

Title:

Interaction in distance education: A longitudinal study of participant interaction via email distribution lists in a graduate distance education program.

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Abstract

Based on Michael Moore's (1989) theory of transactional distance, this study is a descriptive cross-sectional, longitudinal examination of asynchronous interaction among three distinct entities (student, instructors, institution) in a doctoral distance education program. The interaction was mediated via electronic mail (email) distributions lists. The email messages, exchanged via electronic distribution lists that were used in support a doctoral distance education program, were stored in a relational database for the purpose of coding the manifest content of the email messages.

A codebook was developed based on prior research of Henri (1992), Hillman (1997,1999), and Saba and Shearer (1994). The codebook was validated during a pilot study. All the email messages accumulated over seven semesters of course work were coded on three levels of three variables developed for the study. The codes described why the email message was sent (the purpose), how the purpose of the message was conveyed (the mechanism), and what the email was about (the subject). Subcategories for each code further describe the interaction manifest in the email messages. Eliciting, responding, and humanizing describe why an email message was sent. Fact-sharing, explaining, and opining describe how the purpose of the email message was conveyed. Procedure, content, and nonacademic/social describe the subject of the email messages.

Crosstabulation chi-square tests for independence yielded significant results among the entities and across time. The way in which the email distribution lists were used was associated to entity and time. However, using Cramer's V to measure effect size, a weak association was evident. Instructors, students, and the institution generally used the email distribution lists differently.

Introduction and Description of the Study

This study explored participant interaction via asynchronous dialog in a cohort-based doctoral distance education program, which was supported, in part, via electronic mail (email) distribution lists. Utilizing Michael Moore's (1989) theory of transactional distance as the theoretical foundations, an archive of email messages was explored for the purpose of identifying and classifying the dialog and interactions manifest in the email messages. Using a cross-sectional, longitudinal approach to exploring the email messages provided valuable data, which added to our understanding of how email can supplement a distance education program.

Background Information

Students who for any number of reasons, cannot or will not participate in traditional campus-based education, use distance education. Increasing demand for continuing higher education has led many institutions to expand their influence beyond their traditional geographic boundaries. The U.S. Department of Education, National Center for Educational Statistics Survey (1999), *Distance Education at Post Secondary Institutions: 1997–1998*, reported that between 1994-95 and 1997-98 the number of universities offering distance education programs increased by 72 percent. Increasing interest in distance education has kindled questions from faculties and administrators about the effectiveness of education delivered distant from the traditional higher education campus and campus support systems. One of those questions concerns how students and teachers can have quality pedagogical and social interactions; interactions which have been shown to be a key component in the learning process (Abrami & Bures, 1996; Fulford & Zhang, 1993; Garrison & Shale, 1987;

Gunawardena & Zittle, 1997; Hassenplug & Harnish, 1998; McDonald & Gibson, 1998; Palloff & Pratt, 1999; Wagner, 1994). Human interaction has been claimed to be the single most important ingredient in education (McCombs, 1985 p. 162) and has been related to both student satisfaction and retention (Pascarella and Terenzini, 1977; Tinto, 1989).

Additionally, Abrami and Bures (1996) described some of the weaknesses they perceived with learning through distance education.

In particular, social and intellectual isolation are two course-related factors that may contribute to weaknesses in DE. Distance learners appear to experience fewer and less-essential opportunities to interact with teachers and other students to discuss course content, assignments, learning strategies, and personal concerns about learning. DE students are physically separated from the social learning environment, and this may have effects on their perceptions of psychological isolation and detachment, which in turn, affect learning (p.39).

Many have suggested that computer mediated communication (CMC) can provide an effective medium for the requisite pedagogical and social interactions needed in education (Gunawardena & Zittle, 1997; Harasim, 1990; Hiltz, 1994; McDonald & Gibson, 1998; Santoro, 1995). CMC functions vary across a spectrum from basic email to multi-media enhanced virtual classrooms. This study focused on one aspect of computer-mediated communication, using email distribution lists as the medium for interaction between and among teachers and students that are geographically dispersed and physically separated from the traditional higher education campus.

The study focused on the dialog component of Moore's (1989) theory; however, the structure component of Moore's theory is also discussed. Dialog is the interplay of words, ideas, and other actions that take place when learner and teacher engage in an educational transaction. The extent and nature of this dialog vary according to the individual needs and philosophies of the participants in the interaction. The communication medium used will also have an effect on the quality and extent of the dialog. Moore and Kearsley (1996) say more dialog is likely in computer mediated distance education because of the speed, ease of use, and the ability to have anytime, anyplace dialog with the instructor. Dialog is, "The extent to which, in any educational program, learner and educator are able to respond to each other. In other words, it is the extent of verbal interaction between the educator and the learner" (Saba & Shearer, 1994, p.42).

An instructional interaction occurs when an instructor and a learner interact in a way to change the behavior of the learner toward an educational goal (Wagner, 1994). From a learner's standpoint there are three types of interaction in the learning process (Berge, 1996) (a) interaction with content, (b) interaction with teacher and students, and (c) interaction with the institution. Moore (1989) described three types of interaction in distance education, (a) learner-content interaction, (b) learner-instructor interaction, and (c) learner-learner interaction. Each of these types of interactions serves a pedagogical purpose and each of these types of interaction can take place via electronic distribution lists.

Purpose of the Study

The purpose of this study was to explore the interaction facilitated via electronic mail distribution lists by identifying and describing the types and frequencies of interaction that take place via electronic distribution lists over the length of a doctoral distance education program. Several prior studies have

examined interaction in electronic forums (Henri, 1992; Hillman, 1999; Saba and Shearer, 1994); however, these prior studies were not longitudinal. Therefore, a second purpose of this study was to explore how the electronic dialog and interaction may have changed over time.

The fundamental questions guiding this study were:

- 1- Why were the electronic distribution lists used?
- 2- How were the electronic distribution lists used?
- 3- What were the electronic distribution lists used for?
- 4- If interaction via electronic distribution lists did take place between and among distinct entities in distance education, what differences are there in the way each entity used the distribution lists?
- 5- What changes, if any, in the way the distribution lists are used are apparent over time?

Overview of the Study

Email messages exchanged via electronic distribution lists used during the course-work portion of a cohort-based, doctoral, distance education program offered by a Western Land Grant University were selected as the data for exploration in this study. During a pilot study, a thematic coding system based on the appropriate prior research was developed and validated. The email messages were analyzed and coded in accordance with that coding system. Patterns and types of interaction were identified and coded to develop quantitative descriptions of why interactions were initiated, how the interactions were transmitted, and what the subject of the interaction was. See Shinkle (2001) for complete details of the pilot study.

Method

Microsoft Access was used to create relational database tables to store the information extracted from the email messages during the coding process. Attributes of each email message describing the date and time sent, the email address of the author, the entity (student, instructor, or institutional representative) of which the author was member, and the texts of the messages as written by the author were stored for each email message. See Shinkle (2001) for complete details about creating the database. The database was created to facilitate the thematic coding of the email messages.

Creating the Coding System

The objective of this study was to describe how email distribution lists are used in distance education programs. A pilot study was conducted to identify variables meaningful to this study. Based on the prior work of Henri (1992), Saba and Shearer (1994), and Hillman (1999) a thematic coding system and codebook were developed for use in coding the email messages.

After reviewing the relevant literature on converting qualitative information into quantitative data, a thematic coding system was developed for recording and cataloging the content of this data. According to Boyatzis (1998) thematic analysis is not a methodology, it is a process used to translate qualitative information into quantitative data. Thematic analysis involves three stages. They are: (a) deciding on sampling and design issues, (b) developing themes and a code, and (c) validating and using the code. The sample in this study is the archived email messages. A pilot study group consisting of six students from the program under study analyzed several of the archived email messages and individually identified thematic areas apparent to them. The author then refined a common set of themes and requested the pilot study group to once again determine which themes were most relevant to them as

experienced distance education students. Three major code categories with each category having three levels evolved from the pilot study. Table 1 lists the code categories and the levels for each category.

Table 1

Code Categories and Code Category Levels

<u>Code Category</u>	<u>Category Level</u>
Purpose (Why)	Eliciting
	Responding
	Humanizing
Mechanism (How)	Fact Sharing
	Explaining
	Opining
Subject (What)	Procedure
	Content
	Non-academic/social

Each of category and category level is explained below. The main categories and some category levels may resemble some of Hillman's categories; however, the definitions of the categories and category levels in this study are much broader than Hillman's and the reader should not assume they are the same as Hillman's.

A codebook with a procedure for systematically evaluating and coding the messages was developed and refined. Multiple tests of the codebook were conducted and the codebook and coding procedure were refined until acceptable inter-coder and intra-coder reliability levels were obtained.

Overall inter-coder reliability is 77.5% agreement on presence of a code level and overall intra-coder reliability is 93.2 % agreement on the presence of a code level. For complete details about the pilot study, code development, and code validation, see Appendix A (research prospectus).

Coding the Data

Using the codebook developed during the pilot study, every email message was coded for the presence of three categories of variables. Every message was analyzed and coded with respect to the purpose of the message (why was the message sent), the mechanism of the message (how was the purpose conveyed), and the subject of the message (what was the message about). The presence of these coding categories may be either explicitly stated or implicitly obvious based on prior message content.

The purpose of the messages tells why the author created and sent the email message. There are three levels for why an email message was sent.

1- An eliciting message is an email message designed to cause interaction. All questions, commands, imperatives have the purpose of eliciting a response. For example,

“Do you think it was a sign of the times, that I was not given an IQ test? I would be curious to know how many of you took an IQ test, when you took it, who gave it to you, and what test it was? If you did take an IQ test, do you believe the score played a role in a "self-fulfilling prophecy"?”

2- A responding message is an email message in response to any previously posted email message or conversation. For example:

“At some point during my schooling these tests ceased to be administered to us. It wasn't until later in my life that I began to hear and read of the kinds of issues (name deleted) raised such as racial and social class biases and court cases that had an impact on the final disposition of these assessment instruments as mandatory tools in assessing intelligence.”

3- A humanizing message is an email message used to support an atmosphere conducive to interaction. Light hearted jokes, relevant personal vignettes, anecdotes, and messages that encourage trust among list participants. For example:

“I went to elementary school in the (name deleted) School District during the 1960's, and I have memories of taking mandatory IQ tests. I remember it was particularly frustrating because no matter how well one did (or didn't do), students were never allowed to see the results. I never knew, or at least I don't remember, the names of the tests I took. I do; however, remember at the time there was talk about how some people were questioning the validity of these tests.”

The mechanism of an email message is the method by which the meaning of the email took place. How did the author convey his/her meaning? There are three levels for how a message was conveyed.

1- A fact-sharing email message describes what is, was, or will be without explanation. For example:

“I just got a memo (paper) in my box announcing that Governor (name deleted) will be here at (named changed) College on Tuesday, November 4 to discuss the Western Governors' University.”

2- An explaining email message explains relationships for or against events, principles, theories, or arguments. For example:

“Though only YOUR specific five member committee CAN make final determinations re: transfer hours [that's why up to now we've shied away from examining transcripts] to relieve some anxiety I'm willing to offer suggestions about likely overlap or substitutions of (name deleted) courses and to provide my educated guess.”

3- An opining email message states a personal value of an event, idea, state of affairs, or policy.

For example:

“Call me "up in the night” but I see learning as a bit of both process and product. For example in the process of learning to write, the learning comes in the doing. The end result is indicative of what one has learned – an end product. If I can write well and my message is clear, you could say that I "learned" to write.”

The subject of an email message refers to what is being discussed in the email. There are three levels for the subject of the email message.

1- An email message coded with a subject of procedure means the subject of the email message pertained to program or course procedure. For example:

“We have been working with Martha (name changed) to fix this and propose that her weekend be moved from 4/30 to 4/23. I believe many of you will be at Sarah’s (name changed) class that weekend; Martha’s (name changed) would begin on Saturday. “

2- An email message coded with a subject of content means the subject email message pertains to course or program content. For example:

“Now, let's consider enrichment. I feel I would be enriched more by the experience of negotiating, as an adult, the structure of my learning, rather than spending hours putting together a document that will sit on some shelf only to be used as an example of a portfolio to future students. (Frankly, the examples that I examined were more like scrap books than portfolios.) I could understand if this project is for someone's research data, or is to be used as documentation that is needed by the department for accreditation review, but to try and sell me on the notion that this will enrich and benefit me personally is questionable at best.”

3- An email message coded as non-academic/social means the subject of the email dealt with issues that were not content or procedure. For example:

“After (name deleted) phoned the Crystal Inn and discussed our party needs, we determined that our celebration would be a better match for the adjacent Applebee's restaurant. (Name deleted) phoned Applebee's and arranged with them to save a large area for our group on Friday night. Many have asked about what to bring and eating at Applebee's solves that problem – just bring cash!”

The unit of coding

Every email message was stored in the database as originally authored. The length of a message varied from a few words to several hundred words. Every message was coded with at least one purpose, at least one mechanism, and at least one subject. However, due to the polysemic nature of email messages, one message building on another, there is not one perfect method to determine the unit of coding. A one or two word message, when read with knowledge of previous messages, could potentially be coded within multiple levels. In addition, one message could exhibit presence of any one level multiple times. The unit of coding was an email message, or part of an email message, that conveyed enough meaning to indicate the presence of any one of the code categories. Therefore, if a level was present more than one time per message, that level was only coded as being present one time. For complete details on how the messages were coded see Appendix A (research prospectus).

Analysis and Discussion

The results of this study describe the interaction manifest in the archived email messages. This section is divided into three parts. First, a description of the sample in general terms. Second, an analysis of the research questions is presented. Third, a discussion of the findings is presented.

Description of the Sample

An understanding of the multiple elements involved in this study is essential to understanding the findings of this study. An understanding of the setting in which the sample originated, an understanding of the entities involved in the setting, and an understanding of how and where the data originated are the elements crucial to answering the research questions presented earlier.

The Program

In the summer of 1997, a Western Land Grant University started a doctoral distance education program in Adult Learning and Technology in a neighboring state. The program accepted applications from approximately one hundred students. Thirty-six students were selected for the program. None of the students selected lived within three hundred miles of the university campus and the students living the farthest from the campus were seven hundred miles from the main university campus. Early in the program, which completed the coursework portion of the program in December 1999, five students dropped out of the program. When the course work portion of the program ended in December 1999, there were thirty students active in the program.

Each three semester-credit-hour course met in three face-to-face, intensive weekend class sessions at a central location in the state where the program was being offered. The intensive weekends consisted of four hours on Friday evening and eight hours on Saturday. Seven two-hour, audio sessions, for each three semester-credit-hour class, were also held. The instructors traveled to the neighboring state for the intensive weekends; however, the two-hour sessions were supported via audio-only conference calls. Seven groups of students met at different locations for the audio sessions. The instructors originated the audio sessions from the main university campus.

The literature review (See Shinkle 2001) examined several different definitions of distance education. The author presents this program as a distance education program for several reasons. Those reasons include (a) the program was geographically separated from the university campus, (b) the instructors were physically separated from the university campus when they were teaching the intensive weekend classes, (c) the students and instructors were geographically separated during the audio conferences, and (d) the students were separated from the traditional university support systems

(registration, advising, library services). An additional reason the author contends this program is a distance education program is that technology played a major roll in the communication and interaction processes of this program.

The Students

The program was designed using the cohort model; the students took the same classes together during the majority of the program. The program was designed for students to attend on a year-round basis; therefore, there were three semesters of coursework offered per year. The semester calendar approximated the traditional campus three-semester calendar. Late in the program there were two elective courses offered. Students decided to participate in the elective courses as required by their previous educational records. Enrollment in each of the two elective courses included approximately one-half of the students in each course. Therefore, the thirty students still active in the program at the end of the coursework portion had spent the equivalent of seven traditional semesters together.

The student counts at each of the seven audio locations consisted of site A = three, site B = five, site C = four, site D = two, site E = four, site F = nine, and site G = three. One student from site B dropped early in the program, and the remaining five students that dropped out of the program were all from site F. Each of the thirty students active at the end of the program sent at least one email to the email distribution list during the course of the program.

The Instructors

The instructors were all full-time faculty from the sponsoring university. Ten instructors taught fourteen different classes. One instructor taught three classes, two instructors each taught two classes,

and the remaining seven instructors each taught one class. Each instructor used email and sent at least one email to the email distribution lists.

The Institution

The institution, the last of the three entities of interest in this study, consisted of one graduate assistant, one full-time department secretary, miscellaneous registration and library personnel, and the department instructors when their email message met specific criteria. The job of the graduate assistant was to support the needs of the out-of-state cohort of students. The department secretary handled university procedure and policy issues for the cohort. If an instructor authored an email message that dealt with program procedure, not specific course procedure, the instructor was considered part of the institution for classification of that particular email message.

The Data

As a class project for a technology class offered in the first semester of the program, one student set up an email distribution list. The purpose of the list was to introduce students to electronic distribution list technology and demonstrate how electronic distribution lists are used in distance education. The sponsoring university had developed an Internet-based, discussion list for students to use as part of this program. The students in the program soon decided they were more comfortable using the email distribution list and asked the university to allow continued use of the email list that had been setup by the student. Both the university and the student responsible for management of the list agreed to continue using the email distribution list for the asynchronous communication and interaction needs of the program.

A management feature of the distribution list program allows list managers to archive all the email messages distributed to a particular list. The data for this study was the archived email messages distributed to every member of this doctoral distance education program. The first message was distributed on October 7, 1997 and although the list is still in operation, the data for this study ends at the end of the seventh semester of the program. The coursework was completed by the end of the seventh semester.

Analysis of the Research Questions

The fundamental questions guiding this study were:

- 1- Why were the electronic distribution lists used?
- 2- How were the electronic distribution lists used?
- 3- What were the electronic distribution lists used for?
- 4- If interaction via electronic distribution lists did take place between and among distinct entities in distance education, what differences are there in the way each entity used the distribution lists?
- 5- What changes, if any, in the way the distribution lists were used are apparent over time?

During the coursework portion of this program, 1203 email messages were distributed via the electronic distribution lists. Table 2 provides numeric and percentage analysis among entities and across semesters.

Table 2

Count and Percentage Analysis of Messages Sent among Entities and Semesters

								<u>Semester</u>							
								1	2	3	4	5	6	7	Total

Student	Count	72	95	236	233	209	53	45	943
	% Of Total	6%	8%	20%	19%	17%	4%	4%	78%
Instructors	Count	17	10	24	50	24	39	4	168
	% Of Total	1%	1%	2%	4%	2%	3%	0%	14%
Institution	Count	1	3	3	32	9	21	23	92
	% Of Total	0%	0%	0%	3%	1%	2%	2%	8%
Total	Count	90	108	263	315	242	113	72	1203
	% Of Total	8%	9%	22%	26%	20%	9%	6%	100%

Overall, the text portion of the messages (the part authored by the sender) consisted of 196,540 words. The mean word count per message is 163 words. The mean time the messages were sent is 4:43 p.m. for students, 5:28 p. m. for instructors, and 3:45 p.m. for the institution. Appendix B shows the detail of the proportional breakdown of each category and level of coding.

Purpose of the Messages

When grouped as three levels of purpose, the levels eliciting, responding, and humanizing explain why the email lists were used. Of the 1203 messages delivered, there were 1608 purpose instances observed and coded. Appendix C provides detailed count and percentage analysis of the purpose of the messages. The overall proportional makeup of the purposes of the email messages is (a) eliciting 35.9 percent, (b) responding 44.5 percent, and (c) humanizing 19.6 percent.

Table 3 lists the proportional breakdown of the three levels of purpose for each of the three entities. A crosstabulation chi-square test for independence was performed to examine the relationship.

The results of the test indicate that $\chi^2 = 14.616$, $p < .01$; therefore, indicating that purpose and entity are not independent.

An effect size for crosstabulation χ^2 tests is Cramer's V. Cramer's V is the positive square root of $\sqrt{\chi^2/N/k-1}$, where k is smaller of the two dimensions of the crosstabulation (George and Mallery, 2001). Cramer's V values near zero indicate a weak association of variables. Traditionally values of .1, .3, and .5 indicate small, medium, and large effect sizes (Green, Salkind, and Akey; 1997). Due to the significant χ^2 tests, Cramer's V was used to test the strength of the association of the variables.

Cramer's V = .067, $p < .01$ indicating a weak association of purpose and entity.

Responding messages accounted for the greatest proportion of both student and instructor messages. Eliciting messages accounted for the greatest proportion of institutional messages. Humanizing messages were the smallest proportion of messages for all entities. As a proportion of their total purposes, students used humanizing messages less than the other two entities.

Follow up tests using different combinations of entity were done. The entity combination of student and institution showed independence in the purpose of their respective email messages ($\chi^2 = 5.693$, $p = .058$). These results indicate that while there is an association of email message purpose between students and instructors and an association of purpose between instructors and institutional messages, the institutional representatives used the lists differently than students. All other combinations were significant for purpose. See Appendix G for follow up test detail.

Table 3

Statistical Analysis and Proportional Values for Entity by Purpose Crosstabulation

Entity

		<u>Institution</u>	<u>Instructor</u>	<u>Student</u>	χ^2 test independence	Cramer's V	
Purpose	Eliciting	Count	53	67	458	14.616*	0.067*
		% within Entity	39.00%	27.50%	37.30%		
	Humanizing	Count	35	53	227		
		% within Entity	25.70%	21.70%	18.50%	N = 1608	
	Responding	Count	48	124	543	df = 4	
		% within Entity	35.30%	50.80%	44.20%		

* $p < .01$

Mechanism of the Message

When grouped as three levels of mechanism, the levels fact-sharing, explaining, and opining describe how the authors conveyed the purpose of their messages. Appendix D provides detailed count and percentage analysis of the mechanism used to convey the purpose of the messages. Within the 1203 messages delivered, 1709 mechanism instances were observed and coded. The overall proportional makeup of the mechanisms observed is (a) fact sharing 42.0 percent, (b) explaining 26.8 percent, and (c) opining 31.2 percent.

Table 4 lists the proportional breakdown of the levels of mechanism for each of the three entities. A crosstabulation chi-square test for independence was performed to examine the relationship. The results of the test indicate that $\chi^2 = 17.771$, $p < .005$; therefore, indicating the mechanism and entity type are not independent. Cramer's V was used to test the strength of the association. Cramer's V =

.071, $p < .005$, indicating a small effect size. Therefore, the association of mechanism and entity is weak.

Follow up tests using different combinations of entity indicate the combination of institution and instructor is independent in mechanism used ($\chi^2 = 3.041$, $p = .219$). There is an association of mechanism between students and instructors and students and institutional representatives, however there is no association of the level of mechanism between instructors and institutional representatives. The other combinations of entity were significant and therefore associated. See Appendix G for follow up test detail.

As a proportion of total messages, fact-sharing messages was the greatest proportion for all entities. The institution sent the largest proportion of fact-sharing messages, the instructors sent more explaining messages, and the students sent the largest proportion of opining messages.

Table 4

Statistical Analysis and Proportional Values for Entity by Mechanism Crosstabulation

		Entity			χ^2 test of independence	Cramer's V
		<u>Institution</u>	<u>Instructor</u>	<u>Student</u>		
Explaining	Count	34	81	357	17.771*	0.071*
	% within Entity	24.50%	30.30%	26.40%		
How Fact sharing	Count	75	120	544	N = 1759	df = 4
	% within Entity	54.00%	44.90%	40.20%		
Opining	Count	30	66	452	N = 1759	df = 4
	% within Entity	21.60%	24.70%	33.40%		

* p < .005

Subject of the Messages

When grouped as three levels of subject, the levels content, procedure, and non-academic/social describe what the subject of the message was. Appendix E provides detailed count and percentage analysis of the subject of the messages. Within the 1203 messages delivered, 1445 different subject instances were observed. The overall proportional makeup of the subjects observed is (a) content 48.4 percent, (b) procedure 24.8 percent, and nonacademic/social 26.8 percent.

Table 5 lists the proportional breakdown of the levels of subject for each of the three entities. A crosstabulation chi-square test for independence was performed to examine the relationship. The results of the test indicate that $\chi^2 = 129.947$, $p < .005$; therefore, indicating that the subject and entity type are

not independent. Cramer's $V = .212$, $p < .005$, indicating a small effect size and weak association.

Follow up tests for all entity combinations were significant for all combinations of entity. There is an association of subject to entity for all entity combinations. See Appendix G for follow up test detail.

Table 5

Statistical Analysis and Proportional Values for Entity by Subject Crosstabulation

		Entity			χ^2 test of independence	Cramer's V		
		<u>Institution</u>	<u>Instructor</u>	<u>Student</u>				
Content	Count	18	107	574	129.947*	0.212*		
	% within Entity	13.60%	47.60%	52.80%				
SUB- JECT	Non-academic/ Social	Count	37	40	310	28.00%	17.80%	28.50%
	Procedure	Count	77	78	204			
		% within Entity	58.30%	34.70%	18.80%	df = 4		

* $p < .005$

As a proportion of their total messages, the institution sent a larger proportion of procedural messages. Content subjects accounted for the largest proportion of student and instructor messages.

The students and the institution sent proportionally the same amount of nonacademic/social messages.

Change in use over time

This study examined data collected over a period spanning seven semesters. The last question important to this study asks if the overall use of the distribution list changed over time (semester 1 – semester 7). Chi-square tests for independence of purpose by semester, mechanism by semester, and subject by semester were significant. The way in which the lists were used is not independent of semester. See Appendix F for the details of the chi-square and Cramer's V test results for purpose, mechanism, and subject by semester. None of the three variables are independent of semester; however the effect size described by Cramer's V is weak for all tests. Follow up tests for different combinations of entity and semester were inappropriate due to the sparseness of a significant number of cells in the crosstabulation.

Figure 1 provides a visual indication of how the different entities used the distribution list over the seven semesters. Differences in high and low points among the entities confirm the chi-square test results, which indicate the three variables (purpose, mechanism, and subject) are not independent of entity over time. There is an association between overall use of the distribution lists and entity from semester to semester. In general changes in use were consistently associated with entity and time.

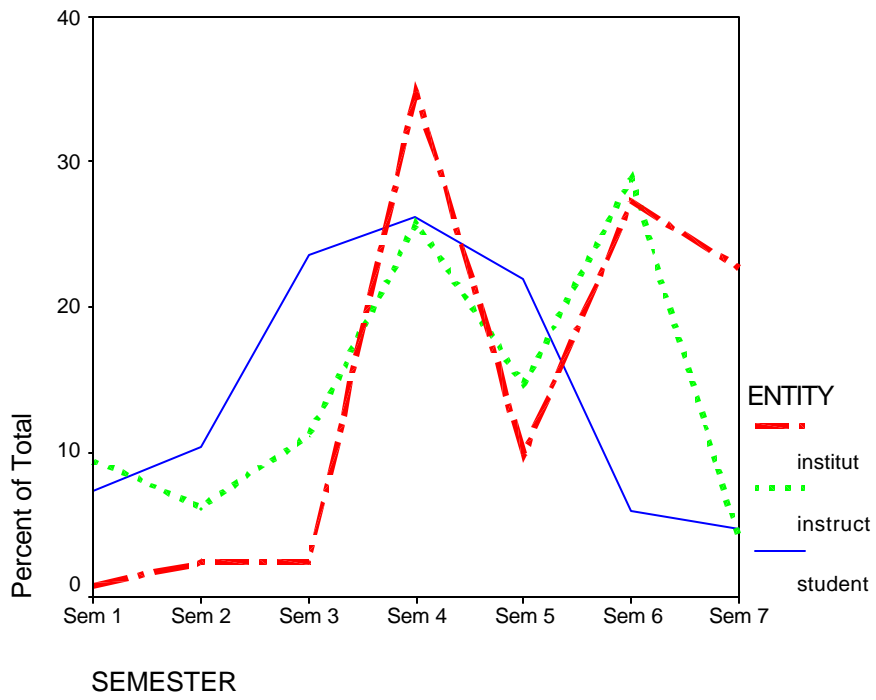


Figure 1. Entity by semester percent of total messages sent by entity.

Discussion of the Finding, Limitations, and Implications

Discussion of the Findings

This study of interaction via electronic distribution lists operated with one purpose; to provide a cross-sectional, longitudinal description of the interaction that takes place via unmoderated electronic distribution lists in distance education classes. The findings of this study should prove important to the distance education community for several reasons.

Open discussion via the distribution lists.

The total number of words transmitted via the electronic distribution list was 196,540. Fulford and Zhang (1993) say that people speak at 125 – 150 words per minute. At these rates, the distribution lists provided students with the equivalent of 21 – 26 hours of continual discussion. Of course, this was not continual discussion. The asynchronicity of the email messages allowed students to critically evaluate the content of the messages, consider a response and respond, or just record the information for later use. Hillman (1997) found that instructors spoke 73 percent of the words in face-to-face classes, and in CMC classes, teachers wrote 48 percent of the words. This study found that students wrote 73.7 percent of the words with the remaining 26.3 percent shared between instructors and the institution. Of course, there are more students than instructors or institutional representatives in this study; however, the same is true in face-to-face settings. Extension of this research should try to answer why students apparently did more of the writing (authoring) during this program.

Community building via the distribution lists.

Overall, 19.6 percent of the messages were coded with a purpose of humanizing and 26.8 percent of the messages were coded with a subject of nonacademic/social. Future research should

measure the potential effect that humanizing and nonacademic/social interaction via email distribution lists may have on various aspects of distance education programs. To what extent can social aspects of education and group maintenance be influenced by this medium?

As a proportion of their total purposes for sending email, the institutional representatives authored more eliciting and humanizing messages than either instructors or students. This result may indicate that the institution authored messages only when there was a need to get answers (elicit) from the students; students that were several hundred miles from the institution. The geographic and social separation from the students may also account for why the institution wrote more humanizing messages. The instructors and students met on occasion in face-to-face settings; however, the institution seldom if ever met with the students.

As a proportion of their total messages, students did the least amount of humanizing. The students met in face-to-face settings with instructors and met face-to-face with other students for the audio-only conference calls. This increased face-to-face time may account for the lowest level of humanizing messages from students and account for the higher proportions of humanizing from the institutional representatives and instructors. Additional research should try to isolate the reasons for and benefits of using the distribution lists for humanizing purposes.

Responding via the distribution lists.

As a proportion of their messages, instructors authored responding messages more than the institution and students combined. This finding should not be unexpected. Students generally ask questions (elicit) and instructors usually respond. However, 27.5 percent of the instructors email messages were eliciting messages. Wee the instructors eliciting in relation to course content or program

procedure? Extension of this research should try to identify the type of questions the instructors were asking of the students.

The subject of the email messages.

As a proportion of their messages, 58.3 percent of the institutional messages dealt with procedural subjects and 34.7 percent of the instructor's messages dealt with procedural subjects. Only 18.8 percent of student messages dealt with procedural subjects. Moore and Kearsley (1996) said things like learning objectives, content themes, information presentations, case studies, pictorial and other illustrations, exercises, projects, and tests are the structural elements of distance education. The level of course structure is determined by the philosophy of the instructor and the institution. Extension of this research should try to identify the extent that these procedural messages accounted for the structure (as defined by Moore and Kearsley) of the program.

The distribution lists over time.

All entities used the list differently over time; however, the weakness of the association between semester and each variable tempers the magnitude of the difference. Institutional use of the distribution lists, as a percentage of total institutional use, peaked in semester four, declined in semester five, and rebounded and remained high during semesters six and seven. During semester four, Comprehensive Exams were given to all students. Messages dealing with exam procedures can account for this peak in activity. During semesters six and seven, an increase in program procedure messages can account for the increase in institutional messages.

Nonacademic/social messages also increased during these semesters. Was the distribution list being used for social purposes to mediate stress during these peak use periods? Extension of this

research should try to identify the cause of the increase in messages dealing with nonacademic/social subjects during these peak semesters.

The general appearance of Figure 1, which depicts the overall semester by entity use of the distribution lists, has a generally normal appearance. Future research should explore the normal appearance with respect to a life cycle of the distribution list usage. Does this appearance of normality result from the life cycle of the distribution list, or is merely reflecting the life cycle of the distance education program?

Limitations of this Study

This study examines one distance education program. The conditions under which this program existed are unique to this program. The sample represents only a small portion of the real population of distance education programs. The coding of the messages is based on a codebook developed for this study and is limited to the consistent application of the code by the researcher. The number of codes and the code categories selected for analysis may not be the only codes important to understanding this program and understanding how email distribution lists interact with distance education.

Implications and Conclusions

At this time, eighteen months after the coursework for this program was completed, thirteen of the thirty students active at the end of coursework have completed their doctoral programs. Six more students are scheduled to complete within three months and all but three of the thirty students active at the end of coursework are still actively working to complete the doctoral program. The cohort model may be one factor in the retention levels experienced by this program, and the email distribution lists

may be one of the elements that made this program successful. More research needs to be completed to isolate the variables that can be influenced via the use of electronic distribution lists.

Electronic mail is a text-based form of asynchronous communication. Email may lack some of the glitz of more modern interactive media used in distance education; however, the researcher believes that this study contributed to the body of knowledge on distance education and showed how the medium was successful in supporting this doctoral distance education program. The level of transactional distance, in this program, was affected by the use of the distribution lists; however the question in measurable terms, of how much the program was affected remains unanswered. This study may well have created more questions than it provided answers; therefore, future research should extend this study in order to find answers to the questions raised herein. This study does justify continued research to refine coding and analysis methods of the content of asynchronous communication in distance education.

Future research should extend and refine the codes used in this study. Narrowing the definitions of the codes and extending the breadth of the coding system will help educators understand how email distribution lists can help support distance education. Future research should draw data from more distance education programs and compare the results to this study. Future research should find ways to complete a controlled experiment to test how email distribution lists can be used in support of distance education. Future research should consider a qualitative approach to analyzing this or similar data, rather than converting the qualitative information into quantifiable data as was done in this study.

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