor	Learner	Content
c==c	possible			possible	required
c==p	possible	possible		possible	
p==c	possible			possible	required
p==p	possible	possible		possible	

subject matter independently of each other. Thus, it is impossible for any of the parallel learning behaviors to be simultaneous with learner-instructor interaction during the same event.

In nearly all instances, parallel learning involved more than one student. Thus, there was usually learner-learner interaction. An example of one of the few cases where there was no learner-learner interaction, but there was c==c behavior, was in the science course. Jacob frequently worked problems alone or read other part of the text while the instructor lectured. Thus, he was acquiring the content independently of the instructional delivery by the instructor.

The media and the environment assist the learners to acquire the content information. Consequently, it is possible the learners will interact with the media or the environment to facilitate the process of learning. Unless the interfacing technology is a human or some aspect of the environment is the content of the course, the media and environment cannot be the object of an event involving c==c or p==c. A possible example might be a distance education course on using the

Live Board to facilitate instruction. No such course currently exists in the Com-Net system, and I saw no instances of the environment being the topic of the course, but such is not impossible in the future or in other locations. The TA, being part of the interface, did occasionally interact with students about process of the course, and even more rarely about the content.

Using the same format as Table 24, Table 25 notes the percentages of each kind of parallel learning behavior combined with a single specific interaction counted in the field notes. A single parallel learning event might, however, be combined with two or more interactions. For example, students talking about the solution to a problem in the text while the instructor lectures (c==c) has both a learner-learner and a learner-content interaction.

Table 25

Percentages of Interaction Events Combined With Parallel Learning Events That Were Noted in the Field Notes

	Object of Interaction				
Parallel Learning	Media	Environment	Instructor	Learner	Content
c==c	<1%			33%	36%
c==p	4%	<1%		18%	
p==c				2%	2%
p==p	1%	<1%		3%	

Only 3% of the c==c/learner-content combination events is accounted for by solitary learners like Jacob. That is, 33% of all of the interaction events combined with parallel learning events were c==c and learner-content interaction that involved

more than one learner and thus also involved learner-learner interaction. The 3% that remains of the 36% are accounted for by solitary learning events.

Individual Parallel Events

Table 26 shows the percentages of each individual form of parallel learning behavior counted in the field notes. When parallel learning was occurring, 90% of the time instructors were delivering content. That is, 90% of the parallel learning events are accounted for by c==c and c==p.

Table 26

Percentages of Each of the Forms of Parallel Learning Behaviors Counted in the Field Notes

	Instructor activity	
Student activity	Instructor Content	Instructor Process
Student Content	57%	3%
Student Process	33%	7%

Students were dealing with content 60% of the time they were exhibiting parallel learning behaviors. That is, 60% of the parallel learning events are accounted for by c==c and p==c. When the instructors began to deal with the process of acquiring the content, the students tended to switch to the process.

Content/Content Parallel Learning

Content/content parallel learning occurred frequently in the science course. Sue and Sharon almost constantly worked together on the content being taught.

These students clarified concepts for each other and checked to see if they got the same answers when they were given problems to work. The parallel learning behavior of Libby and Megan in the math course was like the pair in the science course. These students and their behavior were discussed in the section on peer groups beginning on page 188. Table 27 lists the percentages of parallel learning behaviors noted in the field notes that were c==c behaviors for each course.

Table 27

Percentages of Parallel Learning Behaviors Represented by c==c for Each Course

Course	Percentage
Art	88
History	72
Science	68
English	56
Sociology	50
Agriculture education	49
Math	47
Psychology	45
Elementary education	34

The higher than average percentage in the art course reflects the lack of socializing by the students in that classroom. When they interacted at all it was usually about the content. The high percentage in the history course reflects the interest of the students in this classroom in the content itself. Sharon and Sue in the

science course commonly interacted about the content during the lecture. So the percentage in the science course is high.

The low percentage in the elementary education course reflects the instructional methods of the instructor. This instructor used videotapes that were purchased by students. Laboratories were conducted at each of the sites. At the site where I observed, we watched the videos together in the classroom. While the videos were substitutes for the instructor, they demanded both our vision and our hearing. We tended to talk about the content of the videos less than we did content that was delivered by the instructor. This instructor did not lecture frequently. Thus, when there was interaction with the content, the instructor was usually not involved.

The low percentage in the psychology course corresponds with the classroom atmosphere, which was frequently non-content-related conversations. These students seldom interacted with the content during class time unless they were called on or were reviewing for an exam.

Content/Process Parallel Learning

Content/process parallel learning consisted of such things as one student asking another what page of the textbook was being discussed, sharing notes and books, arranging study groups, complaining about situations, receiving returned exams or homework from the TA, or adjusting the interfacing technology in some way, while the instructor was delivering the content. Table 28 lists the percentages of parallel learning behaviors noted in the field notes that were c==p for each course.

Table 28

Percentages of Parallel Learning Behaviors Represented by c==p for Each Course

Course	Percentage
Agriculture education	49
Psychology	46
English	42
Elementary education	39
Math	31
Science	25
History	22
Art	12
Sociology	0

The higher than average percentage in the agriculture education course reflects two kinds of events. First, there were two days when the delivery system crashed repeatedly. The students had to go find the TA They made an effort to get the instruction they needed. The second kind of event was the sharing of handouts. The first couple of days of the course, the other two students did not have their extended syllabus with a copy of all the handouts and shared mine. Another day, I forgot my syllabus and looked on with the student closest to me.

The c==p events in the psychology course included a variety of events. Students told each other what page the instructor was lecturing from in the text. Students discussed what was wrong with the exams and how they had answered

some of the questions. Students also discussed and clarified for each other what papers were required.

Nearly all of the c==p events in the English course happened in one day. A student arrived late and needed to know where we were, a couple of students talked to the site administrator about the course and the delivery system, the TA could not be found so a student removed an error message from the screen, and students discussed the requirements for an assignment.

Process/Content Parallel Learning

Process/content parallel learning was, for example, seen in the math course. Commonly, while the instructor was telling the students about the schedule for tests, or suggesting certain skill to be practice, or making modifications to the homework assignments in the syllabus, Libby and Megan worked on one of the problems from the book, or reworked a problem the instructor had discussed earlier.

The pair in the science course were very consistent in continuing to deal with the content while the instructor was dealing with issues related to the interfacing technology. This content interaction took the form of checking with others to be sure they understood what had just been delivered by the instructor or working problems in the text or the study guide. As the term progressed, they included more and more of the other students around them. Table 29 lists the percentages of parallel learning behaviors noted in the field notes that were p==c for each course.

None of the percentage were very high. The math and science courses had the highest percentages as a result of the normal behaviors of the pairs of students

Table 29

Percentages of Parallel Learning Behaviors Represented by p==c for Each Course

Course	Percentage
Math	8
Science	5
Elementary education	2
Agriculture education	1
History	1
Psychology	1
Art	0
English	0
Sociology	0

that worked together. The percentages were not high partly because instructors spent far less time on the process of the course than on the content.

Process/Process Parallel Learning

Process/process parallel learning was common the first couple weeks of the courses. Typically the instructors began the courses by going over the syllabus with the class, but at the remote sites, the students were making their own plans for study groups, sharing of resources, and groups for group work. Table 30 lists the percentages of parallel learning behaviors noted in the field notes that were p==p for each course.

The elementary education course had a relatively high percentage of p==p. As already noted, a relatively large portion of time the instructor was interacting with

Table 30

Percentages of Parallel Learning Behaviors Represented by p==p for Each Course

Course	Percentage
Sociology	50
Elementary education	25
Math	14
Psychology	9
History	4
Science	2
English	2
Agriculture education	1
Art	0

the class he was dealing with process issues. This prompted the students at the site where I was observing to also deal with process issues.

When the students in the sociology classroom exhibited any parallel learning behaviors, they did the same kind of thing the instructor was doing. If the instructor was delivering content, the students dealt with content. If the instructor was dealing with the process, the students did the same.

The Profiles of the Parallel Learning Events

The profiles of parallel learning behaviors differed in the courses. Figures 53 to 62 show how these behaviors varied throughout the term for each of the courses and the courses overall.

Agriculture education. The peak levels of p==c and p==p in agriculture education reflect only one event of each kind in week two (Fig. 53). In this course, when the instructor was dealing with the requirements of the course and thus process, the students were paying attention to what he was saying so they knew what was required of them. When the instructor was dealing with the technology, and thus process, these students were usually off track and talking about things not related to the course. They took interruptions as an opportunity to socialize. This behavior accounts for the lack of parallel events when the instructor was exhibiting process behaviors.

Weeks six, seven, and eight, were the three weeks when the students in this classroom were the most active. During weeks six and seven, the graphical portion of the delivery system failed, and we had to get the TA to get us reconnected. Both she and the students removed error messages from the screen.

Week six was the week that Anne talked almost constantly during the class. At first she related an event that had recently happened to her outside of class, but then switched to discussing this course, both the content and requirements.

Week seven was the week I forgot my extended syllabus and had to share with one of the other students when we needed to refer to one of the handouts. Also, there was a paper due. Anne and Judi discussed how they handled resources and formatting.

Week eight was still busy, but less busy than the previous two weeks. This week Judi was the more active student and there was a lot of ongoing chatter.

Week five was low because for the most part, when the three students responded to what the instructor was saying, they were speaking to themselves and

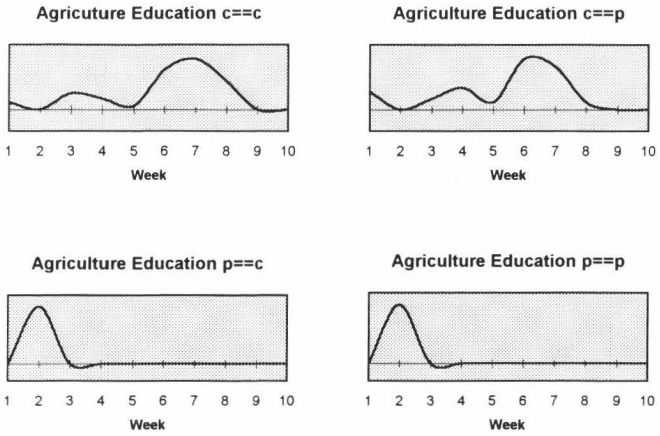

Figure 53. Profile of frequency of parallel learning events for the agriculture education course across a 10-week period.

not directly to the others. They were also responding to what the instructor was saying and not something else. The students seemed more subdued than normal that week.

Art. There were no p==c or p==p events in the art course (Fig. 54). The other student and I were not very sociable. When other students might have taken an opportunity to talk, we were silent.

Week three was the first week the two of us were together. The other student had taken an art course before, and so while the instructor was lecturing, she was telling me about other artwork that was related to the ones being discussed. I felt she was trying to establish herself as the authority in the classroom. She was the authority and I did not challenge that. She quickly quieted when I did not offer

additional information about art. As the profile shows, her commentary did not continue much after that week.

Process reached a peak as the topic of interaction while the instructor lecture during weeks three, four and seven. There was an exam during week five, and the other student had had exams from this instructor before. During weeks three and four she told me what she knew about exams and assignments. She was also worried about the difficulty of the coming exam. During week seven, the TA, Jill, who had not been with us because of an injury, returned. She had been the TA for the previous art course in this sequence, and had taken both of the courses. She wanted to know where we were in the book and what we had covered.

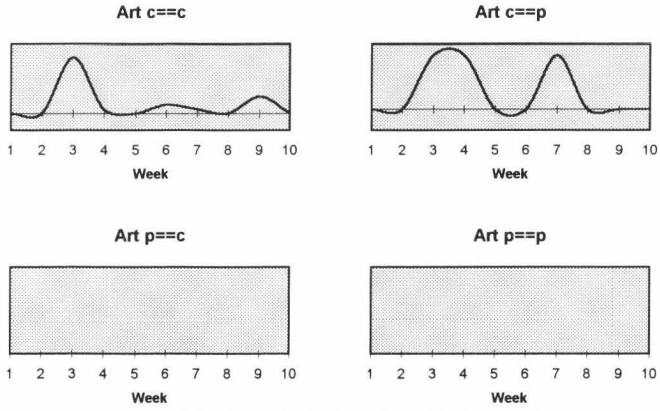

Figure 54. Profile of frequency of parallel learning events for the art course across a 10-week period.

Elementary education. The profiles in the elementary education class appear quite different from each other, though there are some interesting points of commonality (Fig. 55). During this course, much of the content was delivered by videotape. I counted both the videotape and the instructor's assistant as instructors for this study because both were provided by the instructor for instructional purposes.

One of the common points is seen in week six. The peak for c==p was reached that week, and the second high point for p==p was also reached that week. The c==c profile is also high that week. Week six was one of the weeks the instructor lectured, and conducted a class (statewide) discussion. When we watched a video, we tended to focus more attention on the instruction than we did when we had the live instructor. It was easier to keep one ear on the instructor and look at something else at the same time whereas the video required some visual focus. During this week, I made a copy for myself of an article Sheila had, and we looked at pages in her workbook while listening to the class discussion.

Week nine was another case of the instructor being with us live. Sheila and I were doing other things at the same time as we listened to him. This was also the week that Sheila asked me to look over her project to see if I thought it was good enough. I managed not to tell her whether it was OK or not. I made a couple of cosmetic suggestions but avoided substantive comments. I have discussed my rationale for this approach in the Research Procedures section beginning on page 55.

The first week of the course, the instructor's assistant introduced us to the course requirements. I counted her as the instructor for that night. The fact that she

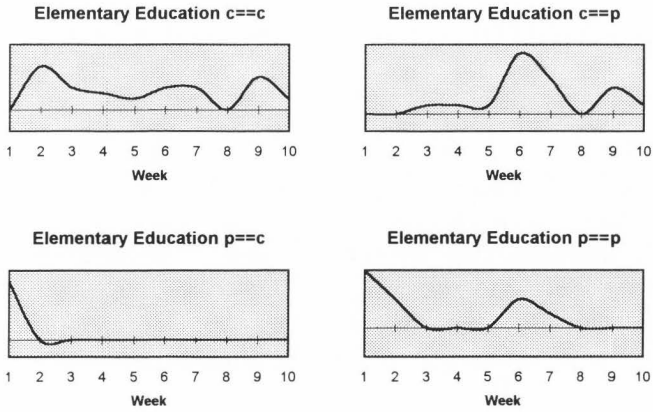

Figure 55. Profile of frequency of parallel learning events for the elementary education course across a 10-week period.

did not present course content, but did present process information is seen in the high level of p==p and p==c for week one.

The high point of c==c at week two was the result of some comments made about the video we were watching. The information on the video was new to both of us, and we commented to each other about the material. It was much like watching a television documentary, except there were no commercials.

English. The students in the English classroom spent less time than average paying attention (Fig. 56). As the lack of any events for the p==c profile demonstrates, the students did not go out of their way to discuss the content of the course.

Both the c==p and p==p profiles had high points during week one. The process discussions of some of the students in this classroom centered around how

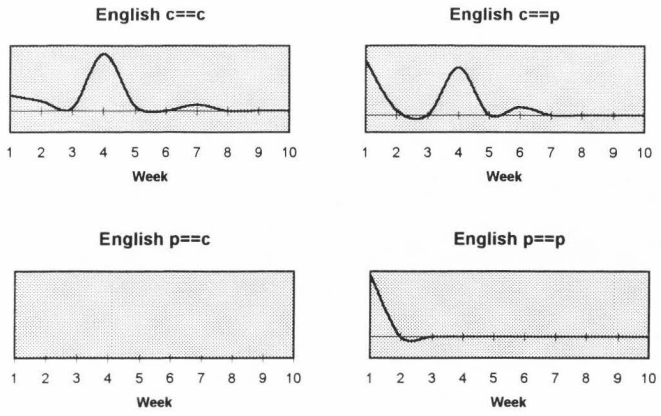

Figure 56. Profile of frequency of parallel learning events for the English course across a 10-week period.

much was going to be required to get through this course. We also needed to purchase a manual from the TA, and that was taken care of during class time.

Week four has shown peaks in other profiles of the English course as well as the c==c and c==p profiles. This was the week the class was discussing occupational folklore. Most of the students had examples to share with the students at this site. This was a generally active week, so it is not surprising this activity shows up in the parallel activity related to both the content and the process.

History. The parallel learning profiles for the history course are very much different from each other (Fig. 57). Each of them has its peak at different weeks.

The c==c profile had two major peaks, at weeks five and seven. Week six might have been the peak, but there was an exam that week. During the first class period of week five we had a visitor, Linda, from another site. Linda, Molly, and to

some extent Lisa had conversations about the information the instructor was presenting. The second class period of week five, we had a statewide class discussion about an assigned book. At our site, and as I could hear across the system at other sites, the students had their own class discussion and related the best material to the instructor.

The first class period of week seven was the day Lisa's mother came to take notes for her. This mother was not familiar with the history being discussed, and so Molly helped her understand. Molly also added her own favorite stories to what was being presented. Without realizing it, Lisa's mother stepped into her daughter's role as part of a peer group. The events of that class period were enough to make that week the second highest for c==c behavior. The second class period of that week, I was the only student who attended.

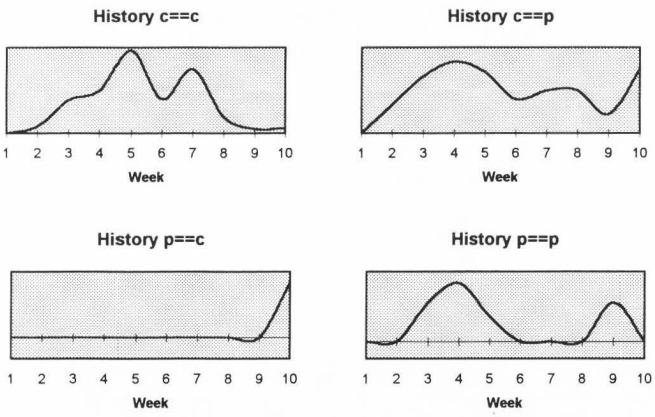

Figure 57. Profile of frequency of parallel learning events for the history course across a 10-week period.

Week four was the highest week for the c==p profile. This was the week Lisa joined our group. Molly and I did everything we could to help her get caught up with the rest of us.

Week ten was the highest point for the p==c profile. However, this was caused by only one event. The instructor was getting the class started, and the students were sharing their ideas for a pending class discussion.

Math. The parallel learning profiles in the math course, like the profiles for the interactions in the math course, seem to indicate the students were more active later in the term (Fig. 58). This assumption is supported by the observation of the learning group formation. When the learning pair got together about week four, they began to work together during the class time.

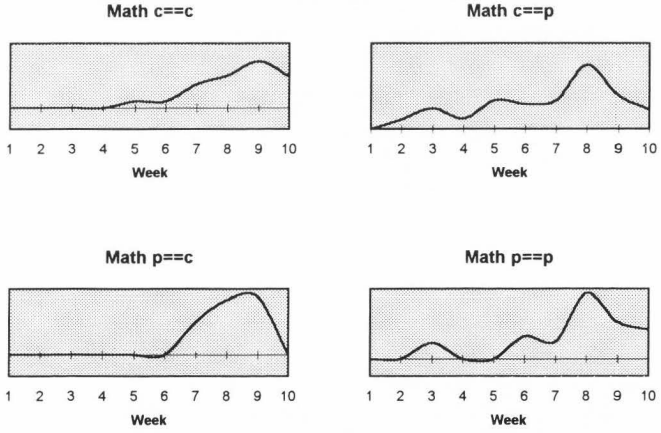

Figure 58. Profile of frequency of parallel learning events for the math course across a 10-week period.

The c==p and p==p profiles have more events per student during the first four weeks than the c==c and p==c. This can be accounted for because in the math classroom, the TA was present nearly all the time. The students in this course tended to ask the TA a question about schedules and exam protocols before asking the instructor. It was easier for them to ask, for example, if their homework was back during class time than for students in other courses who did not have a TA in the room.

Both of the profiles that reflect student process behavior peaked at week eight, and the profiles that reflect student content behavior peaked at week nine. During week eight, there were three primary events that prompted the process behavior. First, exam results had recently been returned and the students were discussing their scores and what they thought of the exam. Second, Libby had purchased a new calculator and was showing Megan how it worked. Third, there was a major crash of the delivery system. All the sites were disconnected. After the TA got all but one site back on, she left the room for a minute. While she was gone, the last site wanted to reconnect. The instructor allowed time for the site to reconnect and Donald and I went looking for the TA.

Week nine was the week before the final. Libby and Megan spent considerable time working problems from the practice exam and homework assignments during the lecture.

Psychology. The four profiles for the psychology course are very different from each other (Fig. 59). Like the classroom demeanor itself in this course the profiles resemble a circus ride. The sharp jump in the c==c behavior profile the last week of the term was the result of the instructor finishing the presentation of material

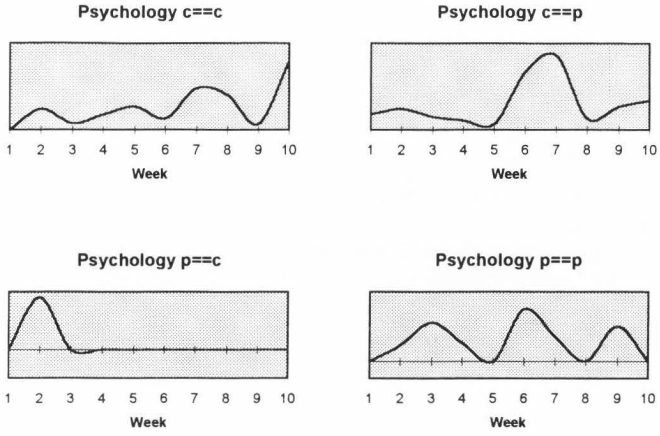

Figure 59. Profile of frequency of parallel learning events for the psychology course across a 10-week period.

for the term combined with students studying together for the final exam that was given later that night.

The rise in the c==p behavior profile during weeks six and seven reflects the students habit of helping each other figure out where the instructor was lecturing from in the text book, so that if called on they could read from the book. The number of c==p events for week six was actually higher than for week seven, but there were fewer students attending week seven, and so the number of events per student was higher.

The p==c profile peak at week two is caused by the only p==c event of the term. This instructor seemed to be new to the Com-Net system and during this

event he was trying to fix his microphone so his voice was not muffled. One student was explaining to another what the instructor had just talked about.

There are three distinct peaks in the p==p profile. Weeks six and nine were weeks following an exam when the instructor was reviewing the exam, and the students were having their own discussion of the exam and the results. The peak early in the term reflects the instructor familiarizing himself with the system, and the students figuring out what he expected and where he was in the textbook.

Science. The profiles in the science course reflect the tendency for process behaviors to happen early in the term and content behaviors to happen later in the term (Fig. 60). The first few week of the term, the students and the instructor were figuring out and establishing the procedures and requirements for the course.

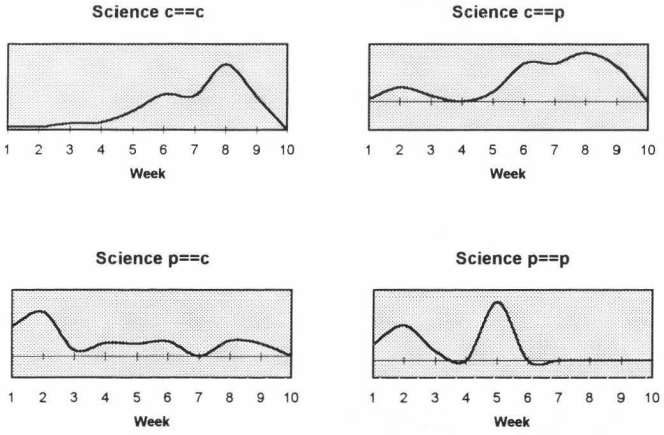

Figure 60. Profile of frequency of parallel learning events for the science course across a 10-week period.

The factors contributing to the peaks around week two for the c==p, p==c, and p==p profiles were the newness of the delivery system and consequent problems requiring the instructor's attention, the students organizing study groups, and students discussing course requirements and study materials. The peak in the p==p profile during week five reflects the system crashing and students sharing and looking at their results on an exam while the instructors worked with the TA to get the system working again.

The c==c profile peak at week eight happened immediately following the complaint by two other students that Sue and Sharon were being disruptive in the classroom. Most of the c==c events of week eight still involved the behaviors of those two students. However, by this time in the term, the second learning pair had formed and the first learning pair had expanded, so there were more students involved than just the two. The effects of the learning groups can be seen in all the parallel learning types that involve content in this course. Once the groups got going, the content behavior increased.

The process behaviors on the part of the students remained relatively high during the last half of the term. I can attribute this to two factors. First, like the math course, the TA was more available than in most classrooms. This TA made her presence known by returning papers and exams or occasionally attempting to quiet the students. Even though she was in the other room, there was a sliding window between the classrooms. Students in this science course tended to ask her or each other questions during class time rather than ask the instructor. It was easy to turn to her and ask.

The second factor effecting the process behaviors primarily involved preparation for and review of exams. This group of students, and especially the larger learning peer group, had a camaraderie that involved helping each other pass this course and so they worked together and congratulated each other on good scores.

Sociology. The only kind of parallel learning behaviors exhibited by the students in the sociology course at the site where was observing were c==c and p==p (Fig. 61). If the instructor was dealing with content, so were the students. If the instructor was dealing with process, so were the students.

These students were so noninteractive I only noted a total of two c==c events and two p==p event for the entire quarter. The p==p events at week seven involved a student asking me about the book reports that were due shortly. When I

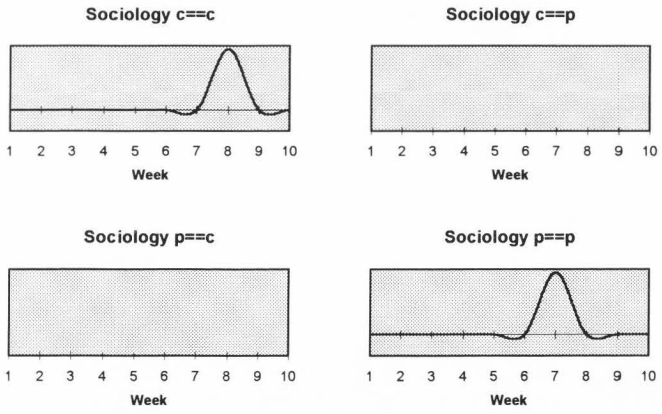

Figure 61. Profile of frequency of parallel learning events for the sociology course across a 10-week period.

did not know, this student asked another student. While this was happening in our classroom, the instructors was trying to get the class started.

Both of the c==c events of week eight were initiated by the instructor directing us to play a game that demonstrated a concept he was trying to teach. He got us talking to each other and a couple of times students in the classroom talked to each other while he was explaining what the results meant. Immediately after the game, all the students returned to their regular seats and their regular behavior.

All the courses combined. The profiles for all the courses combined (Fig. 62) show distinctly the tendency for the instructors' process behavior to peak early and late and for the students to exhibit parallel learning behavior generally later in the term.

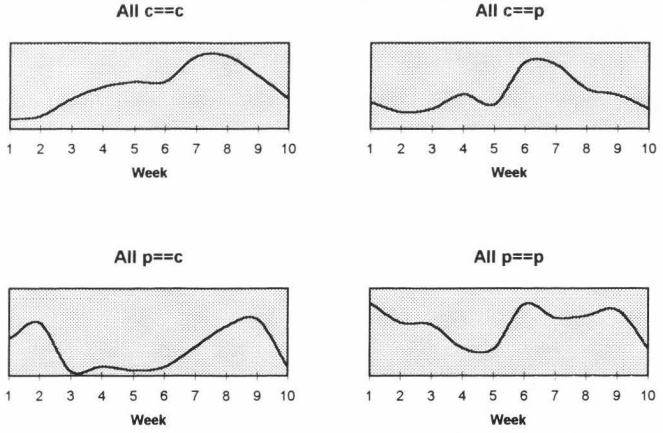

Figure 62. Profile of frequency of parallel learning events for all the courses combined across a 10-week period.

The first week of the course, the students do not have much content to talk about, but by the time the instructor is trying to clarify process information from the first week, the students are trying to clarify content they did not understand the first week. This explains to me why one of the p==c profile peaks was the second week.

The profiles would seem to hint that the instructors discuss the process early in the quarter when they describe what is required for the course. Then they discuss the process again later in the term when they are discussing final exam expectations, term paper expectations, and missing assignments. Students tended to talk about these same topics and that is my explanation for the p==p and p==c profiles.

As the students became more familiar with the general pace of the course and with each other, they seemed to feel freer to work with each other while the instructor was delivering content or dealing with a process. This is supported by the earlier learner-learner profiles, which peaked later in the term.

Summary

The instructors in the Com-Net system could not see, and seldom could hear their students. This left the students free to accomplish some of their learning independently of the instructors during class time.

This independent content acquisition was done for at least three reasons. First, it was easier to communicate with someone there at the site with them, either another student or the TA. Sometimes it was a matter of a quick comment or question. This was noted earlier in the discussion of learner-learner interaction.

Second, interrupting the instructor with a comment or question was uncomfortable. Getting the instructor's attention using only audio requires a much harsher interruption. In a system where instructors and students can see each other, a physical signal can be used to indicate a student wishes to interrupt.

Third, there was generally a camaraderie among the students at each of the sites. There were two exceptions to this that I saw in the art and sociology courses. The students in the focus groups I conducted talked about being friends with each other and helping each other during class time. Many of these student have been in other courses together and so learning together has become part of the social fabric of these classrooms. One of the students in a focus group spoke about this:

> As far as socializing, I mean, the only interaction I have with people is right there in class. I don't have time to do it. A lot of the non-traditional students, especially, they've got so many other things going on they don't have time to socialize so the only interaction you have is if you're doing a project or in class.

Possible Confounding Explanations

As with all research, there are events that are unavoidable that may influence the outcome. This is more the case when the data collection instrument is a human. This study, too, has its potential traps. I have tried to think of possible events that may have interfered with my data collection, colored my interpretation, or limited my descriptions. I have looked in the two most obvious places, myself and the object of the study.

I, as a Data Collection and Analysis Instrument

There are two things that may have hampered my ability to be a perfect data collection instrument. First, as a human I am not internally consistent. Second, my interpretation of events may not be the same as someone else's.

Internal Consistency

As with any human being, there were some days when I was more tired or distractible than other days. There is the possibility that on those days I took field notes differently than on other days. That is unavoidable. Perhaps on good days when my fingers could fly, I might have taken better notes than usual. There were some days when the students in the course were quieter than others and so with fewer events it was easier to keep up with the events. There were some days when there was so much activity going on that was unrelated to the subject matter I would have raised suspicion if I appeared to be taking notes and so, those notes had to be abbreviated and written during the portions of the class period when we were paying attention to the instructor.

I have tried to limit the effect on the results of the study by broadening the scope of the research and narrowing my focus, constantly referring to the narrative to check the numerical illumination, and limiting specific information to individual courses rather than comparing one course to another.

Broadening the scope and narrowing the focus. The research design for this study included breadth in number of courses, the sites of the classrooms, the academic level, the academic content, and the time of day. This, I believe, helped

give me a broad sampling of my own ability to write field notes. That is, some courses were easier than others, some times of day were easier than others.

I was aware during this study that my own abilities could affect the quality and quantity of the field notes beyond the effects imposed by the classroom atmosphere. Consequently, I checked myself repeatedly to be certain I was exerting as much energy as I could to observing and recording within the confines of my role as student. I was aware of my focus. Some of the time, like focusing one's eyes, this became automatic. But, like we all experience, there were a few rare times when it seemed I had been staring off in the distance, that is, getting into the role of student too well. Whenever I realized this had happened, I quickly wrote what had been transpiring in the notes.

Checking the narrative. When I discussed the profiles of the courses in each of the interaction sections, I always looked at the field notes to see why that particular class period had the highest number of events per student. I also verified I had not missed something about other high points in that course. Then I checked my external explanation (the field notes) about that week with my internal picture (visual memory) of that week and that course.

Not comparing courses. I have avoided comparing one course to another because, because the atmospheres in the courses were different, it was not possible to take identical field notes across the courses. The reason why I attended so many courses was to get as varied a collection as possible. I am confident in my relative consistency within courses. The courses themselves tended not to vary dramatically from one week to the next, making relatively consistent note taking possible. However, I am aware that consistency across the courses was not possible. So, in

the report of findings I have chosen to talk about individual courses and the distance education system as a whole, but not courses compared with each other.

Interpretation of Interaction Events

In the field notes I generally noted behaviors rather than interactions. That is, I wrote down what the students were doing, then later, I coded those behaviors by the interaction types. There is an exception to that statement. Near the beginning of the study I wrote a thought paper on the parallel learning matrix. From then on, when I needed an abbreviation for specific parallel behaviors, I used the c==c, c==p, p==c, and p==p abbreviations to denote the behavior. I was not interested in the subject of the event; even so, using the parallel abbreviations did denote that the subject was in some way about the content of the course.

As I began to analyze the field notes, I coded them based on the interactions. Then, as I indicated in the procedures section, I verified that all the behaviors would fit into the interaction types.

Recently, my advisor suggested that I see if others would agree with my interpretation of the students' behaviors based on the definitions in the interaction types. I suggested we ask graduate students in a distance education course on campus to participate.

The methodology. The instructor of the on-campus class agreed to allow the students to participate, and I created an instrument designed to check their interpretations. That instrument is in Appendix E. I gave them my working definitions from Moore (1989b), Hillman et al. (1994), and the definition I was using at the time (Walden & Burnham, 1996) to describe learner-environment interaction. I

gave them my two-letter coding abbreviations. Then I gave them a sample scenario with the interactions circled, and labeled as an example of what I wanted them to do. Finally I gave them four more scenarios and asked them to circle and label the interactions in each of those. The sample scenario had an example of each of the five interaction types. The remaining four had three or more interactions in them for a total of 20 interactions, four of each type, throughout the four scenarios. The students had 15 minutes to complete the task. I then collected their responses and we talked about interaction. It was during that conversation that I realized the need to rewrite the definition of learner-environment interaction to reflect criteria I was using, more accurately.

I took the responses back to my office and analyzed them. There were six students and the instructor. I chose to not include instructor's response in the overall scoring for two reasons. First, I have had discussions with her about this study and interactions, and second, her knowledge of the field of distance education is so much beyond that of the students that her understanding and responses would be different from theirs.

Next, I marked their papers with agreement or disagreement on the original 20 interactions. However, there were 13 events that were included by one or more of the students that I did not identify as interactions. So I marked those as disagreements. Now, I had a quandary. If a student marked an event I did not have, then they obviously disagreed with me. However, what if a student agreed with me and did not mark the same event as an interaction? I decided to count those as agrees when looking at all the students combined. Appendix F contains the exercise scenarios with the interactions circled and identified.

The results. First I figured a simple agreement between me and each of the other six students individually, including as disagrees the items a student added. Table 31 shows those percentages of agreement.

Table 31

Percentages of Agreement Between the Individual Students and Me on the Interaction Interpretation Exercise

Student number	Percent of agreement
1	52
2	59
3	46
4	48
5	58
6	74

Then I looked at the percentage agreement on only the original 20 interactions ignoring the items added by the students. Table 32 shows those percentages.

Next, I included as disagrees those items the students added, and included as agrees the same items that were not added by each student which had been added by one or more other students. That is, I included as agreement those items where a student agreed with me that an event was not an interaction, but only if the event had been labeled an interaction by another student. Table 33 shows the resulting percentages of agreement.

Table 32

Percentages of Agreement Between the Individual Students and Me on the Original 20 Interactions for the Interaction Interpretation Exercise

Student number	Percent of agreement
1	65
2	80
3	60
4	55
5	70
6	85

I think this third method most accurately represents the students' understanding of interaction when compared with mine. However, all of these results are influenced by the inadequate definitions of interaction in the literature and my growing understanding of the interactions of adult distance learners that I had observed.

After that general comparison, I created a table that included each of the objects of interaction individually and each of the six students and all the students combined, the number of agreements and disagreements for each of the 20 and the extra 13 interactions, and percentages of agreement for the original 20 and for all 33 items. Across the top, M stands for learner-interface (media) interaction, E stands for learner-environment interaction, I stands for learner-instructor interaction, L stands for learner-learner interaction, and C stands for learner-content interaction. Down the left side, A stands for number of items agreed on. D stands for the number of items disagreed on, XA stands for the number of items not identified as

Table 33

Percentages of Agreement Between the Individual Students and Me Including Interactions Added and Interactions Not Added on the Interaction Interpretation Exercise

Student number	Percent of agreement
1	55
2	67
3	58
4	64
5	70
6	82

interactions that were added as interactions by one or more other student, and XD stands for the number of items added by a particular student that were not identified as interactions by me. As these results show, the definition of environment did not lead to an outstanding percentage of disagreement. In fact, learner-content seemed to be the most troubling interaction.

Of the 13 extra interactions one was added by all six students, one was identified by four students, 7 were identified by two students, and four were identified by one student each. Table 35 shows the number for each kind of object of interaction that was added.

The unanimous event occurred in the first scenario. All six students said the instructor's lecturing and writing on the electronic board was an example of learner-instructor interaction, even though there was no indication the learners were responding reciprocally.

Table 34

Numbers of Agreements and Disagreement on the Original 20 Interactions and the Additional 13 Interactions and the Percentage of Agreement for the Original 20 and the Expanded 33 for the Interaction Interpretation Exercise

Student	M	E	I	L	C	% agree
1						
A	3	3	3	3	1	
D	1	1	1	1	3	
% agree	75	75	75	75	25	65
XA	0	2	3	1	2	
XD	2	1	1	0	1	
Total %	50	71	75	80	43	55
2						
A	3	3	4	4	2	
D	1	1	0	0	2	
% agree	75	75	100	100	50	80
XA	2	2	2	0	0	
XD	0	1	2	1	3	
Total %	83	71	75	80	29	67
3						
A	3	3	3	2	1	
D	1	1	1	2	3	
% agree	75	75	75	50	25	60
XA	1	2	1	0	3	
XD	1	1	3	1	0	
Total %	67	71	50	40	57	58
4						
A	2	1	3	4	1	
D	2	3	1	0	3	
% agree	50	25	75	100	25	55
XA	2	3	2	0	3	
XD	0	0	2	1	0	
Total %	67	57	62	80	57	64

(table continues)

Student	M	E	I	L	C	% agree
5						
A	2	4	3	3	2	
D	2	0	1	1	2	
% agree	50	100	75	75	50	70
XA	1	2	3	0	3	
XD	1	1	1	1	0	
Total %	50	86	75	60	71	70
6						
A	3	4	3	4	3	
D	1	0	1	0	1	
% agree	75	100	75	100	75	85
XA	2	2	2	1	3	
XD	0	1	2	0	0	
Total %	83	86	62	100	86	82
all						
A	16	18	19	20	10	
D	8	6	5	4	14	
% agree	67	75	79	83	42	69
XA	8	13	13	2	14	
XD	4	5	11	4	4	
Total %	67	74	67	73	57	67

Table 35

Number of Interactions Added By Type of Object of Interaction for the Interaction Interpretation Exercise

Object type	Number added
Interface	2
Environment	3
Instructor	4
Learner	1
Content	3

Next, I wanted to see if there was any pattern to the type of object added by each of the students. Table 36 is a table of students and which interaction object type they added. The numbers across the top are the student numbers. The letter number combinations down the side denote the specific interaction that was added.

Table 36

Type of Interaction Object Added by Each Student on the Interaction Interpretation Exercise

Object added	1	2	3	4	5	6	Number of students
M1	X				X		2
M2	X		X				2
E1			X		X		2
E2	X	X					2
E3						X	1
I1	X	X	X	X	X	X	6
I2			X	X			2
I3		X	X				2
I4						X	1
L1		X	X	X	X		4
C1	X	X					2
C2		X					1
C3		X					1
Number added	5	7	6	3	4	3	28

I did not see any particular pattern here to indicate that any student had more difficulty with any particular interaction than another. But, what about the 20 original interactions? The next table lists those and shows which students disagreed with me. The first letter tells which kind of interaction object, the number is the sequential number of the item, and the last letter tells which scenario it was in. The lowercase a is scenario 1, b is scenario 2, and so forth.

The interactions that have the word "type" added indicate those in which the student identified the event as an interaction but gave it the a type label different from mine. Otherwise, a single X means they did not identify the event as an interaction.

Interpretation. These results may reflect more of a confusion about what constitutes an interaction given the existing definitions in the literature, than a lack of being able to identify interactions. The results of this exercise do indicate that a study of the interaction concept was needed. I have been careful in my interpretation of behaviors in terms of interaction, and refined my understanding of the current definitions. I am convinced that had there been adequate time to discuss the definitions, and guide the students in the classification of behaviors into interaction types, the agreement would have been closer.

The Com-Net System as Object of Study

There is the possibility that the field I studied is so different from other distance education experiences that none of the findings are transferable. It is more likely that there is a range of transferability depending on the object of the transfer. Again, readers will need to know their own environment to determine if the results

Table 37

Original 20 Individual Interaction Items and Disagreement for the Interaction Interpretation Exercise

Item	1	2	3	4	5	6	Total
M1b							0
M2c				X			1
M3d	X	X	X	X	X	X	6
M4d					X type		1
E1a				X type			1
E2b				X			1
E3c							0
E4d	X	X	X	X			4
I1b							0
I2c							0
I3d	X		X	X type	X	X	5
I4d							0
L1a			X				1
L2b	X						1
L3d			X type		X type		2
L4d							0
C1a				X			1
C2b	X	X	X type	X	X		5
C3c	X type	X	X		X		4
C4c	X		X	X		X	4
Total	7	4	8	9	6	3	37

of this study can be applied to their setting. I have attempted to give as much information as possible about the environment of these students so the reader can discern how information can be used and in what context. There are two important sources of difference I have identified: the mediating technology and student demographics.

The Mediating Technology

In distance education, the mediating technology may be as simple as the post office for correspondence courses, or as complex as two-way audio and video. I have included the mediating technology in my discussion of the literature to indicate that research studies may have different results based solely on the environment in which they are conducted. I have also tried to focus the attention of the reader on the assumptions and limitations of this study. Assumptions and limitations of this study include: The actors are adult learners, they are taking courses offered for credit from a university, they meet in groups, there are groups statewide, and they do not meet with the instructor. There are reasons why I think the findings of this study are, within a range, transferable to different settings with different mediating technology.

In another graduate distance education class (different from the one used to test my ability to classify interactions), the students reported on one-shot observations of distance education opportunities within the university. One of the students who observed the two-way audio, two-way video (Ed-Net) classroom had also seen the Com-Net system. That student remarked that the student behavior did not seem all that different between the two.

One of the students in one of the student focus groups was getting his degree primarily on the Ed-Net system, but was getting one of the classes he needed on the Com-Net system. He also remarked that the experiences were not much different for him.

I have had opportunity to discuss classroom behavior with other practitioners in the distance education field at national conferences. Even though I noticed in my face-to-face meetings at conferences and in the literature that the general meaning of interaction focuses on the learner-instructor interaction or the technology, and that definitions are needed, all agreed there is more activity in a distance education classroom than in a face-to-face classroom.

Student Demographics

There is one glaring difference between the students in the Com-Net system that I observed and the students in the 32 studies I inventoried for the review of literature. In the 11 courses, there were only five males. These five males were in four courses. In the studies that reported the percentages of gender, the ratio is much closer to even, but still with a majority of females. The courses that were attended by males were math, psychology, science, and sociology.

To check whether or not the classrooms where I observed were atypical of the Com-Net system, I went to the Com-Net office and looked a class rolls. I counted (where I could identify gender by first name) females and males in the courses that I attended statewide. Because I was careful to select a cross section of disciplines to observe, I next decided to compare those courses to comparable courses. I chose to compare each course that I attended the first term with another

course that was as close to the same discipline and academic level as I could find during the same term. To spread the sample, I then chose to compare each course that I attended the second term with a comparable course held the term previous to my study. Table 38 shows the percentage of females in the classrooms where I observed, the percentage of females in the courses statewide, and the percentage of females in comparable courses.

It appears that the classrooms where I observed had a higher than usual percentage of females compared to those same courses statewide, but that the courses that I chose were typical of comparable courses.

In the study of potential gender differences where I could, namely the seating choice of males, I looked into other classrooms to get a better representation. In that respect there did not seem to be any difference among the courses.

In classroom behavior, there was as great a span of behavior among the males as among the females, and with so small a sample, generalizations about differences between males and females are difficult to make.

Summary

There are always differences in the locations of research, imperfections in research designs and methodologies, and accidents. Researchers are called upon to replicate and thoroughly describe. The body of research, in any method or of any content, is made up of approximations and generalizations of the ultimate truth. Some approximations are closer than others. Some generalizations are more encompassing. Readers must be able, both in terms of their own expertise and in terms of the quality of the research, to discern how close the approximations or how

Table 38

Percentages of Females in Courses in This Study and in the Research Articles

Course	% Females where I observed	% Females statewide	% Females in comparable courses
Agriculture education	100	85	94
Art	100	50	60
Business	100	54	63
Elementary education	100	91	85
English	100	83	93
History	100	75	63
Human environments	100	94	95
Math	88	63	87
Psychology	82	81	68
Science	90	72	57
Sociology	83	62	52
All courses combined	92	70	69

global the generalizations are to their situation. It is the responsibility of the researcher to provide indicators. I have tried to identify the possible weak spots in this study and provide an interpretation of their effect. I want this study to provide a foundation of useful information for practitioners in the field of distance education.

INTERPRETATION

Up to this point, I have tried to limit myself to discussing concepts that come directly from the individual observations for each of the courses. In each of the sections about the interactions and about parallel learning I have discussed the findings that answer the three research questions. Now, in this section, I would like to focus on the answers to the three research questions themselves. These answers lead to a proposed conceptual structure of interaction in distance education. Then to conclude, I offer a working definition of the learners' interaction in distance education settings.

Possible Answers to the Research Questions

I attempted to answer the following three research questions:

1. What interactions do learners at a distance exhibit in their educational setting?
2. What observable events appear to prompt the beginning and ending of the learners' interactions?
3. What observable outcomes result from the learners' interactions?

The only learners I can speak of with a high degree of accuracy are those students I observed in the Com-Net system. However, based on conversations with others, locally and nationally, who have caught glimpses of distance learners in other distance learning environments, I believe these students were not much different from all adult distance learners. My observations are finished, but I assume that the behaviors I observed continue, and I can answer questions about what these learners do, based on what I have seen them doing.

What Interactions Learners Exhibit

Distance students do not enter the classroom, sit neatly in rows of seats, get out their notebooks and pencils, write quietly for 50 minutes only occasionally looking up to copy off a blackboard, and stand up to leave when the class is over. These students actively, interactively, respond and react physically and verbally to persons and objects in their learning environment. The behaviors of these students are proactive and reactive. Students begin interactions, and reciprocate when someone or something else begins an interaction. They interact with something or someone around them about events and ideas. Distance students interact with the object of the interaction about the subject of the interaction.

The Objects of the Interactions: The Learners' Behavior

The learners in these settings have something that they interact with, the objects of interaction. Based on the theoretical thinking of others (Hillman et al., 1994; Moore, 1989b), others' observations, and my own observations, learners can have interactions with five objects: the technological mediating interface, the learning environment, the instructor or instruction otherwise created by the instructor, other learners, and the content of the instruction. The learners may interact with the objects singularly or in combinations of interactions. In these classrooms, the observer can see interactions or the evidence of interaction with one or more of these objects almost continuously. Thus, the observable behaviors of the distance

learners can realistically be said to be bounded and defined by the objects of interaction. These interactions have been defined in the Findings section.

The Subjects of the Interactions: The Learners' Focus

Learners interact with an object about something. That something may be the course content, the course process, or other subjects. These learners are in these classrooms to acquire the content, but they do not leave the rest of their lives in the lobby. They choose, actively or reactively, the subject of their interactions based on what else is happening in the classroom, and what their needs are at that time. Because this is where they come to acquire academic content, a majority of the subject matter of the interaction events is the content or the processes involved in getting the content.

The Structure of Interactions

Each interaction event has a subject and one or more objects. This study describes three general categories for the subject of the interactions: academic content, acquisition process, and material not related to the course content. The objects of the interactions are defined by the five types of interaction: learner-interface, learner-environment, learner-instructor, learner-learner, and learner-content.

This study further describes a specific set of combinations of subjects and objects that are related to each other. This set of related combinations is called parallel learning. When the subject of the interaction is content or process, and the

object is, by definition, something other than learner-instructor interaction, but simultaneously, the instructor is delivering content or discussing process, this interaction is called parallel learning. Parallel learning is further subdivided, but that has already been discussed in the Findings section beginning on page 230.

Events That Appear to Begin and End Interactions

There are events surrounding these interactions. There are reasons why interactions begin, and reasons why they end. Sometimes these reasons are observable and sometimes the reason may not be directly observable but can be inferred from other behaviors and interactions.

The Beginnings of Interactions

The reason an interaction begins sometimes has to be inferred from other evidence. For example, if a learner asks a questions, it can be inferred that the student was confused, or needed more information as a result of that learner's learner-content interaction. There was one possible exception to this example. In the science course, there were some quick comments among the students (learner-learner interaction) at the site where I was observing. The students were supposing that a specific student at another site was asking questions to show he had read the material and was smart. The cause for this learner-learner interaction was not confusion. The initiating event was a learner-content interaction. However, frequently, the events preceding and appearing to prompt the interactions are observable.

Observable and inferred events that appear to prompt an interaction fall into the same categories as the objects of interaction. The prompting events may be caused by what is normally an object of an interaction: interface, environment, instructor, another learner, or content. The prompting event may be one of the five types of interactions: learner-interface, learner-environment, learner-instructor, learner-learner, or learner-content. For example, a learner may cause an event that prompts an interaction, or the prompting event may be a learner-learner interaction.

Objects as Prompts

It is possible for an event caused by what is normally the object of an interaction (the interface, the environment, an instructor, a learner, or the content) to prompt one of the five types of interaction (learner-interface, learner-environment, learner-instructor, learner-learner, or learner-content). The objects may cause events that prompt interactions or prompt interactions themselves.

The failure of the mediating technology (the interface) may prompt learner-learner interactions. The learners may interact with each other, discussing the situation. The lack of new content may allow time for a conversation about last night's events or discussion about how those involved are doing on the paper that is due shortly. The absence of the mediation may prompt learner-content interaction by allowing time for discussion of the material that was being delivered. The absence of instruction may prompt some learners to read the text (learner-content) while waiting for the problem to be fixed. An event involving the interface may prompt interactions with any one or more of the five objects of interaction.

The temperature of the environment may prompt learner-learner interaction when learners complain to each other about the heat. A learner may interact with the interface by asking the TA to turn on the air conditioner. A learner may interact with the environment to turn down the heat. The environment of a learner can prompt a learner's interaction with any of the objects of interaction.

An instructor may prompt an interaction or combination of interactions. The instructor may prompt a comment by a learner to another learner (learner-learner interaction) or to the instructor (learner-instructor interaction). A learner may look in the text for confirmation by the content (learner-content interaction). Two or more learners may begin a parallel discussion of the content that is independent of the instructor because of something the instructor said. An event involving the instructor may prompt interactions with any one or more of the five objects of interaction.

The learners themselves may prompt learner-learner interactions on the part of other learners, or learner-interactions that include the first learner. Comments made as an aside may evolve into full-blown discussions. Learners are always one of the participants in learner interactions, and they frequently provide the prompt. A learner's question may prompt a learner-content interaction by another student who tries to find the answer in the text. A learner may prompt learner-instructor interaction by asking a question of the instructor. Learners may prompt interactions with any one or more of the five objects of interaction.

The content being discovered by a learner may prompt an interaction with another learner or the instructor to ask a question or add additional insights. The desire to interact with the instructor because of the content may prompt an interaction with the mediating technology. A sudden insight into the content may

cause either a learner-learner interaction to share the insight, or a check of the text (learner-content interaction) to see if the learner's new understanding is correct. The exploration of the content in a laboratory setting may prompt interaction with the environment to perform the required exercise. The content of the course may prompt any of the five types of interaction.

Interactions as Prompts

It is common for interactions in these classrooms to prompt other interactions. There may be chains of interactions, one interaction leading to another interaction and that interaction to another.

Interaction of one learner with the TA may prompt another learner to join the conversation and add learner-learner interaction. Interaction with the mediating technology (learner-interface) needed to view a video provided by the instructor (learner-instructor) may be required to enable interaction with the content.

The learner-environment interaction of stepping out for a drink may prompt learner-learner and learner-content interactions necessary to review what happened in the classroom while the student was gone. Eating in the classroom (learner-environment interaction) sometimes involved the sharing of snacks with other learners (learner-learner and other learner-environment interactions). A learner may need to move closer (learner-environment) to a working microphone (learner-interface) in order for the learner to interact with the instructor (learner-instructor).

An interaction with an instructor may prompt interaction with the content. If the instructor asks a question, the learner is required to think about the content, and sometimes look in the text for the answer. Some instructors require learners to

interact with each other to prepare for interactions with the instructor. An instructor may give (learner-instructor) a group of students (learner-learner) a question to find the answer (learner-content) for and return the answer to the instructor (learner-instructor). A learner-instructor interaction discussing the content may prompt other learners to interact also about the content leading to a parallel learning (c==c) interaction.

A learner interacting with another learner may prompt one of several other interactions. A learner may interact with the content in order to answer a question asked by another student. A learner may contribute the content of the discussion to the statewide discussion (learner-instructor, and learner-interface). A learner may pass the candy (learner-environment).

The prompting of another interaction by a learner-content interaction is more difficult to observe because much of the learner-content interaction happens inside a learner's head. A humorous, insightful, or disturbing thought about the content may prompt sharing of that thought with another learner or the instructor involving learner-learner, learner-instructors, or learner-interface interactions.

The Endings of Interactions

When do interactions stop? Interactions stop when they are no longer useful or possible. Interactions end when they are no longer required or some event interrupts or makes the interaction impossible.

Many interactions stop when the interaction is no longer required, or the need that began the interaction is satisfied. Class is over, so the mediating technology is shut off. The learner understands, so additional interaction with the instructor about

the question asked by the learner is no longer required. The problem is solved, so the learner sets the text aside. The cookies are gone, so the learner stops eating. The story has been told, so the learners stop talking.

Many interactions stop when they are interrupted. And, yes, the sources of the interruption can again be found in the same categories as the objects of interaction. The interruption may be caused by an object or another competing or completing interaction. Interaction between the learner and the instructor may be interrupted by the failure of the interface (object) or the interruption by another learner (learner-instructor or learner-learner interaction). Interactions between learners may be interrupted by a sudden question to one of the learners by the instructor. The solving of a problem from the text may by interrupted by another learner at another site reporting the answer.

Objects and interactions may either prompt the beginning or provide the ending for an interaction. Beyond that, I think it is possible for part of an interaction to begin an interaction and for that same interaction to end the ensuing interaction. For example, if an instructor asks a group of students to solve a problem and report the answer, the learner-instructor interaction begins when the instructor gives the directions and ends after the students report the answer and the instructor responds to their answer. During the time covered by the learner-instructor interaction, the learners exhibited learner-learner and learner-content interactions. These learner-learner and learner-content interactions began when the instructor gave the assignment and ended when the instructor asked for the results.

The Interplay of Interaction Events

There are sequences of events that frequently precede and follow a single interaction event. I would like to show some of the patterns of chains and webs of events. I offer these based on my observations from this study. The diagrams of each of the patterns of chained interaction events are limited to three links with the interaction that is the focus of the discussion being the center, darkened link.

Figure 63 shows one of the forms that chains of events and interactions can take. An object or interaction may prompt an interaction. Then the interaction may end with another interaction or the resolution of the interaction.

There are some cases in which if there is one interaction, there is usually another interaction simultaneously. For example, when a learner interacts with the instructor from a distance, the learner and instructor must also interact with the mediating technology. However, both of these interactions overlap in the chain. Figure 64 shows this chain.

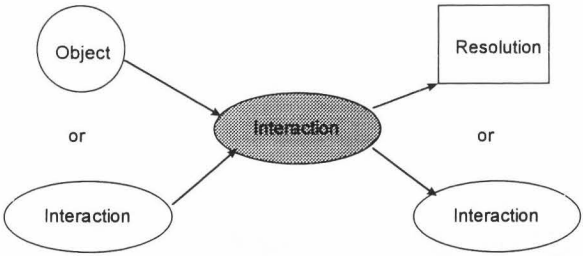

Figure 63. Example chain of interaction events.

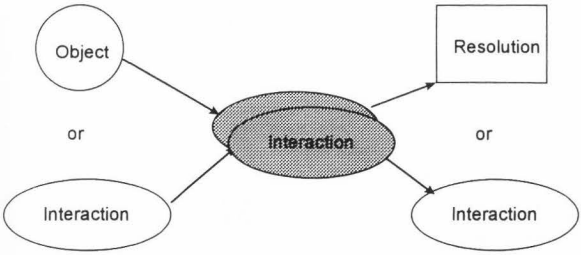

Figure 64. Example chain with overlapping interactions.

Even though the diagram only shows the interaction that is the focus of the chain having an overlapping interaction, the same overlap could be true for the interactions that begin or end the central interaction.

The same interaction may both begin an interaction and end an interaction. Figure 65 shows a diagram of this event.

An object or interaction event may prompt more than one other interaction event. This would create a web of interaction events. However, each of the

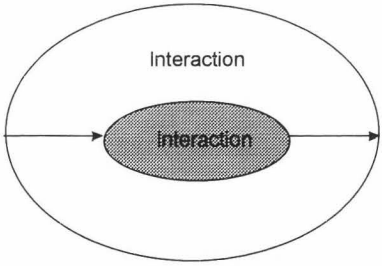

Figure 65. Example of the same interaction beginning and ending another interaction.

interactions in the web would have its own beginning and ending link in the chain. And so the interactions continue leading to and resulting from one another.

Outcomes of the Interactions

What observable outcomes are possible? Some outcomes may be beneficial or may be detrimental to the acquisition of the content of the course. The outcomes may be other interactions, or a whole chain or web of other interactions. That chain or web may continue to grow for most of the class period. The outcome of an interaction may be the satisfaction of the need that began the interaction. The outcome of all the interactions during a course is the final change in the learners as a result of attending that course.

The outcome of an interaction is related to what ended the interaction. If the interaction was prompted by a need, and the interactions stops when the need is met, then the outcome is the resolution of the need. The outcome of an interaction can also be an ensuing interaction.

At the end of a course or a class period, there are one or more outcomes that are the result of the learners controlling their own learning. The observable learning control behaviors can be classified using one or more of the interaction types. The outcomes of the learners' collective behavior for the class period or course are the results of multiple interaction events. Those outcomes may be beneficial, such as the understanding of new information, or detrimental, such as a waste of time or further confusion. It is possible that the same outcome may be beneficial to one learner and detrimental to another.

The beneficial effect of an interaction might have a detrimental effect on another learner. For example, if one learner leaves the room to satisfy a need, that learner-environment interaction might result in the comfort of one learner and the disruption of another. A single interaction may also have both a beneficial and a detrimental effect on the same student. In the previous example, the learner who left the room had a need met, but also missed some of the course content.

The interaction events themselves influence and overlap each other to varying degrees. The beginning, ending, and transpiring of the interaction events have an influence on each other and the learners. And so, the chain of interactions continues.

Proposed Working Definition of Learner Interaction in Distance Education

I offer the following as a working definition of learner interaction in adult distance education classrooms:

> **Learner interaction** is either the reciprocal action or mutual influence between the learner and the object of the interaction or the influence of the object of the interaction on the learner.

This definition leads to a definition and discussion of the structure of interaction events found in these classrooms:

> **Learner interaction** consists of a subject of interaction and one or more objects of the interaction.

The research literature and this study have identified five types of interaction. The following are those types and recommended definitions for those types based on the definitions of Moore (1989b), Hillman et al. (1994), and this study:

Learner-Interface interaction is the reciprocal action or mutual influence between the learner and the technologies used to deliver instruction or the influence of the technologies used to deliver instruction on the learner.

Learner-Environment interaction is that reciprocal action or mutual influence between a learner and the learner's surroundings that can either assist or hinder the learning.

Learner-Instructor interaction is the reciprocal action or mutual influence between the learner and the instructor or media created by the instructor to deliver instruction.

Learner-Learner interaction is the reciprocal action or mutual influence between learners.

Learner-Content interaction is the reciprocal action or mutual influence between the learner and the content of the instruction or the influence of the content of instruction on the learner.

The five types of interaction define the five objects of the interactions. There are five objects that are in the interactions with the learners. I offer the following definitions of interface, environment, instructor, learner, and content to develop the total picture of adult learner interactions in distance education.

The interface is the media, technology, or persons that stand between the learner and the instructor and facilitate the transfer of the content and the interaction between the learner and the instructor.

The environment is the surroundings of the distant learner during the normally scheduled educational opportunity.

The instructor is the expert or the media expert created by the expert who provides the content and evaluates the acquisition of the content by the learner.

The learner is the person involved in the deliberate acquisition of information in a content area.

The content is the collection of information in an academic discipline that is the subject of the educational experience.

This study has shown three main categories of the subject of the interaction. These subjects are material related to the content of the course, material related to the process of acquiring the content of the course, and material not related to the course. Each of these categories may be further subdivided by the degree of closeness to the aims of the course. I offer the following definition of process to finish defining the components of adult learner interaction in distance education:

Process is the procedure used to acquire or transfer the content to the learner.

I have provided these definitions and this description of adult learner interaction in distance education settings to be used specifically for those environments where adult learners meet in groups at a distance from the instructor. These definitions may or may not have additional components and applications in other environments. The question of whether or not these definitions apply to other environments is yet to be discovered.

SUMMARY

The project reported in this document was originally started because Dr. Burnham wanted someone to go out and document parallel learning, Dr. Tueller wanted information about what was happening in the remote classrooms, and I wanted an interesting study to capture my imagination and test my skills. Dr. Burnham gave me one of his presentations to read in which he discussed parallel learning as the acquisition of the course content that takes place concurrently with, but independently of, the delivery of instruction (Burnham, 1995). I read the presentation and then began to look at the literature about learners at a distance. A few paragraphs by Garrison (1989a, p. 228) gave me a topic that would interest all three of us: learner control. Further exploration of the literature led to Moore (1989b) and Hillman et al. (1994) and I began to think about learner interactions at remote sites.

The Literature

My exploration of the literature also led me to discover that even though interaction was mentioned frequently by practitioners and researchers as something desirable and worthy of study, the term was seldom defined, and narrowly used. In the articles and presentations, the word interaction was generally used to indicate that learners and instructors or learners and learners were communicating with one another. A few philosophical articles, not research articles, discussed the definition and operationalization of the term interaction (Cookson & Chang, 1995; Hillman et al., 1994; Mackin & Hoffman, 1996; Moore, 1989b; Wagner, 1994).

The research articles were primarily reports of surveys and interviews with learners. In fact, 94% of the research studies used at least one survey or interview. Only 6% of the studies used observation as a method to gather data about the learners, and those observations were of short duration. The most common method for studying these learners was to ask them rather than watch them.

Research Design, Methods, and Procedures

I had access to the Com-Net system with its audio-graphic technology, multiple sites, and variety of courses. I also had the necessary curiosity and interest in exploration. So, an observation of the learners and their interactions seemed to fit the interests of Dr. Burnham, Dr. Tueller, and me. A study of the learners' interactions at remote sites by observing those interactions also fit a weak spot in the body of research.

Dr. Tueller gave his support. The Institutional Review Board gave its permission. The registrar of the university gave his assistance. Dr. Burnham gave his guidance. I gave my effort. Thus, I began the process of auditing 11 Com-Net courses during two academic terms as a participant/observer. I had three research questions:

1. What interactions do learners at a distance exhibit in their educational setting?
2. What observable events appear to prompt the beginning or ending of the learners' interactions?
3. What observable outcomes result from the learners' interactions?

I chose a research design based on the field study procedures of entering the field, gaining and building trust, obtaining and preserving the data, analyzing the data,

and reporting the results outlined by Adams and Schvaneveldt (1985). I created a list of characteristics of these courses that I needed to vary to obtain a broad range of situations. Those characteristics were (a) the site where the courses were held, (b) the academic content of the courses, (c) the time of day the courses were held, (d) the number of class periods per week, (e) the academic level of the courses, and (f) the number of learners in the classroom. Table 5 lists the characteristics of the 11 courses.

While I was observing, I wrote down, as accurately as possible, learner behaviors in the classrooms during class time. I wrote my field notes as though I were writing notes about the content of the course. As a good student should, I took notes. I also audio taped the classes in case something happened to my field notes and for further research. After all the courses were completed, I conducted focus groups at three additional remote sites.

While I was waiting between classes, out in the field, I began to think more about parallel learning. I developed the idea that there are four kinds of parallel behavioral events that can be classified as parallel learning. These four types depended on whether the instructor was talking about the content of the course itself or the process of obtaining the content such as assignments and exams, and whether the students were also concurrently discussing the course content or the process independently of the instructor. Thus I was observing four possible combinations of subjects being discussed: instructor-content/student-content, instructor-content/student-process, instructor-process/student-content, or instructor-process/student-process. The matrix of these behaviors is shown on page 232.

Data Analysis

After the first term ended, I tried analyzing the field notes for the first six courses. I coded all the behavioral events by interaction types. I used the definitions of the interactions types found in my reading of the literature and listed on pages 28-29. I also coded the events based on the definition of parallel learning and the extension of the definition into the four types of parallel learning.

I compared the behaviors associated with each of the interaction types, and based on themes in the data, I listed what could be said about each of the interaction and parallel learning types. In addition to the verbal description of categories, I further counted the number of events for each interaction type and parallel learning event, and created visual profiles of the learners' activities across the academic term. I used those profiles to provide an opportunity to discuss the kinds of events that caused high spots during the term, and in some cases these profiles provided an opportunity to see other patterns in the verbal data.

Findings

During the first data analysis, I discovered that most of the learner control behaviors could be coded as one of the interaction types. Those behaviors that did not fall into one of the interaction types had something else in common. That commonality was the learners' environment. So, I added learner-environment to the four other types of learner interactions. I defined learner-environment interaction as that reciprocal action or mutual influence between a learner and the learner's surroundings that can either assist or hinder the learning. With the addition of a fifth

interaction type, all the behaviors fit one or more of the interactions types. Each of the parallel events also fit one or more interaction type. Consequently, I realized that parallel learning events were a special subset of interaction types. Now, I had evidence of each of the interaction types found in the literature and the one I added. I had confirmation of the interaction types by observation in the field, and I also had additional information about each of the interaction types beyond that found in the literature. Table 39 is a list of the general factors of each of the interactions that were discovered by this research and discussed in the Findings section of this document beginning on page 102.

Learners interacted with the interface to varying degrees depending on which part of the interface they were utilizing at the time. They interacted most with the TA, second most with the microphone, and least of all with the technology that provided the visual component of the system. Interaction with others who were not at the local site required the use of the mediating technology. This use of the interface became almost second nature. The interface was most noticeable when it was not working.

Learners interacted with their environment in these remote sites like the autonomous adults that they were. They took care of their own needs and did not ask for anyone else's permission to do what they needed. They could both meet their own needs and complete the requirements for the course. There were four observed objectives for the learner-environment interaction: achieving comfort, relieving boredom, making the most efficient use of busy lives, and facilitating learning.

The learners' interactions with their instructors were heavily influenced by the interface between them. During class time, the learners at the remote sites were required to press a microphone key in order to speak to the instructor. Tests and

Table 39

Information Known About Interactions Based on Observations of Learners

Interaction	Expanded Information
Learner-Interface	• learners interacted with the technology • learners interacted with the technical assistants • learners were generally required to interact with the technology in order to interact with the instructor and learners at other sites
Learner-Environment	• learners achieved comfort • learners relieved boredom • learners made the best of busy lives • learners facilitated learning
Learner-Instructor	• the interaction was facilitated and hindered by the technology • interactions happened with individuals, sites, and the class statewide • learners behaved differently at remote sites than they did where the instructor was present
Learner-Learner	• learners interacted mostly with learners at the same site • the subject of interaction ranged from current course content to life in general • the purposes of the interaction were clarifying information adding information relieving boredom socializing following guiding by the instructor • learners formed peer groups
Learner-Content	• observable behaviors were discussion with instructor discussion with other learners reading texts working problems participating on projects and labs taking exams • sources of content were instructor texts other learners

homework assignments were given to the TA, who passed them on to the instructor and returned them to the learners. Unlike a face-to-face classroom, this system had many classrooms at a distance from each other. The learners interacted with the instructors as individual learners, individual sites, and as the entire class statewide. When the instructor was in the classroom with a group of learners, their interactions with the other learners, both at the same site and across the state, were filtered through the instructor. But, when the instructor was at a distance, the interaction with the instructor was often filtered through the other learners before there was any interaction with the instructor.

The interactions that learners had with each other were the most frequent. They were in the room with each other, no interface was required for communication, and they were moving through the academic term as peers. I have classified the subject of their interactions into three main categories: the content of the course, the process of passing the course, and topics not related to the course. The reasons that the learners interacted with each other were to clarify course content, add information to that being given by the instructor or text, relieve boredom, meet their socializing needs, or follow the directions of the instructor that required interaction. In many of the remote sites, distinct peer groups formed. These groups were regular in the form of their interactions and in the their choice of other learners. They worked together on the content or socialized and they formed because of need or previous acquaintance. All the groups began with two learners. Many of the pairs eventually included other learners in their group, but a few did not.

The learners' interaction with the content was not directly observable because it was internal. There were learner behaviors that were observable that could be used

as indicators of learner-content interaction. Those behaviors were discussing the content with the instructor or other learners, reading texts, working problems, and participating in classroom projects and labs. Consequently, learner-content interaction was generally observed in combination with learner-learner or learner-instructor interactions. There were multiple sources of the content: the instructor, the texts, and other learners. Thus, learners sometimes learned material about the content of the course that was not delivered or intended by the instructor. Because these students were not in the classroom with the instructor, they had an opportunity to acquire additional content about the subject matter of the course.

Parallel learning, that learning that took place concurrently to, but independently of the instructor, was a collection of learner interactions. The table outlining which form of parallel learning coincided with which interaction or interactions is found on page 234. The most frequent form of parallel learning was content/content interaction. That is, the instructor was delivering content and at the same time the learners were discussing or reading the content of the course independently of the instructor. The second most frequent, though about half as often as the content/content, was the content/processes. In this form, for example, the instructor was delivering the content, and at the same time the learners were discussing the assignments, or perhaps asking the TA about homework or exams. The least common was process/content. When the instructor was talking about procedures related to the acquisition of the content, the learners were usually paying attention to the instructor. Very rarely did the learners continue on with a discussion of the content.

Parallel learning was feasible because, in the Com-Net system, the instructors could not see and seldom could hear the learners. This left the learners free to accomplish some of their learning together. Apparently there were at least three reasons why parallel learning took place. First, it was easier to communicate with someone in the same room. Second, it was uncomfortable to interrupt the instructor because a raised hand was not visible to the instructor. Third, there was a camaraderie among the students at each of the sites. Parallel learning took advantage of the ability to learn together in contrast with learning individually.

Interpretation

The interactions of the learners in this distance education setting were far more complicated than indicated in the literature. Until now, research that included a look at interaction did so from a distance and with poor or nonexistent definitions. A reading of the literature would indicate that interaction is necessary or at least desirable, but as far as I can tell, not much as been done to study interaction itself beyond counting events. I have found that there is a structure to the interactions, and connections between them. I have offered a new definition of learner interactions in distance education for further consideration and study.

The learners interacted with an object: the interface, their environment, the instructor, other learners, and the content. When these learners interacted, they interacted about something. The main subjects of these interactions were the course content, the process of obtaining the content, and topics not related to the course.

Interactions did not occur in isolation. They may have been countable, but they were not separate. Interactions were influenced, prompted, and inhibited by

other interactions. The collection of behaviors that were exhibited by the learners in these classrooms consisted of a web of interactions.

The answers to the three research questions can be found in the discussions in the Findings section. The answers have been brought together and interpreted in the Interpretation section. I would now like to provide short answers to the research questions. What interactions do learners at a distance exhibit in their educational settings? They exhibit learner-interface interactions, learner-environment interactions, learner-instructor interactions, learner-learner interactions, and learner-content interactions. What observable events appear to prompt the beginning or ending of learner interactions? The learners' needs provide the purpose for the interactions, but the objects of the interaction and the interactions themselves provide the observable events that prompt the beginning or ending of the interactions. What observable outcomes result from the learner interactions? The learners have their needs met, or they move on to other interactions, or both.

The Final Comment

When I first walked into the Com-Net classrooms, I was surprised. I judged that these learners were disrespectful. They did not appear to be paying attention to the instructor, they talked among themselves, they left the room during class, and they sat wherever and however they wanted. I realized that in order to appear to fit in and be accepted as a fellow student, I would have to loosen up and imitate their behavior. Then, just as I forced myself to spread my stuff around me, put my feet up, and join them, I understood that no one was there to see that we sat up straight and spit out our gum. We were adults! We were free to act like adult learners.

RECOMMENDATIONS

There are a few recommendations that I would like to make based on the research. All projects must come to an end and be tied up in a sheaf called a report and set in the field to be collected with all the other sheaves and stored together in a big building. However, there may be seeds that fall to ground which, if watered, spring up to create a new crop.

One of the seeds has already sprouted. Dr. Burnham and I have begun a collection of recommendations for instructors who wish to use the naturally occurring interactions to beneficially influence the learning environment (Burnham & Walden, 1997). Table 40 lists the interactions and possible instructional strategies for the instructor to use to beneficially influence learning.

The suggested strategies need more research but, at a minimum, I recommend that instructors be aware that interactions are occurring beyond their vision. Instructors can either choose to ignore interactions, or choose to influence them.

Other seeds that have fallen are those questions that I have been collecting that I would like to answer in the future. I would like to sow them as a starting point for further research:

1. To what extent and to what environments is the proposed definition of learner interaction transferable? Can the definitions be confirmed in a two-way video environment, in a computer-based environment?
2. Beyond the subjects and objects of interaction are there other structural components of interaction? For example, are there modifiers?

Table 40

Recommended Instructional Strategies to Beneficially Influence Learning

Interaction Type	Instructional Strategies
Learner-Interface	• Practicing with equipment (instructor and learners) • Setting example of appropriate use of equipment • Directing technical assistants
Learner-Environment	• Setting psychological environment • Guiding behavior • Acknowledgment of physical needs • Feedback about behavior
Learner-Instructor	• Directed questions To individuals To sites • Pre-notified questions To individuals To sites • Expanded discussion
Learner-Learner	• Form learning partnerships • Encourage site discussions
Learner-Content	• Ask questions • Direct site discussions • Set up learning experiences

3. How does the quantity and quality of learner interaction affect the outcomes of the learner interaction and/or the course? What correlations could be found if the interactions were counted and identified using a more objective measure?

4. What instructional strategies or environmental influences can be employed to promote beneficial interaction and inhibit detrimental interaction? How does the instructor's behavior and strategies influence the learners' interactions?

5. Can the links, frequency, quantity, variations, and timing of interactions be systematically observed and described? Can the structure of interaction be verified and expanded?

I hope that the offered description of adult learner interaction from the field, and the definitions based on those observations have opened the door for discussion and further research. Shall we continue?

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APPENDICES

Appendix A: Sidebars

Byron:

I've been thinking again (occupational hazard). I've been thinking about reflexivity in qualitative research (in this case field studies). It seems to me that there is a continuum. At the most relevant end are those time when I made notes to myself, in the field notes, about my own response as a student. At the other end are those experiences that influence the research, but are not concurrent with the field experience.

Reports that I have read describe the researcher's own responses to the field on the more relevant end. But, I have been thinking about the changes in the researcher due to the research. I have also been thinking about the experiences that are the result of doing the research, but are not part of the field. Last weekend I read an article in the latest _Qualitative Inquiry_ by a woman discussing how the field study she was involved in affected her physically and emotionally. I'll be thinking more about this in the coming weeks and months.

What I am interested in pursuing now is the experiences that are the result of doing the field study but are not part of the field. In this case most of these experience happened while driving to the field, so my mind was, to some extent, focused on the field experience. I've chosen to call them side-bars (like the side-bars in magazine article that are related to the feature article, but not part of it). In my mind, these experiences are gifts.

It is debatable whether these side-bar experiences influence my interpretation of the field any more than any other part of my life experience does. I

can make them relate to the field, but when they first happened, I did not associate them with observation, just gratitude. Because, at the time, my mind was alert and I was prepared to observe, these side-bars seem to interweave with the field.

There is something about being intensely involved with and living with a research project and then having something else grab attention that I think can only be appreciated by someone who has been there. Since you are a researcher/evaluator who travels a lot, I hope you can understand why I choose to share these experiences with you.

So, every so often you will find a "Side-bar" in your mail box. Feedback (of any kind) is welcome, but since this is not academic content, is not expected.

Beth

From: Beth Walden <walden@cc.usu.edu>

To: Bybur@cc.usu.edu

Subject: Side-bar 1

It is early spring or late winter, sometime during January, February or March. It is just barely getting light at 7:15 AM as I drive towards Bridger to observe a chemistry class. After Bridger will be a business class in Fremont with a few hour gap between. During the gap I will settle in at my favorite coffee shop, plug the computer into the wall, and write. The women behind the counter already recognize me.

I've just passed the turn-off to Sterling. The outdoors is that misty blue color that comes just before the misty rose color that comes just before the dusty yellow of the sun having risen. I've had to shift the Subaru down to third to make it up the hill till I can shift back to fourth just before Sherwood Hills. I have plenty of time to reach class.

I start into the right turn around the hills when I see red brake lights further around the bend through the bushes at the inside of the curve. I know that, for some reason, the person ahead of me has had to slow, I might as well begin to slow, too, since I will probably need to do so shortly. I tap the brake as I come around the corner. The car ahead has proceeded on, and I wonder why they slowed.

Now I see them. Three graceful deer caught on the road right-of-way between the deer fences. Unsure what to do, they alternately dart out onto the road and retreat to the dirt. They were well defined but dark silhouettes of black grace on the misty blue canvas. These silhouettes have thin tapering prancing legs, sleek bodies, ducking and rising bluntly pointed heads, flagging tails.

I remember the warning from the driver before me. I tap my brakes to flash my red lights to warn the drivers (if any) behind me. The deer and I are into one of those clumsy dances where both start to go, then both stop. They are darting back and forth, I am talking to them.

Just as they bound back to the dirt, again, another car races past me not slowing, and apparently not seeing the dance of the deer or my brake lights. I am livid. I yell myself sore as I finally slip past the confusion. How can someone be so uncaring as to race up the hill after being warned!!!

I calm down because I realize that my yelling is hurting only me. Before long, I am back in my day. But, on the way home, I remember to look to be sure there are no deer bodies on the side of the road. To my relief I see only plants, dirt, and snow next to the pavement.

Now it is the last day I drive home from observing a class. I'm between Fremont and Bridger, and it is just past quitting time and finally a warm day. For some reason, today other drivers have been coming to near complete stops before making turns. I can't move to the other lane because of traffic, and I am tired. I don't want to stop. Another stopped driver ahead. Oh, good a break in the left lane I'll go around. As I accelerate to get into the faster traffic beside me, I realize there is nowhere for the vehicle in the right lane to turn. So, now THEY are stopping just for the heck of it! It figures, it has been a loud, hectic, busy day, I've been in Fremont and Central City, I just want to get home and OTHER people are stopping in the middle of the road, just because!

I take the time to look beyond the other vehicle as I pass. There on the side of the road are a pair of dark and confused Canada geese.

Reading other people's minds is more difficult than observing their behavior. Sometime, it is even difficult to read my own mind.

From: Beth Walden <walden@cc.usu.edu>

To: bybur@cc.usu.edu

Subject: Side-bar 2

This is another story about animals. Like humans, when they are nervous about being watched it is because they are concerned about their safety. Unlike humans though, they are not concerned about appearing foolish.

This experience happened sometime late in a term. It was about 2:30 in the afternoon and I was headed to Fremont to listen to Dr. Instructor with my two suspicious fellow students.

I had been noticing hawks on the telephone and power poles, again. There are a lot of hawks and eagles out there. Just north of Fremont I noticed ahead a dark shape on the very top of a pole that was about 20 feet tall. Could it be a hawk? Not likely, since it was so dark. Could it be an eagle? Probably not a bald eagle since I could see no white. I thought maybe it was a young bald or a dark golden eagle. I set my mind to look again when I got closer, and returned my eyes to the road.

Just as I looked back towards the direction of the pole, my attention was caught by motion in a field of dry, yellow vegetation below the pole. It was two dogs, playing. They were nearly identical to each other and the size, shape and coloration of wolves. One was just barely smaller than the other. They had pale coats (the color of the surrounding vegetation) with dark points and dark long hairs sparsely poking through the light fur. The submissive dog was provoking the dominate dog to play. She/he was running along side but slightly behind the other and bumped the neck of the lead dog with his/her nose. The lead dog turned sharply in response

and playfully nipped at the smaller dog. However, the lead dog misjudged the position of the young pest and both tripped and rolled together in the field.

Suddenly I remembered to check the top of the pole. Eagle? Hawk? No! Cat! There on the flat top of the pole hunched a small black cat. Hind feet planted solidly on the pole, face peering down between the front toes hung over the edge. All attention was focused on watching the dogs.

As I whizzed past, I envisioned the scrambling that cat must have done to get up there. I didn't need to wonder about its motivation.

I sometime wondered, when I was out in the field, whether I was more at risk from my observation post or the observed. I did, however, learn to scramble!

From: Beth Walden <walden@cc.usu.edu>

To: bybur@cc.usu.edu

Subject: Side Bar 3

Late in the observation portion of the data collection I began to feel somewhat stifled by the tight schedule. I felt that I had seen enough to know what was going on in those classrooms. I didn't need to go to any more. In fact, the Monday class was already over. But, I had committed to myself to finish the observations, and to do it with the same care that I used when I began five months before.

Early on a Friday morning I was almost to Fremont for the 8 AM art class, only one other student, and she wasn't too happy that I was there anyway. Even my music tapes were getting old. It was one of those times to just do what is in front of me to do. Just keep driving. Remembered the cat on the pole. That location was just ahead. Started to daydream...

Suddenly, something brilliantly white was in my right peripheral vision. I turned to look quickly. A flock of about a dozen pelicans were feeding in a small pond about an acre big. The stark white feathers and intense yellow bills contrasted sharply with the newly green fields and deep blue/brown water of the pond. They dipped into the water and their heads came up dripping, sparkling, and chomping to adjust the load in their bills. Ahh, another gift! Again, I had reason to feel alive and grateful.

But, even in data collection, there is a time to stop "fishing" and start digesting.

From: Beth Walden <walden@cc.usu.edu>

To: Byron Burnham <byrbur@library.lib.usu.edu>

Subject: Sidebar 4: with a Warning

WARNING and reflection: The following contains a topic not considered pleasant by most people. Please keep in mind that when I first started college almost thirty years ago my major was biology with a chemistry minor. The experiences that resulted in this side bar were disturbing, but compelling. When a creature dies and I see on the road, or find in the woods, the body, I silently express an acceptance of the death and acknowledgment that it once shared in the life force that I still hold.

Seeing so many dead animals on the road sparked in my mind a curiosity and a need to explain. (I view curiosity as a form of compliment) I also seek, for some strange reason, to honor the animals by making something out of their demise. I will try to, as delicately as possible (as opposed to my usual bluntness), describe my observations.

OBSERVATIONS OF ROAD KILL (A QUALITATIVE STUDY)

In five months of driving I had ample opportunity to see the results of mixing cars and animals. As is my habit, I recognized the existence, and averted my eyes, but images lingered. As the months and miles added up, I became aware that there were certain similarities in the results of the carnage that correlated with the species of the animals. Since I repeatedly drove the same routes, I sometimes had

the dis-opportunity to observe the same animal on more than one trip. I found myself creating theories and looking for confirmation or disconfirmation.

There are four species of animals that are hit most often: hawks, cats, skunks, and deer. There was one snake, one dog, and a porcupine, but these are not included in this description because of the limited sample.

There was a correspondence between the location where the animals came to rest and the species. Hawks end up in the middle of the road. A large majority of cats and skunks end up in driving lanes, and deer end up on the edge of the road. In one case I could see evidence that a deer had been moved out of traffic to the edge of the road. That was the only animal that appeared to have been moved.

Due to the animals' locations there were differences in the results on the body. Hawks and deer tended maintain their physical integrity and shape, while the cats and skunks as time went on, became increasingly unrecognizable. Cats and skunks differed in the attachments of body parts. Cats tended to remain connected. As days passed skunks tended to effect about a 5-10 foot diameter section of road.

I haven't been able to determine how hawks are hit. Cars don't fly. I had a theory that they were hit feeding on the carrion left by previous animals. So, from then on, when I saw a hawk I looked for other animals. This theory was disconfirmed. When I saw hawks I did not see other animals anywhere near by. I have no theory about why they ended up in the middle of the road as opposed to other locations.

I further observed that hawks had the annoying habit of coming to rest with their feathers or wings perpendicular to the flow of traffic, so that when a car passed

them coming toward me, the feathers were ruffled giving the appearance of a live animal.

I wondered about where deer were actually hit. I theorized that they were hit close to the edge of the road as they bound into traffic or stand too close to traffic. I have tentatively not disconfirmed this theory. There was only one indicator that any of them had been hit in any other location. I did find myself looking for evidence of movement of the animal. I only saw that in one instance.

On two road trips in four states in the western United States (Montana, Idaho, Wyoming, and Colorado) I attempted to generalize these observations, but the population of animals is different both in size and species. Also, the duration of observation was much shorter. So, no conclusions were possible.

As for further study, I hope I don't have to do it.

Almost anything can be studied, but the researcher should always be considerate of the subjects of study. Sometimes this is done by what the researcher chooses to notice, and sometime by how the subjects are described. I noticed that since I began the field study mode, more experiences have lent themselves to study.

From: Beth Walden <walden@cc.usu.edu>

To: bybur@cc.usu.edu

Subject: Sidebar 5

Another misty, gray, foggy, late mid winter early morning. Same trip south. Same road, same car, same time, same music, same dirty snow, just the same same. It had been gray and sunless for two weeks, but that was normal and expected around here. Still going to classes. Same students, same tables, getting sick of my tape recorder, swimming in cassette tapes.

I was driving the roller-coaster of the canyon. Up into the fog, down beside gray walls of plowed snow. Around a curve left, around a curve right. Soon I would drop down left towards Mantua where traffic would pick up. Driving grace would end. The first sight of that area would be that gray icy lake in the bottom of the V of hills. The road pointed directly at it, leading the way down around to the right and past the small town on the shore.

I eased the car around the curve left and watched for the lake to appear. This was one of my favorite spots on this trip. Suddenly, I was stunned! Light! There was obviously a small hole in the clouds that I couldn't see behind the hill on the left. I could see the sharp focused shaft of light. It enclosed, caressed, only the lake. A gray panorama with only the lake lit. The sky, the road, the hills beside the road, and the hills on the other side of the lake were still gray. This canvas had only two objects, the yellow light and the ice blue lake.

I should have stopped, all too soon I was beyond the lake, but the gift of the sight added energy to my day.

No matter what, keep driving. Serendipity happens! The unique is missed unless time is spent on the typical. Without familiarity with the normal, serendipity is not recognized.

From: Beth Walden <walden@cc.usu.edu>

To: bybur@cc.usu.edu

Subject: Side Bar 6

Light. It can serve so many purposes.

Early in the field study on a very cold pre-snow night, I was driving home about 10 PM through the canyon. It was supposed to begin snowing at any time. I saw a couple of shafts of white light just slightly down from the top of one of the hills. I had never noticed anything up there before. Was there a tower or transmitter up there that I didn't know about? I drove around the hill and passed an oncoming car. I promised myself to look up on that hill the next time that I went back up the canyon in the daylight.

I drove over the top and down towards Dry Lake. Two more shafts of light beaming up from just beyond the rise of the road on the other side of the lake. Now what? Driving down to the lake, the lights stayed where they were. Then, just as I started up the other side, a car came over the top. Two shafts of light shown vertically from its headlights.

I saw more of that effect as I passed around the hills. I saw vertical shafts of light long before I could see the cars. Something in the atmosphere refracted the light straight upwards.

Months later in August, while driving home after conducting some focus groups, I was driving past The Great Salt Lake. It was mid afternoon and hot. The lake was shimmering and the sky was hazy with pollution. Both were the same soft

blue and there was no visible line dividing the water and sky. Against, and seemingly separate from, this wash of pastel color was a bright white sail. It too, shimmered in the heat and bobbed up and down like a kite on a string. The only evidence that the boat was floating in water rather than air, was that the bottom of its hull was not visible.

Illumination sometimes tells us as much about the environment as the object it illuminates. And sometimes the true reality of the observation is confused by illumination. It is good to look at important things in more than one light.

From: Beth Walden <walden@cc.usu.edu>

To: bybur@cc.usu.edu

Subject: Sidebar 7

There are a lot of birds of different feathers out there. Each kind have their own habits and their own food preferences.

Early in the spring I turned off the highway on the last leg toward home, crossed a bridge and turned to admire a spread of new green growth. To my amazement, there in the wet sea of green were dozens of dark birds wading in the ooze. A whole flock of ibis were grazing in the overflow marsh on the edge of the river. For a few weeks, until the flood receded and the farmer baled what was left, I watched the ibis glean their nourishment. When the field changed, the birds left.

Hawks and eagles were common on my trips back and forth. I have many of them stored in my memory. There was a hawk on a telephone pole along the road, watching, just watching. There was an eagle, maybe a bald, to far to see, brooding on the top of a tree at the edge of the Great Salt Lake. There was another hawk on a fence rail staring at the ground. And, there, definitely a bald eagle, swooped toward the ground and crashed clumsily, wings at crazy angles, on top of its prey. Hawks and eagles, all solitary, all specific.

There are pelicans in this part of the state. I tended to see then more often than usual because they travel long distances daily between their night time roost and their daytime watery feeding spots. Their route and mine were parallel. I've seen them in the distance flying south to the lakes, long string of white beads oscillating in the brilliant blue sky. I've seen them flying closer, long, steady strokes

of black tipped wings. Patience. Daily patience. I've seen them on the water. They dip their heads, then raise them with a bill full of water. The water beads off the edges as they tip their heads back and shake them from side to side, throats swelling and shrinking as the food slides back to be digested. Pelicans travel long distances and gather what is available in their chosen locations.

Some researchers collaborate and strike while the field is green. Other researchers work alone. Some researchers narrow their focus and employ their eagle eyes. And what am I? For the time being, I think I must be a pelican.

From: Beth Walden <walden@cc.usu.edu>

To: bybur@cc.usu.edu

Subject: Sidebar 8

While driving, distractions come up frequently. Some are unexpected, some are deliberate.

One afternoon, I was heading out to the field again, and was driving through the south end of our valley. I had been at the job all day, and was shifting my gears as well as the car's. It is my habit to look up to the mountains as they get closer, and I was in a contemplative mood. I often pondered or daydreamed as I drove. This day I was studying a piece of the mountain near one of the peaks. I was trying to see if I could see, high on the face, the trail that I had been on a couple of years before. Some days I think I can see it. Fortunately, I looked back to the road just in time to see the patrol officer opening the door on his colorfully lit car into my lane.

I learned to keep the road at least in the corner of my eye. Looking up the hillside north of Willard Canyon, I traced the route to the outcrop where I had looked down on flying eagles and hawks early one spring. The corner of eye caught the another car squeezing in too close between me and the car ahead. Eyes return to the road and foot eases off the accelerator. Attention moved off the distant and returned to the close at hand.

During the winter and spring the storms are fiercer at the top of the canyon between my valley and the rest of the world. During one blowing snowstorm, I was driving down a hill. At the bottom I could see a large dark shape spread across both of my lanes. How could I plan ahead? I could really see only a few feet in front of

me. What was it? If I had to stop, how long would it take and would I still be on the road? In fact, I wasn't always sure where the lanes were. It wasn't until I was much closer that I saw that a semi truck had slid across the road and impaled itself in a snow bank. Like everyone else, I eased into the lanes belonging to the oncoming traffic and drove around.

The worst storm during all the drives was a rainstorm late in the spring. At the top of the canyon, the rain was battering against all the car windows at once. I couldn't tell which direction the wind was from. Clips from a weather documentary flashed in my mind and the similarity to one of the scenes was uncanny. I became truly worried. I scanned the sky and did my routine inventory of tornado requirements and symptoms. Oddly, I could see the clouds high overhead better than I could see the road a few feet in front of me. The air was whirling but I couldn't seen any form to it, so I concentrated on trying to see what little I could of what was in front of me and drive.

Some days it's impossible to keep an eye on both the big picture and the details, but each informs the other.

Appendix B: Focus Group Protocols

ADMINISTRATORS

How long have you been in distance education?

Approximately how many students do you have at your site each quarter?

Typically, how well do you get to know the students at your site?

From your perspective I'd like you to talk about the typical behavior of the students in the distance education classrooms?

What is the most outrageous student behavior you have seen (or heard about) in your classrooms?

Do any of the instructors talk to you about what the students do during class time? If so, what is the general gist of those conversations? What is your perspective about what the instructors see in the students?

In your opinion what would be the ideal student behavior during class time?

When students interact with each other in the classroom, what is the subject of that interaction? The class content or other topics?

A researcher has noted that students form groups for studying together or socializing together either during or after class time. Do groups of this kind seem to form at your site - social or study groups? How do these groups get started. Are they beneficial or detrimental. (Perry, probe for what is the majority situation)

In any classroom there are students who seem to dominate their classmates. Does this happen in your classrooms? How so? How do they behave.

Now I'd like to talk for a couple of minutes about your TA's. What do they typically do at your site? How would you describe their interaction with the students?

(Instructions for Perry: Let the administrators and instructors discuss among themselves and carry the conversation provided they stay on the topic of the behavior of the students)

INSTRUCTORS

How long have you taught over COM-NET? About how many classes and students do you teach each year?

While you are teaching what do you think your students are doing at the other sites?

From your vantage point what a you tell is happening. What feedback have you had?

What stories have you heard about your students behaviors, or another instructor's students' behavior?

What kinds of things do you do to manage, encourage, or discourage the students' behaviors? Are some things more successful? Why?

How much interaction do you have with your students both during and outside of class time? How is interaction outside the classroom done? (email, phone, visits, etc.). Are there specific classes or certain periods during the course of a class that requires more interaction?

How much do you make use of the TA's? Is that adequate? Are there problems?

What do you think the role of the TA's should be?

What is your relationship like with the TA's and the site administrators if any?

TECHNICAL ASSISTANTS

How long have you been a TA? How many classes do you assist each quarter?

How well do you get to know the students at your site?

From your perspective, please describe the typical behavior of the students in the distance education classrooms?

What is the most outrageous student behavior you have seen or heard about in your classrooms?

Do instructors talk to you about what the students do during class time? If so, what is the general gist of those conversations?

In your opinion what would be the ideal student behavior?

A researcher has noted that students form groups for studying together or socializing together either during or after class time. Do groups of this kind seem to form at your site - social or study groups? How do these groups get started. Are they beneficial or detrimental.

In any classroom there are students who seem to dominate their classmates. Does this happen in your classrooms? How so? How do they behave.

What tasks do you perform for the students or the instructors?

What is a typical class period like?

STUDENTS

How many classes have you taken via COM-NET?

What is the typical behavior of the students in the distance education classrooms?

What is the most outrageous student behavior you have seen in any of your classes?

In your opinion what is the ideal classroom atmosphere?

How well do you get to know the other students? How much do you interact with them? - the TA's - the administrators?

How much do the instructors encourage interaction with them or with other students? How do they do it? Is it successful? What do they do that discourages interaction?

I have observed distinct groups of students who form groups for studying together or socializing together during class time. Does this seem to happen at your site? If groups form here at your site, which kind of group seem to form most often?

During class, what do you seem to talk about most, the subject matter or other topics?

What would you like to share with me about what it is like to get your education at a distance?

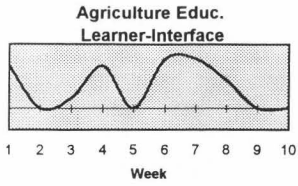
Describe the ideal instructor?

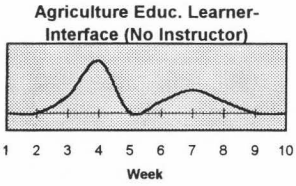
Appendix C: Coding Sheet

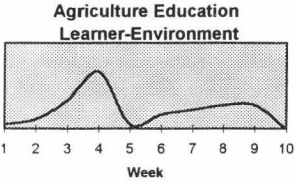
Course : Quarter:

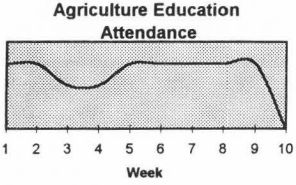
Week	Date	Attend	L/M	L/E	L/I	L/L	L/C	C--C	C--P	P--P	P--C
1a											
1b											
2a											
2b											
3a											
3b											
4a											
4b											
5a											
5b											
6a											
6b											
7a											
7b											
8a											
8b											
9a											
9b											
10a											
10b											

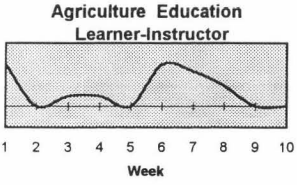
Appendix D: Profiles For Courses

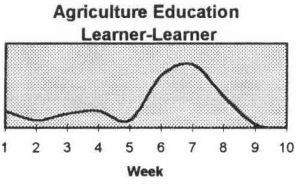

Agriculture Educ.
Learner-Interface
1 2 3 4 5 6 7 8 9 10
Week

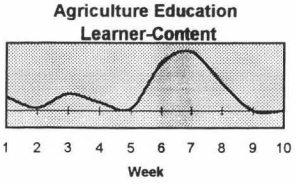

Agriculture Educ. Learner-
Interface (No Instructor)
1 2 3 4 5 6 7 8 9 10
Week


Agriculture Education
Learner-Environment
1 2 3 4 5 6 7 8 9 10
Week

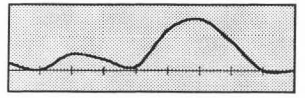

Agriculture Education
Attendance
1 2 3 4 5 6 7 8 9 10
Week


Agriculture Education
Learner-Instructor
1 2 3 4 5 6 7 8 9 10
Week


Agriculture Education
Learner-Learner
1 2 3 4 5 6 7 8 9 10
Week


Agriculture Education
Learner-Content
1 2 3 4 5 6 7 8 9 10
Week

Agricuture Education c==c



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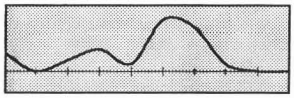
Week

Agriculture Education c==p



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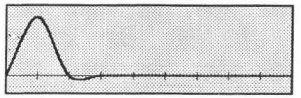
Week

Agriculture Education p==p



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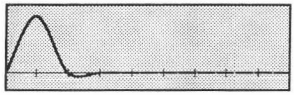
Week

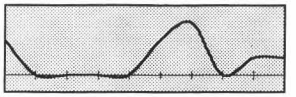
Agriculture Education p==c



1 2 3 4 5 6 7 8 9 10

Week

Art Learner-Interface



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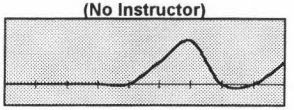
Week

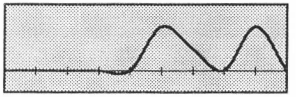
Art Learner-Interface (No Instructor)



1 2 3 4 5 6 7 8 9 10

Week

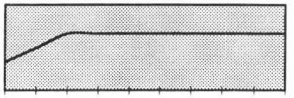
Art Learner-Environment



1 2 3 4 5 6 7 8 9 10

Week

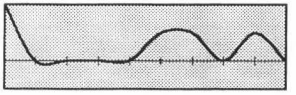
Art Attendance



1 2 3 4 5 6 7 8 9 10

Week

Art Learner-Instructor



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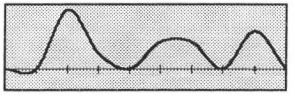
Week

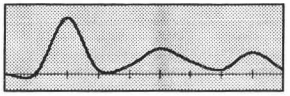
Art Learner-Learner



1 2 3 4 5 6 7 8 9 10

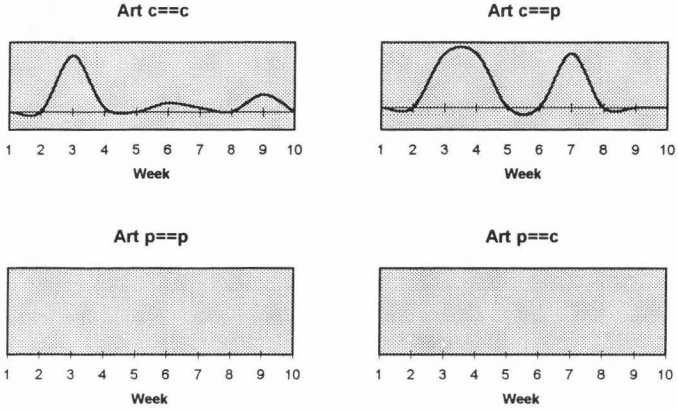
Week

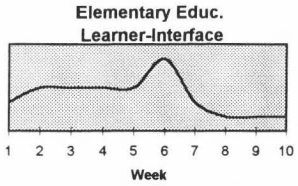
Art Learner-Content

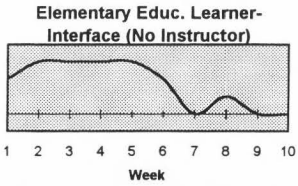


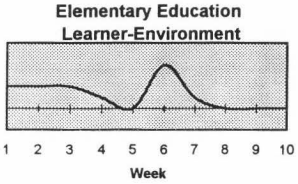
1 2 3 4 5 6 7 8 9 10

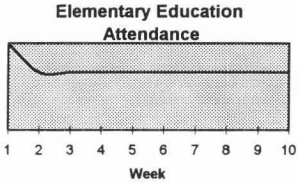
Week

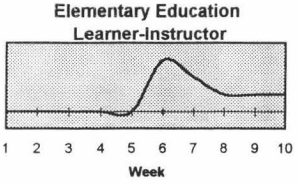

Art c==c
1 2 3 4 5 6 7 8 9 10
Week
Art c==p
1 2 3 4 5 6 7 8 9 10
Week
Art p==p
1 2 3 4 5 6 7 8 9 10
Week
Art p==c
1 2 3 4 5 6 7 8 9 10
Week

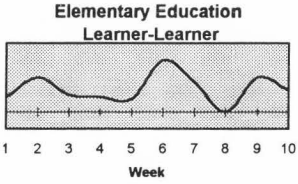

Elementary Educ.
Learner-Interface
1 2 3 4 5 6 7 8 9 10
Week

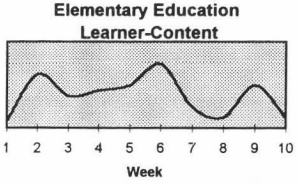

Elementary Educ. Learner-
Interface (No Instructor)
1 2 3 4 5 6 7 8 9 10
Week


Elementary Education
Learner-Environment
1 2 3 4 5 6 7 8 9 10
Week

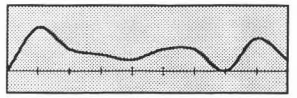

Elementary Education
Attendance
1 2 3 4 5 6 7 8 9 10
Week


Elementary Education
Learner-Instructor
1 2 3 4 5 6 7 8 9 10
Week


Elementary Education
Learner-Learner
1 2 3 4 5 6 7 8 9 10
Week


Elementary Education
Learner-Content
1 2 3 4 5 6 7 8 9 10
Week

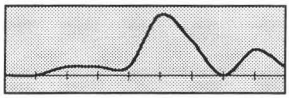
Elementary Education c==c



1 2 3 4 5 6 7 8 9 10

Week

Elementary Education c==p



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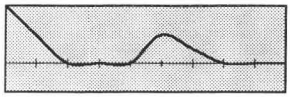
Week

Elementary Education p==p



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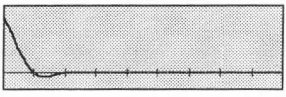
Week

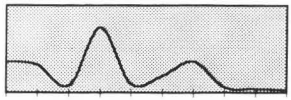
Elementary Education p==c



1 2 3 4 5 6 7 8 9 10

Week

English Learner-Interface



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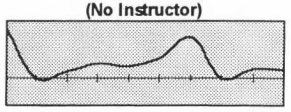
Week

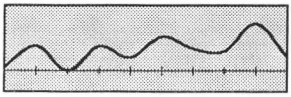
English Learner-Interface (No Instructor)



1 2 3 4 5 6 7 8 9 10

Week

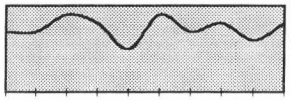
English Learner-Environment



1 2 3 4 5 6 7 8 9 10

Week

English Attendance



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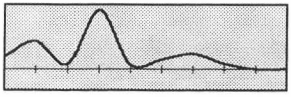
Week

English Learner-Instructor



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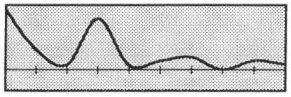
Week

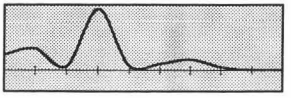
English Learner-Learner



1 2 3 4 5 6 7 8 9 10

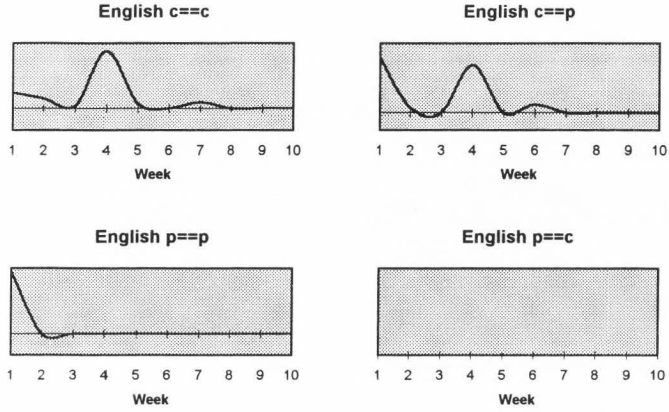
Week

English Learner-Content

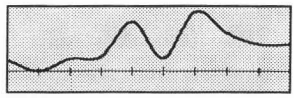


1 2 3 4 5 6 7 8 9 10

Week


English c==c
1 2 3 4 5 6 7 8 9 10
Week
English c==p
1 2 3 4 5 6 7 8 9 10
Week
English p==p
1 2 3 4 5 6 7 8 9 10
Week
English p==c
1 2 3 4 5 6 7 8 9 10
Week

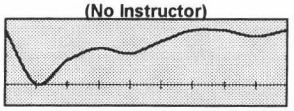
History Learner-Interface



1 2 3 4 5 6 7 8 9 10

Week

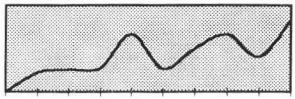
History Learner-Interface (No Instructor)



1 2 3 4 5 6 7 8 9 10

Week

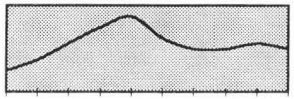
History Learner-Environment



1 2 3 4 5 6 7 8 9 10

Week

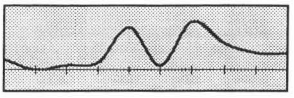
History Attendance



1 2 3 4 5 6 7 8 9 10

Week

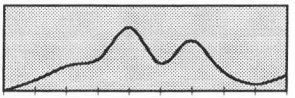
History Learner-Instructor



1 2 3 4 5 6 7 8 9 10

Week

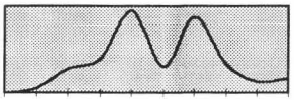
History Learner-Learner



1 2 3 4 5 6 7 8 9 10

Week

History Learner-Content



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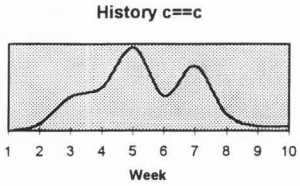
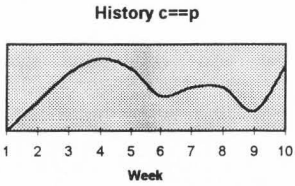
Week


History c==c
1 2 3 4 5 6 7 8 9 10
Week


History c==p
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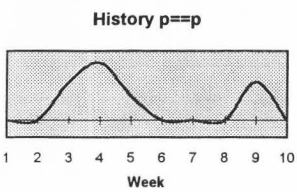
Week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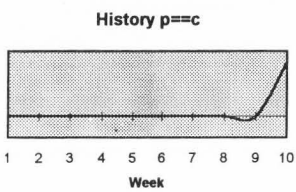
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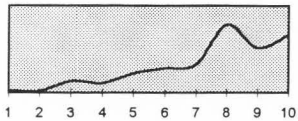
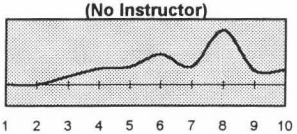
Week

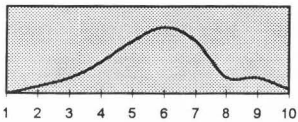
Math Learner-Interface



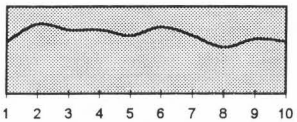
Math Learner-Interface (No Instructor)



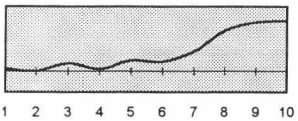
Math Learner-Environment



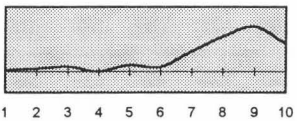
Math Attendance



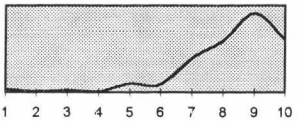
Math Learner-Instructor

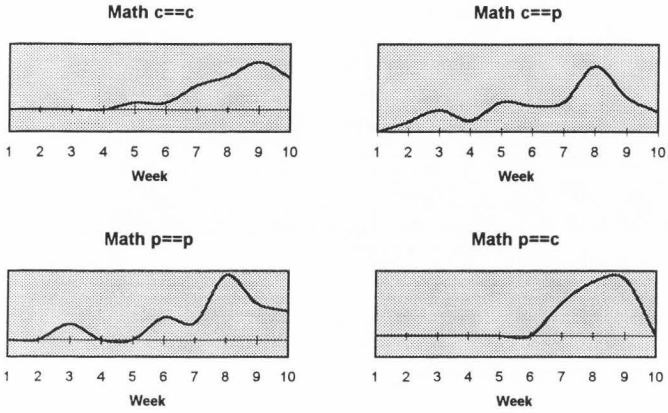


Math Learner-Learner

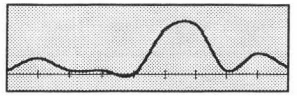


Math Learner-Content




Math c==c
1 2 3 4 5 6 7 8 9 10
Week
Math c==p
1 2 3 4 5 6 7 8 9 10
Week
Math p==p
1 2 3 4 5 6 7 8 9 10
Week
Math p==c
1 2 3 4 5 6 7 8 9 10
Week

Psychology Learner-Interface



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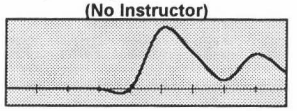
Week

Psychology Learner-Interface (No Instructor)



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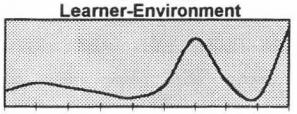
Week

Psychology Learner-Environment



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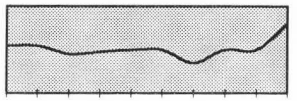
Week

Psychology Attendance



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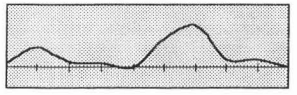
Week

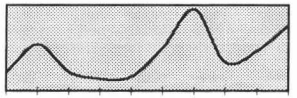
Psychology Learner-Instructor



1 2 3 4 5 6 7 8 9 10

Week

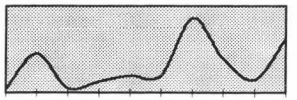
Psychology Learner-Learner



1 2 3 4 5 6 7 8 9 10

Week

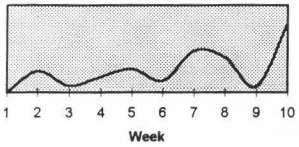
Psychology Learner-Content



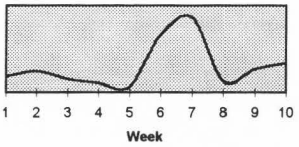
1 2 3 4 5 6 7 8 9 10

Week

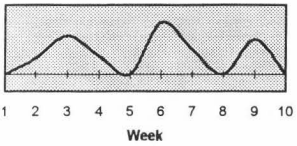
Psychology c==c



Psychology c==p



Psychology p==p



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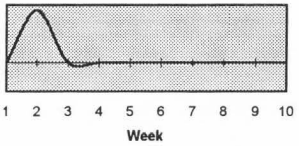
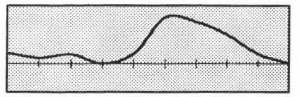
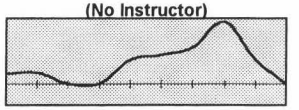


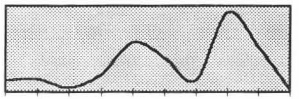
Science Learner-Interface



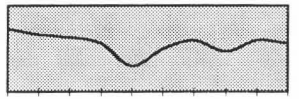
Science Learner-Interface (No Instructor)



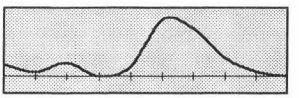
Science Learner-Environment



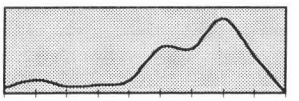
Science Attendance



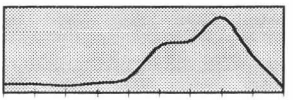
Science Learner-Instructor

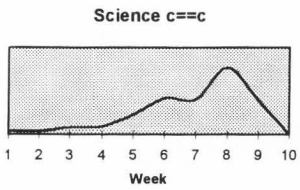


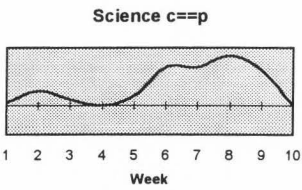
Science Learner-Learner



Science Learner-Content




Science c==c
1 2 3 4 5 6 7 8 9 10
Week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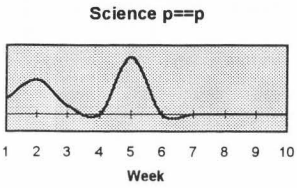
Week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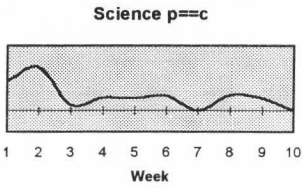
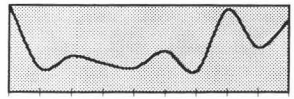
Week


Science p==c
1 2 3 4 5 6 7 8 9 10
Week

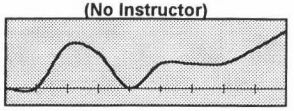
Sociology Learner-Interface



1 2 3 4 5 6 7 8 9 10

Week

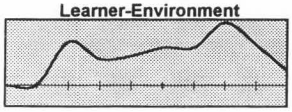
Sociology Learner-Interface (No Instructor)



1 2 3 4 5 6 7 8 9 10

Week

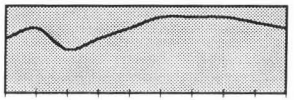
Sociology Learner-Environment



1 2 3 4 5 6 7 8 9 10

Week

Sociology Attendance



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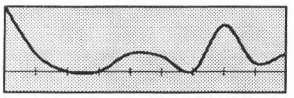
Week

Sociology Learner-Instructor



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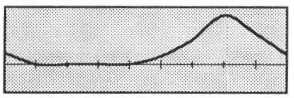
Week

Sociology Learner-Learner



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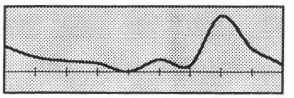
Week

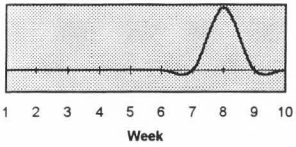
Sociology Learner-Content



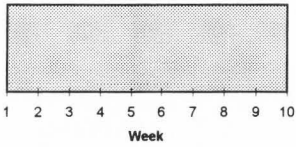
1 2 3 4 5 6 7 8 9 10

Week

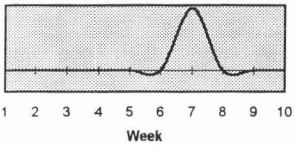
Sociology c==c



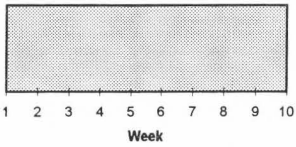
Sociology c==p



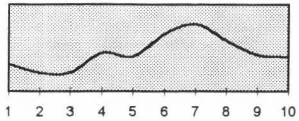
Sociology p==p



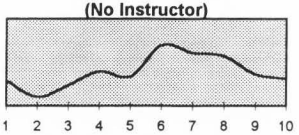
Sociology p==c



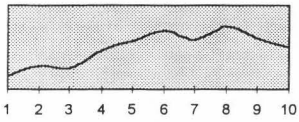
All Learner-Interface



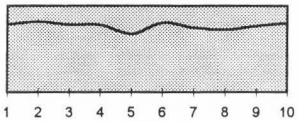
All Learner-Interface (No Instructor)



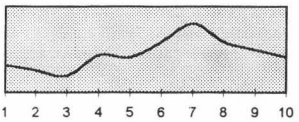
All Learner-Environment



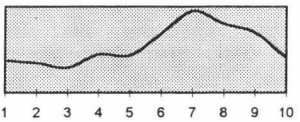
All Attendance



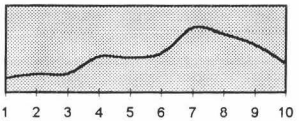
All Learner-Instructor

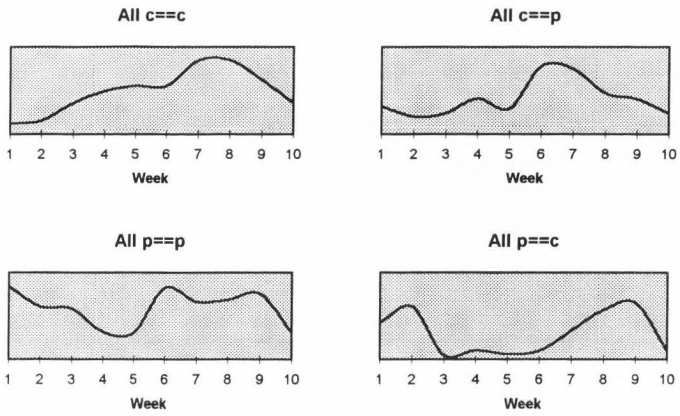


All Learner-Learner



All Learner-Content




All c==c
1 2 3 4 5 6 7 8 9 10
Week
All c==p
1 2 3 4 5 6 7 8 9 10
Week
All p==p
1 2 3 4 5 6 7 8 9 10
Week
All p==c
1 2 3 4 5 6 7 8 9 10
Week

Appendix E: Interpretation Exercise

Instructions:

Using the definitions on the next page identify interactions in the scenarios on the last page. There are more than one interaction in each scenario. Circle the interaction, draw a line from that interaction to the margin and identify using the follow codes:

LC = learner-content interaction
LI = learner-instructor interaction
LL = learner-learner interaction
LM = learner-interface interaction
LE = learner-environment interaction

Each of the scenarios is a composites of events that took place in the Com-Net (audio-graphic) system at one of the receive locations during a regularly scheduled class offered for university credit.

Example Scenario:

This is a course for students preparing to be elementary school teachers. The instructor has prepared a video demonstrating techniques. There are two students in a class room and they have found the proper place on the video and are watching. Their behavior is more like two people sitting at home watching television. They are eating snacks, and commenting to each other about the video. From time to time they write observations in their workbooks which will be turned in for grading at the end of the quarter.

Learner-content Interaction
"...process of intellectually interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structure of the learner's mind."
(Moore, 1989)

Learner-instructor interaction
"...interaction between the learner and the expert who prepared the subject material, or some other expert acting as instructor."
(Moore, 1989)

Learner-learner interaction
"...interaction between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor."
(Moore, 1989)

Learner-interface interaction
"...the interaction that occurs between the learner and the technologies used to deliver instruction."
(Hillman, Willis, & Gunawardena, 1994)

Learner-environment interaction
"Interactions that learners have with their surroundings that effect their ability to learn"
(Walden & Burnham, 1996)

References:

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Scenario 1:
This is a science course. The instructor is lecturing and writing notes on the electronic board. Off to the right side of the classroom, two students who know each other well, are trying to solve a problem at the end of the chapter. Another student is across the hall checking her e-mail in the computer lab, but she has left the door open in case something is said that she considers important.

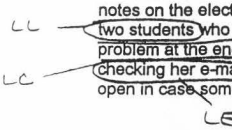
Scenario 2
This is course in adult education, there are three students in the classroom. One of the students has pressed down the microphone key and is answering a question that was asked during the lecture by the instructor. The second student is signaling to the third student to take a bigger handful of candy from the bag that is being passed around.

Scenario 3
This senior level history course has three students in this classroom. Two of the students are history majors, one is a university employee who is auditing. One of the history majors has been sick and unable to attend for two weeks, this is her first day back in the classroom. She is laying on the floor in front of her table, knees up and a clipboard resting on her knees taking notes. The other history major, having a good background in the topic is telling a historical story to the instructor using the microphone in front of her.

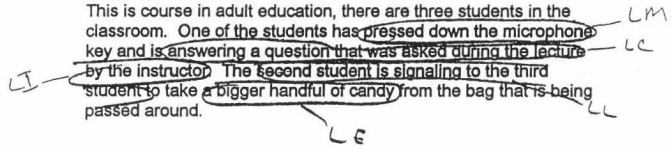
Scenario 4
A psychology class has just received their scores on the first exam. They are angry and grumbling to each other. Among other things said directly to the instructor, they accuse him of writing a poor exam. A student at another site is heard to ask the complainers to let the class get back to learning. A student at this site slaps his hand on a microphone key and responds hotly, "That's what I'm trying to do!" He then packs his bag and leaves.

Appendix F: Interpretation Master

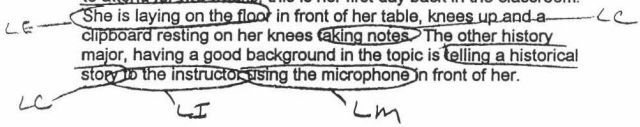
Scenario 1:
This is a science course. The instructor is lecturing and writing notes on the electronic board. Off to the right side of the classroom, two students who know each other well, are trying to solve a problem at the end of the chapter. Another student is across the hall checking her e-mail in the computer lab, but she has left the door open in case something is said that she considers important.



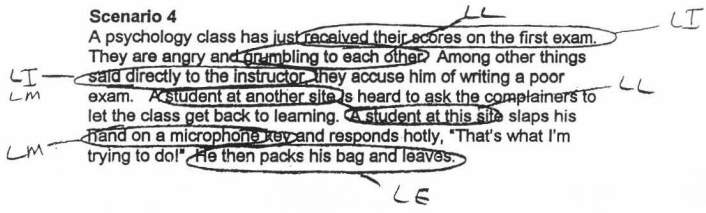
Scenario 2
This is course in adult education, there are three students in the classroom. One of the students has pressed down the microphone key and is answering a question that was asked during the lecture by the instructor. The second student is signaling to the third student to take a bigger handful of candy from the bag that is being passed around.



Scenario 3
This senior level history course has three students in this classroom. Two of the students are history majors, one is a university employee who is auditing. One of the history majors has been sick and unable to attend for two weeks, this is her first day back in the classroom. She is laying on the floor in front of her table, knees up and a clipboard resting on her knees taking notes. The other history major, having a good background in the topic is telling a historical story to the instructor using the microphone in front of her.



Scenario 4
A psychology class has just received their scores on the first exam. They are angry and grumbling to each other. Among other things said directly to the instructor, they accuse him of writing a poor exam. A student at another site is heard to ask the complainers to let the class get back to learning. A student at this site slaps his hand on a microphone key and responds hotly, "That's what I'm trying to do!" He then packs his bag and leaves.



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PUBLICATIONS and PRESENTATIONS:

Burnham, B. R., & Walden, B. E. (1996, October). Building adult instruction on the changing foundations of Technology. Paper presented to the Graduate Colloquium, Department of Instructional Technology, Logan, Utah.

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