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UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

AN EXAMINATION OF COMPUTER-MEDIATED COMMUNICATION'S SCHOLARLY COMMUNICATION

A Dissertation

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in partial fulfillment of the requirements for the

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J.D. Wallace

Norman, Oklahoma

1999

AN EXAMINATION OF COMPUTER-MEDIATED COMMUNICATION'S SCHOLARLY COMMUNICATION

A Dissertation APPROVED FOR THE

DEPARTMENT OF COMMUNICATION

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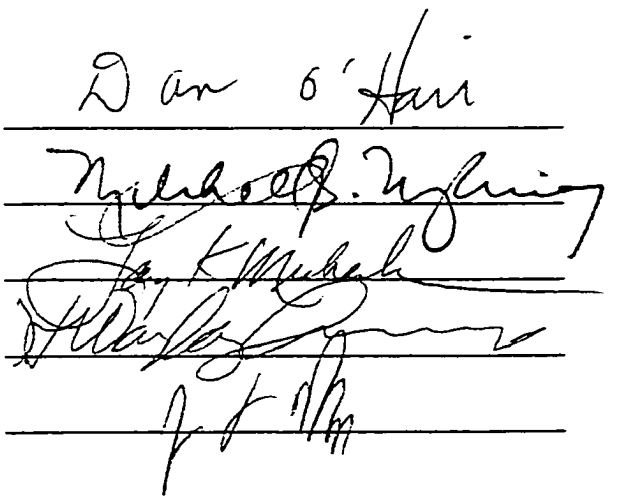

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Table of Contents

Acknowledgments iv

List of Tables ix

List of Figures x

Abstract xi

Chapter 1: Introduction 1

Chapter 2: Literature Review 5

Previous Descriptions of Computer-Mediated Communication 5

Venues of Study 5

Selected Definitions, Applications, and Tools of CMC 12

Describing the Emergent Specialty of CMC 20

Common Descriptions of Scholarly Communication 21

Qualitative Literature Examination 22

Quantitative Literature Examination 23

Bibliometric Analysis 26

Definition 26

Forms of data 28

Scholarly communication model 29

Statement of the Problem 31

Identifying the Domain: Producers and Artifacts 32

Journal articles 36

Identifying the Domain: Concepts 38

Research Questions 39
Research question 1: Artifacts 40
Research question 2: Producers 44
Research question 3: Concepts 46
Research question 4: Relationship of concepts 47
Chapter 3: Methodology 49
Dataset Construction 49
Data Analysis Methods 55
Artifacts 55
Producers 57
Concepts 59
Relationship of Concepts 61
Chapter 4: Results 63
Dataset Demographics 63
Artifacts 64
Producers 70
Concepts 74
Relationship of Concepts 77
Chapter 5: Discussion 81
Overview 81
Dataset Construction 82

Artifacts 83
The Relationship of CMC Journals Among Select Literatures 84
CMC journals' distinguishing characteristics 86
Longitudinal analysis of CMC journals 87
Producers 90
CMC Authors Among Select Literatures 90
Post Hoc ABI/INFORM Author Analysis 92
Concepts 94
CMC Concepts Among Select Literatures 94
Post Hoc Conceptual Trend Analysis 97
Strong performers 97
Low to moderate "long" term performers 98
Relationship of Concepts 100
Current CMC Conceptual Linkages 101
Comprehensive Examination CMC's Conceptual Linkages 103
Limitations 105
Future Research 107
Summary 110
References 114
Appendix A: Selected Definitions of Computer-Mediated Communication 137

Appendix B: Dataset Construction 139

ABI/INFORM Data Conversion 139

ERIC Data Conversion 143

Psychlit Data Conversion 147

Sociofile Data Conversion 151

Appendix C: Cross Referenced Articles 155

Appendix D: Listings of CMC Journals 159

Alphanumeric listings of CMC Journals 159

Frequency listings of CMC Journals 163

Appendix E: Core Journal and Core Author Database Relationship 165

Appendix F: Bibliometric Literature Size Comparisons of Journals and Authors 166

Appendix G: Keyword Analysis 167

Top Keyword Frequency Listing and Longitudinal Analysis 167

Bottom Keyword Frequency Listing 173

Alphanumeric Keyword Listing 178

Appendix H: Top Keyword Database Proximity 184

Appendix I: Keyword Cluster Dendrogram and Agglomerative Schedule 186

Dendrogram 186

Agglomerative Schedule 188

Appendix J: Conceptual Loose Clustering Solution 191

Appendix K: Conceptual Proximity Matrix 195

Variables 1-53 196

Variables 54 -107 199

Variables 108 -116 207

List of Tables

Table 1. Impact of Computer-Mediated Communication Systems in the Organizational Context 7

Table 2. CMC Definitions and Affiliating Characteristics 15

Table 3. CMC Tools Categories 18

Table 4. Cross-Referenced Articles (CRAs) Characteristics 64

Table 5. Journals with CRAs 65

Table 6. Bradfordian Journal Distribution 67

Table 7. CMC Journal Longitudinal Clustering Index 68

Table 8. Core Author Distribution 72

Table 9. Core Authors Contributions to Core Journals 73

Table 10. Concepts Late Emergers 76

Table 11. Core Term Mode Distribution 77

Table 12. Conceptual Clusters Database Affiliation 78

Table 13. ABI/INFORM Core Author Distribution 93

Table 14. Low to Moderate Concepts Longitudinal Analysis 99

List of Figures

Figure 1. Dataset Construction Process 54

Figure 2. Bibliograph of CMC Journals 68

Figure 3. Distribution of Unique and Cross-Referenced Articles 85

Figure 4. CMC Singleton and Recurring Journals' Growth 88

Figure 5. A Comparison of Core Author and Core Journal Distributions 92

Figure 6.Conceptual Key Term Frequency Distribution 95

Abstract

Computers have an ever-increasing role in mediating communication. Many scholars consider the study of "computer-mediated communication" (CMC) the locus for attending to the computer's role in relation to communication. While many definitions and descriptions of CMC are attributed to the literature, they are often selective and disparate. Name-sake publications continue to call for descriptive boundaries of CMC. Currently, none of the afore- mentioned subjective treatments appear sufficient.

This dissertation asks "what is meant by computer-mediated communication?" CMC was defined as it exists in the scholarly communication concerning business, education, psychology, sociology, and social sciences. This exploratory longitudinal analysis: examined the dynamic of computer-mediated communication in general, identified where academic scrutiny was being focused, and gives a general sense of the kinds of issues that were dominate during the time of examination.

Specifically, this study employed bibliometric analytical techniques to establish CMC's artifacts, producers, and concepts within that domain. These were defined as journals, authors of those journals, and conceptual keywords. Artifacts and producers were identified based on their prevalence in the field and academic orientation. A more fine-grained analysis was applied to concepts. They were examined in terms of their prevalence, academic orientation and also their relationship to each other.

What was found was an area of scholarly communication, heavily popularized in education-related journals. Psychology and other social science affiliated disciplines contributed in a less prolific fashion.

There were disparate foci between disciplines of differing perspectives. Multi-disciplinary with some interdisciplinary linkages would be a good description of CMC. Where there was interdisciplinary overlap, the communication discipline appears to be the boundary spanner in the majority of cases. This role did not extend to the business index analyzed.

The distribution of first authors was overwhelming populated by one-time authorship. This significantly differed from theoretically defined literatures associated with a field of study. Moreover, CMC's articles tended to be localized in a relatively few journals. Clusters of conceptual topics tended to be database affiliated. Those with the most wide ranging support among all databases tended to come from topics traditionally associated with the communication discipline. Also "telecommunications", "information network" and "Internet" affiliated topics were widely indicated from a number of the databases.

This study was significant for three reasons. First, it documented CMC's historical emergence. Second, it identified descriptive boundaries concerning CMC's authors, journals, and areas of inquiry that were prevalent. Third, it examines the communication discipline's role in the literature as defined. Additionally, it provides guidance concerning CMC's future research.

Chapter 1: Introduction

There is little question about the onslaught of new technological media. The personal computer (PC), whether individually or in networked formats, is one of the major engines in this deluge (Kerr & Hiltz, 1982; Rice, 1987; Schaefermeyer & Sewell, 1988). Zeffane (1992) makes a case (built on surveys of the CEOs of over 125 companies) that the perception is technology provides increases in productivity, efficiency (reduced costs), personnel control, and competitive advantage. The communication functions of computers is believed to heavily contribute to those increases (Zack, 1993). Furthermore, the case is extended to the betterment of such functions as diffusion of informal information, better coordination, information standardization, and decision making. We see signs of the emergence of the influence of technology in the number of magazines geared to the average consumer.

Currently, our society is inundated by popular magazines with names such as Byte, Compute, Computer Life, Computer Shopper, Home Office Computing, InfoWorld, Mac Week, Mac World, Mobile Office, PC Computing, PC Magazine, PC Week, PC World and a host of other niche publications. In 1994, sales of home personal computers (PCs) surpassed standard color television sets (Staff, 1995). From 1995 to 1997 household penetration of personal computers rose over 10 percent to exceed the 40 percent level (Bogen, 1997; Foust, 1995). While some analysts indicate a slowing in the rate, even conservative projections have the number exceeding 50 percent by 2001 (Bogen, 1997). These statistics underscore the proliferation of new technologies.

One of the more explosive technological developments, both in terms of communication and financial impact, has been the Internet. Future valuations of Internet-related companies can be seen in the exponential growth of Internet related stocks. Yahoo, a company whose business revolves around their flagship search engine, has had their stock soar from 28 to 286 points during 1998. Even more spectacular has been Amazon.com., an Internet company that provides books, music and other online services. Amazon's stock has moved from 24 to over 361 points in the same time frame.

While the Federal Networking Council did not define the term Internet until October 24, 1995, some form of the Internet system has been in place since 1969 (Federal Networking Council, 1995). Internet sites have gone from four in 1969 to over 16 million in 1997 (Zakon, 1997). A 1995 CommerceNet/Nielsen report puts the Internet users above the age of 16 in the U.S. and Canada at 24 million (Auter, 1996).

Even though computer-mediated communication (CMC) is "the hottest of the hot topics" (Eadie, 1997, p. 9) in scholarly circles, one can see it is not a new phenomena. It has decades of history behind it and an exponential growth curve. Unfortunately, the scholarly communication about computer-mediated communication's evolution and relationship with various disciplines remains muddled, at best.

Regardless, the computer's role as a communication media it is becoming increasingly pervasive. There are few guide posts in the emerging literature to demarcate boundary conditions. However, this is a typical state of affairs as variables and contexts are introduced within a field. Some notable references from other areas in the communication discipline could just as easily be describing computer-mediated

communication's current state of development. Greenbaum, Helweg, & Falcione (1988), in regard to the evaluation of organizational communication, speak of a literature that is "dispersed, and is not conveniently available for review, nor is the specific location of such literature known to more than a handful of scholars" (p.276). Delia, (1987) describes "...a significant feature of communication research has been its fragmentation as a topical concern across virtually all the disciplines and fields of the social sciences and humanities "(p. 20).

Both references considered the identification and demarcation of their respective interests as valued and necessary. The study of computer-mediated communication has also matured to a point where macro views of the variable would be extremely useful to its current scholarly efforts. This situation has become increasingly significant over the past two decades. Furthermore, it is expected to continue as the computer is increasingly used as a communication media impacting the way we socialize, learn, and do business (Hollingshead, McGrath, & O'Connor, 1992; Mantovani, 1994; Schaefermeyer & Sewell, 1988; Walther & Burgoon, 1992).

In order to undertake a macro view of CMC, the question of scholarly focus becomes important. One could easily expect the examination of CMC to be undertaken in the academic disciplines of business, education, or a range of social sciences. However, two other alternatives exist. One is that its locus may be more interdisciplinary than the property of a single discipline. The other is that CMC may have no locus at all. Rather, it is a loose collection of scholarly efforts conveniently put under the CMC umbrella with very little in common. Treatments of these issues would help define where

to look for scholarship concerning CMC. If a nexus of CMC literature exists, then an analysis of what is being studied can be undertaken.

By examining what problems scholars are communicating as prominent, we can document and analyze the evolution of computer-mediated communication's study. Using or abandoning current research streams can then tailor future research more efficiently. The stewardship of resources necessary for CMC's study should be of significant concern to scholars involved.

As the communication and other disciplines come to grips with new technologies, individual studies often will not, and cannot, make clear what is being looked at more broadly under a contextual rubric. It is only when the larger picture of a general literature is examined that one can get a feel for what scholarship is doing in examining the new subject area. Specifically, communication scholars' role in relation to the personal computer seems particularly nebulous, with no focus other than the use of the computer. This dissertation responds to the general question: With academia and the public awash in computer-related technology, how do scholars relate it to communication, and within what framework?

Chapter 2: Literature Review

Previous Descriptions of Computer-Mediated Communication

The unique nature of computer-mediated communication (CMC) and its impact on communication is described and forecasted in a variety of venues. CMC research appears in business, communication, psychological, sociological, and educational literatures. A number of scholarly publications describe this emerging specialty of scholars and practitioners (Bordia, 1997; Compton, White, & DeWine, 1991; Ferris, 1997; Harasim, 1990; Kuehn, 1994; Rice & Love, 1987; Walther, 1994, 1996a). The appearance of university programs, magazines, journals, and projects further supports the emergence of this specialty as an area of study (December, 1997b).

Venues of Study

As seen from the above descriptions (and from everyday experience), computers mediating communication is a fixture in a variety of contexts. This computer-based communication media impacts the way people learn, work, communicate, and socialize. These impacts are under scrutiny in a variety of contexts and from a number of different perspectives. The following section describes some of CMC's more prominent venues or loci of scholarship regarding education, work, communication, and socialization.

CMC has altered educational strategies in some environments and often provides alternatives to more traditional methodologies. Great Britain's Open University, New Jersey's Institute of Technology and the ever-increasing number of online degree programs demonstrate CMC's practicality for delivering education. Harasim (1990) asserts that the potential of online education can be explored through the five attributes

that, taken together, both delineate its differences from existing modes of education, and also characterize online education as a unique mode. These include: many to many communication, place independence, time independence (that is time-flexible, not atemporal), text based, and computer mediated interaction. More importantly, there appears to be mounting evidence that student performance is in line with more traditional teaching methods such as the standard lecture-based class (Cheng, Lehmen, & Armstrong, 1990; Phelps, Wells, & Ashworth, 1991). Bellman, Tindimubona, and Arias (1993) detail a number of studies that not only describe parity with traditional learning, but also note a reduction of disparities in minority and female students.

The way people communicate at work has also been altered by CMC. Compton, White, and DeWine (1991, pp. 24-26) review a long list of variable analytic studies that itemize the impacts that computer-mediated communication systems (CMCS) have within the organizational context. Table 1, on page 7, categorizes their review in areas of communication and information, task efficiency, decreases and alterations.

Their analysis of the literature in this area causes them to make the strong assertion that "...a shift has occurred as technologies alter the basic aspects of organizations such as information processing systems, task efficiency and interpersonal relationships..." (Compton, White, & DeWine, 1991, p. 23).

Table 1.

Impact of Computer-Mediated Communication Systems in the Organizational Context

Communication and Information Showed Increased	Task Efficiency Showed Increased	Decreases Occurred in
– efficiency of information flow – access to information – access to organizational power – decision making and creative processes – information distribution and consumption – access to individuals' communication activities in functional groups and superior-subordinate communication – communication with external environments – separation between information poor and rich – open communication networks – low tenure members' ability to influence higher levels in the hierarchy.	– productivity and innovation without the increase of job stress – planning, timely and complete feedback promotion – controlling organizational activities – managing time – initiating action plans – responding to the environments – planning flexible work schedules – eliminating manual labor – composing and preparing documents	– telephone and face to face interactions – media transformations – shadowing and telephone tag **Alterations Occurred in** – organizational structure – roles and status – emergence of technological elite

(Compton, White, & DeWine, 1991)

Media richness theory offers a typology that has been propagated by a number of sources particularly in the communication discipline (Adler & Elmhorst, 1996; Conger, 1992; Daft & Lengel, 1984; Lengel & Daft, 1988; Trevino, Lengel, & Daft, 1987; Trevino, Daft, & Lengel, 1990; Trevino & Webster, 1992). This typology provides a framework in which a variety of media can be compared against each other. Media, including CMC derivatives such as e-mail, are ranked according to their ability to convey

message equivocality. That ability is based on the level of richness inherent within a media. Trevino, Daft, and Lengel (1990) define richness as:

> based upon a blend of four criteria: (1) the availability of instant feedback, making it possible for communicators to converge quickly upon a common interpretation or understanding; (2) the capacity of the medium to transmit multiple cues such as body language, voice tone, and inflection, to convey interpretations; (3) the use of natural language, rather than numbers, to convey subtleties; and (4) the personal focus of the medium. (p. 75)

The theory strongly asserts that, in the organizational environment, the characteristics of the media and the equivocality of the message need to be considered for communication effectiveness (Conger, 1992; Trevino, Daft, and Lengel, 1990).

Spears and Lea (1994) take a more sociological approach to CMC research, hinging their review on a power perspective. Their view is that much of this research is too optimistic in its claim that CMC produces greater power equalization (Kiesler & Sproull, 1992; Dubrovsky, Kiesler, & Sethna, 1991; Kiesler, Siegel, & McGuire, 1984; Siegel, Dubrovsky, Kiesler, & McGuire, 1986; Sproull & Kiesler, 1991b; Weisband, 1992). The basic premise of power equalization is that since nonverbal cues are filtered out, they cannot impose the power relations often associated with them. Examples of these cues would include such things as gender and race. However, Spears and Lea contend that their position is not an alternative to the cues filtered-out position, but merely an extension of the consequences. They state,"to the extent that interpersonal cues are reduced, we argue that the social cues that remain, typically those cues to role,

status, and category membership that are often implied in the social context, can become more important and influential rather than less so" (Spears & Lea, 1994, p. 452).

An early review by Rice and Love (1987) hints at some of the same dynamics. Taking a communication focus, they narrow their concerns into two categories of impact. The first is nature of communication content. The second is structure of communication. Later Rice (1992) cautions that "reliance on standard conceptualizations such as dichotomies between interpersonal and mass media, superior and subordinate flows, or formal and informal content, has institutionalized the notion that face to face is the ideal and that mediated communication, especially computer-mediated communication is a poor substitute" (p. 497). In both these areas, of content and structure, the point is strongly made that CMC is becoming an alternative media, not a poor substitute for existing modes of communication. Regarding CMC, this suggests that hierarchies and typologies concerning other communication media may have to be modified or scrapped altogether.

Walther (1994) divides the majority of interpersonal research on CMC into two categories: one ". . . examines the effects of the CMC media on communication. The other seeks to explain media selection . . ." (p. 474). Cursory reviews of this interpersonal literature discover a literature fraught with mixed results and contrasting bodies of research that differ on CMC and the filtering of nonverbal cues (Fulk, Schmitz, & Steinfield, 1990; Fulk, Schmitz, & Schwartz, 1992; Rice, 1993; Sproull & Kiesler, 1991a, 1991b; Steinfield, 1992; Walther, 1994). Whether nonverbal and other cues are filtered out or merely retarded, continues to be debated. The former position describes a

media that would be relatively lean and incapable of carrying some nonverbal and relational cues. The latter position describes a medium that can carry those cues but is restricted by other nonverbal elements, particularly time and bandwidth. Walther, a major contributor of the latter, extends this position. Walther contends that CMC may not be as unique of a medium as first thought, but one that is more comparable to writing and other forms of asynchronous communication (Walther, 1996a).

This theme of whether or not CMC is a new form of communication is common among a number of the early research efforts. Kiesler, Siegel, and McGuire (1984) offer the generic distinction that "electronic communication differs from any other communication in time, space, ease of use, audience, and opportunity for feedback" (p. 1127). McClure (1991) puts the implications in a clearer light when he states that: "The advent of CMC has created new communication needs (Hellerstein, 1985, 1986) and has encouraged the emergence of patterns of communicative change which did not previously exist" (p. 58).

Standing in stark contrast to this suggested incomparability of computer-mediated and face-to-face (FTF) communication is Bordia's (1997) review of the experimental literature in psychological, sociological, business, and communication databases. This review utilizes a somewhat vague and subjective methodology to examine 18 CMC vs. FTF experimental studies. The results are synthesized into 10 propositions (actually 11 due to propositions 9a and 9b). The first seven are argued to have fairly consistent support. These are:

1. CMC groups take longer to complete the allotted task. (p.101)

2. In a given time period CMC groups produce fewer remarks than FTF groups. (p.101)

3. CMC groups perform better than FTF groups on idea generation tasks (p. 101).

4. There is greater equality of participation in CMC groups. (p.103)

5. When time is limited, CMC groups perform better than FTF groups on tasks involving less and worse on tasks requiring more social-emotional interaction. Given enough time, CMC groups perform as well as FTF groups. (p. 103)

6. There is reduced normative social pressure in CMC groups. (p.105)

7. Perception (understanding) of partner and task is poorer in CMC groups. (p. 105)

Bordia's propositions have been intentionally ordered in terms of confidence in the findings. The following propositions had mixed literature in their regard.

8. In CMC, evaluation of the communication partner is poorer under conditions of limited time. Evaluations of the medium is influenced by the type of task. (p. 106)

9a. There is a higher incidence of uninhibited behavior in CMC groups. (p. 107)

9b. CMC induces a state of deindividuation, which in term leads to uninhibited behavior. (p. 108)

10. CMC groups, as compared to FTF groups, exhibit less choice shift or attitude change. (p. 109)

The above descriptions from various authors describes a literature trying to distill the essence of CMC into a definitional, or at least a typological structure. Currently this structure does not exist beyond individual scholars' particular perspectives.

Selected Definitions, Applications, and Tools of CMC

This diversity of literature has produced renewed efforts to delineate what the term CMC covers. This was the focal point of the January 1997 issue of CMC Magazine (December, 1996b). While recent definitions have been proposed (see December, 1997a; Ferris, 1997), definitional boundaries do not appear to be standardized in the literature at large. However, a number of variations are available. Appendix A offers a selection of definitional variations that span the previous decades' study of the topic. Like many definitions, these are axiomatic statements that conceptualize a particular author's formulation rather than articulate a defendable construct. These include, to varying degrees, definitional treatments of CMC's component terms: computer, mediated, and communication.

Some of these definitions provide a more specific description of what is meant by CMC's computer component (e.g. Ferris, 1997; Fidler, 1997; Winnett, 1986). Treatment of this component, among these definitions, includes references to hardware and software. Hardware references include the actual number of computers necessary for CMC. These range from Winnett's (1986) minimum of one to the more common reference "computers", which implies more than a single machine. Configurations are referred to in a number of the definitions. These detail whether a computing device is sufficient or if it has to be linked to some other device such as a mainframe or telecommunication system.

These definitions mention specific kinds of software used in CMC. Electronic mail (e-mail) is an example of the most commonly referenced software. However, they

also specifically mention bulletin boards, computer conferencing, database, and group software.

Likewise, some definitions give a more distinct treatment to what is meant by the term "mediated". Mediating elements of new technologies may or may not be similar to those of older media (Contractor & Eisenberg, 1990; Daft & Lengel, 1986; Kiesler, Siegel, & McGuire, 1984; Rice, 1992; Short, Williams, & Christie, 1976; Walther, 1996a). Rather than examine definitions for some of the more complicated mediating characteristics such as the degree of "social presence" or "media richness", less discriminating categories were used for comparative purposes.

Pavlik (1998) describes new media technologies mediating characteristics based on their technical functions regarding information. These include "production, distribution, display, and storage" (p. 2). "Production" is the one characteristic that would, arguably, be more linked to mediation of information versus communication. It is a receiver only characteristic defined as "...ways to collect and interpret information" (p. 2). Specifically, in regard to interpersonal communication, Fidler (1997) both defines and critiques some of technology's new mediating features.

> Because interpersonal communication is highly spontaneous and often emotionally charged, the informational content tends to be of a more immediate and ephemeral nature than either the broadcast or document forms. Prior to the development of the telegraph, telephone, and sound recording systems, none of the forms within this family could be accurately preserved, replicated, or transported. (p. 34)

Both authors had similar definitions regarding storage (preservation) and transmission (distribution/transportation) characteristics. These areas were referred to in a number of other CMC definitions as well. "Storage" was the most commonly used term for the first category while the second had a number of labels indicating transmission (e.g., transmitting, channeling, or relaying). The CMC definitions addressed the category of display by articulating in the format in which the communication was received (e.g., textual, graphical, or video). None of the definitions overtly referred to the replicative function of CMC. This is somewhat surprising since it is a function that is both a boon and bane to users (e.g. proficient e-mail users constantly receive and send replicated messages from individuals whose only contribution was to identify, copy, and forward them).

While the communication term within CMC could include any number of elements, a few appeared to be repetitively addressed. These include process issues and kinds of content. Also addressed were contextual elements such as temporality and proximity. Process issues include overt references to interactivity and terms such as encoding and decoding. These terms provide a processual link between the technological and the human components of CMC.

Surprisingly, types of message content were included in some of the definitions. These references directly addressed whether CMC was capable of carrying task, social and personal information within the message.

CMC's expanded ability involving the contextual elements of time and proximity was also featured. More than half of the definitions examined referred to CMC's

abilities regarding asynchronous and synchronous communication. A smaller number referred to the media ability to transcend user's proximity (geographical dispersion).

Table 2.

CMC Definitions and Affiliating Characteristics

Author	Computer			Mediated				Communication			
	Number	Configuration	Software	Transmission	Storage	Display	Replication	Process	Content	Temporality	Proximity
December (1997a)		x		x				x			
Ferris (1997)		x	x	x	x				x	x	
Fidler (1997)	x	x						x			
Olaniran (1996)	x		x	x						x	x
Paulsen (1995)			x	x	x						
Kuehn (1994)	x							x			
Montavani (1994)		x	x	x	x					x	x
Spears & Lea (1994)						x					
Seaton (1993)			x							x	x
Walther (1992)			x	x		x		x		x	
Lea (1991)				x					x		
Hiltz and Johnson (1990)										x	x
Winnett (1986)	x	x	x		x				x	x	x

Table 2 provides a graphical summary of characteristics featured by the various definitions in Appendix A. These are divided under CMC's component terms. It should be noted that although some definitions do not mention some characteristics, they may be assumed to be present. For example, while only a few of the definitions allude to an

actual number of computers (e.g., one, two or more, or the term "computers") most assume more than one. Perhaps, like the term communication itself, CMC is becoming so ubiquitous that efforts at definition provide an unattractive distraction from scholars' current endeavors.

December (1996b) spends a great deal of time defining Internet based computer-mediated communication because the issues involved do impact the research outcome. The point is made that subsequent research may or may not be comparable because of definitional components. In regard to the Internet specifically, and to CMC in general, there are a whole range of media that may be used and that impact the nature of a study (December, 1996b).

To complicate matters, CMC is related to a whole host of tasks describing acronyms that populate computer related literature. Prominent examples include Computer-mediated Communication Systems (CMCS), Computer-supported Cooperative Work (CSCW),Group-Decision Support Systems (GDSS), and Computer Aided Instruction (CAI) (Compton, White, & DeWine, 1991; Easterbrook, 1993; Ferris, 1997; Jessup & Valacich, 1993; Kuehn, 1994; McGrath & Hollingshead, 1994; Mennecke, Hoffer, & Wynne, 1992, Scrivner, 1991). When hierarchies appear to elevate or subjugate CMC within this alphabet soup of computer related literature, it is with the author's perspective in mind. An appropriate example is CAI. It is regarded both as a supra and a subset, depending on the perspective of the author (e.g., Ferris, 1997; Kuehn, 1994).

Regardless, the range of areas subsumed appears to be extensive and growing. Ferris (1997) provides a nice sampling of current applications in the organizational and educational settings:

> The term "CMC" covers a wide range of functions and applications, and encompasses such areas as electronic messaging (Johansen, Vallee & Spangler, 1979), office automation (Rice & Case, 1983; Benest & Dukic, 1993), distributed decision-making (Wellens, 1993), electronic boardrooms (Pinsonneault & Kraemer, 1989), and teleconferencing, in addition to informatics (Santoro, 1995), computer supported cooperative work or CSCW (Bowers & Senford, 1991; Scrivener, 1994), decision support systems and group support systems or GDSS (Jessup & Valacich, 1993), and computer assisted instruction or CAI (Santoro, 1995).

The tools that are used in order to facilitate the mediation of CMC provide a range of possibilities for definition. This range feeds some of the definitional disparities discussed in the research (Olaniran, Friedrich, & Van Gundy, 1992). These tools include software and hardware combinations that mediate communication into textual, audio, and video formats. They have been organized in a number of typologies such as synchronous/asynchronous and the more traditional areas of interpersonal, group, and mass communication.

December (1997c) itemizes a host of CMC tool descriptions available on the world wide web with links to the respective sites. Many of the 141 sites include functional versions of the tools themselves. Table 3, on page 18, illustrates how these

tools are divided into traditional areas of communication analyses. Aside from the traditional areas, December also includes three examples of interfaces termed exMOO, htMUD, and MUTT. This and similar sites provide a convenient way to access scores of tools that currently find themselves, one way or another, under the rubric of CMC. With so many options apparent, one has to wonder about the laxity of boundary conditions so prevalent in the literature.

Table 3.

CMC Tools Categories

Interpersonal	Group	Mass
Audio (20)*	Audio (3)	Audio (3)
Chat systems (1)	Collage (1)	IW (interactive webbing) (3)
E-mail (22)	CU-SeeMe (1)	IRC (Internet Relay Chat) (5)
Talk (2)	Haven (1)	ITR (Internet Talk Radio)(6)
Ztalk (1)	Lily (1)	Lily (1)
	Listproc (1)	Mbone (5)
	Listserve (13)	Usenet (18)
	Majordomo (3)	
	Maven (1)	
	MU with variations (19)	
	Pow-wow (1)	
	Procmail (2)	
	Wit (Web Interactive Talk) (2)	
	WebChat (2)	
	WW(Web World) (2)	
	Yarn (1)	

*Parenthetical numbers represent the number of online resources in that category.

Despite a wide variety of definitional, application, and tool descriptions many articles with the domain as their central focus sidestep the whole issue by not defining the term at all. Rather, the focus is put on the current research project at hand with CMC being a convenient term for categorizing that research (e.g., Hiltz, 1986; Marbrito, 1992; Walther, 1994).

Even articles by Walther (1996a) and Bordia (1997), with a synthesis of CMC literature at their core, provide a less than clear definition. The first article, whose purpose is a "reconceptualization of the work on CMC and interpersonal effects. . ." (Walther, p.4), never defines the term beyond some select exemplars such as e-mail. This is peculiar because the article contrasts a number of alternative mediation methods with "CMC" and "standard CMC" (p. 32). The second article which is purported to be a ". . . synthesis of the experimental literature" (Bordia, p. 99) suggests that "CMC is primarily textual. There are no nonverbal cues to embellish meaning or social context cues regarding gender, age, or status" (p. 100). The previous citation begs the question "what is meant by nonverbal?" Perspectives on this question would cover a range of practical applications from a supervisor's e-mail with name and address clearly identified, to more social examples such as the emoticon (e.g., ":-)", look at the colon-hyphen-parenthesis sideways for a rendition of a smiling face to indicate happiness).

Murray (1997), taking a prompt from Wittgenstein's definition of language offers one possible explanation. Constructs and items associated with CMC have no single element common to them all. They are related to each other in a myriad of different ways

that provides their commonality. December (1997d) makes a pragmatic point along the same lines:

> CMC in the broadest sense involves a wide range of telecommunications activities as well as non-networked transfer of information such as via computer diskettes. CMC however, shouldn't be taken as a catch-all category under which anything mediated by technology falls. . . . Ultimately, the definition of an activity as computer-mediated relies for its validity on its value for shedding meaning on the communication act.

So, rather than pursue a singular definition of what the term CMC describes, perhaps a more general description of what the field itself incorporates within its' confines is the best way to examine the concept. Unfortunately, CMC is not the sole domain of any given discipline. The Journal of Computer-Mediated Communication describes the emerging field of CMC as one that is ". . . currently scattered across a dozen disciplines and as many different outlets" (McLaughlin, 1994, p. 3). Since current disciplinary boundaries do not apply, the problem becomes one of identifying boundaries that make reasonable sense.

Describing the Emergent Specialty of CMC

One thing is certain, that by any definition of the term, CMC involves the use of the computer as an intermediary device. Levinson (1990) suggests that in order to understand a device or a technique, not only should we take a microscopic view through research and examination, but we should also take a more macroscopic view of technology. A larger view of what is going on would point to some form of field analysis

of CMC. This macroscopic view would allow a point of reference and enable others to compare its development either at a later date, or with differing methodologies. An examination using the specific technology (computer) as an anchor, coupled with a communication focus, would allow for a boundary spanning examination of the subject. The advent of the technology has both helped and harmed this kind of examination.

In the past, coalescence of diverse scholarship in subfields of communication took a considerable amount of time (Paisley, 1986). This is rapidly changing due to the increased interconnectivity of databases and researchers provided by technology. Increased interconnectivity makes research collaboration easier, but it also diversifies the roots and branches of a field of study.

If cohesive understanding and direction of the current scholarship regarding computer-mediated communication is to be obtained, an overview of these roots and branches must be executed. This kind of overview would examine the dynamics of CMC in general, help pinpoint where current academic scrutiny is being focused, and gives a general sense of the kinds of issues that are dominating at a given point in time. Literature descriptions are commonly used to articulate the activity represented in these kinds of areas (Hinze, 1994).

Common Descriptions of Scholarly Communication

There are any number of ways to review a literature, from simple compilation of bibliographies to more sophisticated meta-analytical and bibliometric techniques. The publication manual of the American Psychological Association articulates the usefulness of such reviews in: ". . . organizing, integrating, and evaluating previously published

material. . . " (American Psychological Association, 1994, p. 5). All of these have strengths and weaknesses. Choosing between them is often determined by ends desired, resources available, and value for resources expended. The following sections discuss three broad methods of describing and synthesizing literature: qualitative, quantitative, and bibliometric.

Qualitative Literature Examination

Qualitative examinations of the literature include bibliographies and literature reviews. The existence of bibliographies concerning CMC support its position as an increasingly prevalent area of study. Extensive bibliographies both accompany literature reviews, and are a source of publication themselves (e.g., Romiszowski, 1992). Possibly because the individuals who study CMC tend to be users, they seem to avail themselves of the Internet as an outlet. The Internet has provided a number of notable bibliographies containing hundreds of references specifically targeting the CMC literature base[1] (e.g., December, 1993; Rafaeli & Sudweeks, 1994; Rudy, 1995; Walther, 1996b). These reviews bring with them the informed view of their respective authors. These views often disseminate nuances of the relevant and significant, while discarding the unnecessary. The weakness of bibliographical description is that, while they do contain many pertinent examples of a given field, they do little to tell about the general make-up of what the examples include. Also, bibliographies are typically more closely aligned to the research forays of their producers than to a generalizable literature (Chung, 1994; Rubincam, 1987).

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[1] Dates in the following Internet citations reflect date last updated not when created or accessed.

Literature reviews such as the ones alluded to above provide content and context summaries in which to put their treatment of the subject at hand. Whether they are textual (Compton, White, & DeWine 1991; Ferris, 1997; Harasim, 1990; Rice, 1992; Rice & Love, 1987; Spears & Lea, 1991; Walther, 1994) or graphical (December, 1994), they provide a focused treatment of the literature. However, Rosenthal (1991) points out that even the most rigorous reviews have difficulty in providing more than cursory descriptions. Moreover, these reviews are seldom exhaustive and hardly replicable, two qualities that help the scholastic community agree on a characterization of a field of study. While subjective reviews have value for the reasons previously stated, there is little chance for a common description to emerge. Quantitative methodologies are generally thought to be a less subjective approach to describing literatures as a whole, increasing the chances for a common description (Everett & Pecotich, 1991; Ely, 1990).

Quantitative Literature Examination

Content-analysis is one way to develop a treatment of quantitative literature examinations. It has been articulated for almost half a century and has long predominated in the field of communication literature (Berelson, 1952; Dick & Blazek, 1995). There are any number of source materials for this technique (Holsti, 1969; Krippendorf, 1980). Content Analysis can provide a preliminary glimpse into the strength of the purveyance of topic, word, or author within a given area. However it falls short in describing complex relationship within the sampling frame (Dick & Blazek, 1995; Everett & Pecotich, 1991). This technique, with its widest interpretation, includes many of the biliometric techniques

to be discussed subsequently. Generally, however, it is thought of in reference to simple frequency comparison.

Another such treatment is meta-analysis of literature in a particular area. Meta-analytic studies are able to discern consistent levels of significance over a range of literature. Their focus, by design, must be confined to a narrowly defined variable. That variable must have been tested in comparable conditions. Moreover, meta-analytic procedures are dependent upon the literature to provide a large enough pool of studies to make a credible generalization (Hunter & Scmidt, 1990; Rosenthal, 1991). Current forays using this procedure, such as Walther, Anderson, & Park (1994), lack sufficient studies to deliver more than a preliminary glimpse into an area of study such as CMC. Emerging specialties, like CMC, need a broader range of analytical approaches in order to be able to decipher the chaotic dynamics often inherent in their makeup (McCain & Whitney, 1994).

Survey techniques are useful both from a descriptive and historical point of view. They can help pinpoint a topic's core by demarcating in what journals a topic is most likely to reside. This core can in turn be used to examine what are the dominant issues in relation to a topic. Borgman and Rice (1992) recount a number of studies utilizing surveys to establish core journals by examining ". . . journals read by those surveyed (Coblans, 1972; Dansey, 1973, Hansen & Tilbury, 1963; Swicher & Smith, 1982), [and] a survey of authors publishing in one journal of where else they publish (Meadows & Zaborowski, 1979; Reeves & Borgman, 1983). . ."(p. 398). Surveys can help establish an informed consensus about what an area of study includes, and establish prominent issues

within a field. While more in tune with quantitative description, surveys have structural weaknesses that seem to predominate their use. These have included a number of methodological drawbacks such as subjectivity of opinion, non-response, and rater bias toward a particular entity (Everett & Pecotich, 1991; Jobber & Simpson, 1988).

Library information science provides a host of techniques, under the category of bibliometrics, to present a body of research literature in a quantifiable, interpretable, and reliable manner (Ungern-Steenberg, 1995; Moed, 1989; Tijsen, 1992; McCain & Whitney, 1994; Hinze, 1994; Paisley, 1989). Lievrouw (1990) states that "bibliometric studies are of interest to communication researchers because scholarly communication artifacts result directly from a process that involves, first, the authors' expression of their own and others' expert ideas" (p. 61). The genesis of this statement came from a revision of Lievrouw (1989) where the strength of communication analysis is because scientific articles are "written according to a strict set of convention"(p. 616). Secondly, the ". . . appearance of the article in print is usually taken to indicate that communication has also occurred among the author and the evaluators" (p. 617). However, communication as a discipline has largely ignored the gains made by library information science (Beniger, 1988; Borgman & Rice, 1992; Dick & Blazek, 1995; Rice & Crawford, 1992). As with any technique, there can be a number of reasons. Ungen-Steenberg (1995) attributes the cause primarily to features of the method: time consumption, being difficult to perform, and difficult to interpret.

Bibliometric Analysis

Information science in general and bibliometrics specifically have intersected with the communication discipline since 1967 (Borgman & Rice, 1992). However, due to its uncharacteristic absence in communication literature, a slightly more detailed description is in order. This general absence in the communication literature is in spite of its prevalence in other areas of scientific inquiry and a special issue of Communication Research (October, 1989). Bibliometric analysis has been largely ignored as a tool for definition of areas of communication studies either at the macro or micro levels (Dick & Blazek, 1995; Rice & Crawford, 1992). Brooks (1996) speculates it may be because of its eclectic collection of techniques with no central methodological resource possible. However, this position is recanted after a review of Diodato's (1994) Dictionary of Bibliometrics (Brooks, 1996). Regardless of the reason, bibliometrics provides a number of methodologies that can help describe a field, identify "invisible universities," and document the appearance, growth or decline of an emerging focus within a discipline (Ingwersen & Christensen, 1997; Paisley, 1989).

Definition. Fundamentally, bibliometrics is built on the assumption that ". . . scientific publications represent scientific activities "(Hinze, 1994, p.353). Hinze (1994) identifies "relational indicators" of literature to include "keyword, classification codes, or citations" (p. 354). Research in the past has revealed component features of an area of study such as density of literature, core journals, and frequency and relationships between a variety of concepts (e.g., publications, keywords, citations, authors, and universities) (e.g., Brooks, 1989; Beniger, 1988; Campanario, 1995; Courtial, 1994; Callon, Courtial,

& Laville, 1991; Courtial, Callon, & Sigogneau, 1984; Dick & Blazek, 1995; Hinze, 1994; McCain & Whitney, 1994; Paisley, 1989; Rice, 1984; Rice, Chapin, Pressman, Park, & Funkhouser, 1996; Spasser, 1997; Zsindeley & Schubert, 1989).

Pritchard's (1969) definition of bibliometrics is widely accepted as an authority on defining the basic assumptions (Borgman, 1989, Tijssen, 1992). Simply put, bibliometrics refers to ". . . mathematical and statistical analysis of patterns that arise in the publication and use of documents" (Diodato, 1994, p. ix). Arguably, it could be considered a form of content analysis. However, Paisley (1989, p. 707) distinguishes bibliometrics from content analysis because it uses a categorical system based on "extrinsic facts" about the publication (e.g when, where, who, etc.). Content analysis on the other hand, is more intrinsic in nature because ". . . of the need to develop coding categories based on a theory of the relationship of the text to intentions, effects, and the symbolic environment" (p. 707)[2]. Regardless, it has taken a prominent role in the description of scholarly literature's communication patterns (Borgman, 1989; Diodato, 1994; Rice et al., 1996). This foundation, and its acceptance as an avenue for examining fields of study, make it a strong choice for the problem at hand. A number of techniques, familiar to most social scientists, have been employed in bibliometrics to help analyze the structure of a literature and, subsequently, the field it represents. These include

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[2] Paisley's argument appears to be directed at the application of content analysis. At a broader level, bibliometric variables are easily included at either the manifest or latent content level (Holsti, 1969). Furthermore, Diodato defines content analysis as "an analysis of the textual and non-textual elements of a document" (1994, p. 50). This definition also suggests that bibliometrics are content analytic techniques.

traditional statistical methodologies such as cluster analysis, factor analysis, and multi-dimensional scaling (Campanario, 1995; Spasser, 1997).

Forms of data. While methodologies are varied, examination has traditionally been based on two forms of data analyses. Probably the best recognized technique is citation analysis (Borgman, 1989; Diodato, 1994). This area of study has been commonly attributed to Henry Small and colleagues at the Institute of Scientific Information at Philadelphia (Campanario, 1995; Courtial, Callon, & Sigogneau, 1984; Garfield, 1979). Currently, the most used forms of citation analyses are cocitation analysis and bibliographic coupling. Cocitation analysis examines how many times two citations occur in a later journal. Either journals or authors are linked to represent a particular clustering of subject area (Chung, 1994; Diodato, 1994; Persson, 1994; Ungern-Steenberg, 1995). Bibliographic coupling, assumes that if two articles cite the same article there is a commonality between those articles forming an intellectual link (Persson, 1994; Ungern-Steenberg, 1995). This method has been used in identifying invisible universities, as well as author, journal, and article proximity and centrality (Diodato, 1994; Lievrouw, 1989).

The second area of analyses is commonly called co-word analysis. It has been pioneered at the Center de Sociologie de l'Innovation and the Center de Documentation Scientifique et Technique (CDST) primarily by J. P. Courtial and colleagues (Ungern-Steenberg, 1995; Courtial, Callon, & Sigogneau, 1984). This area commonly uses the French national database PASCAL. It has an aggressive research program and a

substantial presence in information science journals such as Sciencetometrics and Journal of Information Science.

Instead of examining the relationship between citations, co-word analysis examines "the co-occurrence of two or more words in one document or in different documents" (Diodato, 1994, p. 54). It is more focused on the content of a research area as opposed to the internal relationships of the literature (Cambrosio, Limoges, Courtial, & Laville, 1993). Co-word analysis has been described as particularly useful in the actual content of the research in a particular field of study (Callon, Courtial, & Laville, 1991; Courtial, 1994; Hinze, 1994; Ungern-Steenberg, 1995).

Despite its prominence in the field of bibliometrics internationally, this area tends to be overlooked by scholars in the United States and, specifically, by communication as a discipline. Paisley (1989) chastises the 1989 October special edition of Communication Research for its' omission ". . . because it is so sweeping" (p.714). Regardless, this area has contributed to the understanding of a number of "hard sciences" with a wide range of exemplars in this dissertation's references (e.g, Callon, Courtial, & Laville, 1991; Courtial, et al. 1984, Courtial, 1994; McCain & Whitney, 1994; Spasser, 1997).

Scholarly communication model. Borgman (1989) gives an overview of the bibliometric techniques and their relation to social science, in general, and communication specifically, with a ". . . model for the intersection of bibliometric and scholarly communication" (p.586). The model puts the variables studied by the technique into three categories: producers, artifacts, and concepts. Producers are defined as individual or corporate authors of the communication.

Artifacts are the output of the producers. They can include either direct or indirect representations of the communication activities of the producers. Commonly, they are reified as publications and convention papers of the producers. Borgman (1990) relegates artifacts as contributing to the study of scholarly communication in the foundational classic tradition.

> Most studies that use the individual article or book as a unit of analysis are considering the artifacts as the message, or the embodiment of an idea. Studies that use the journal as a unit of analysis are likely to view the artifact as the channel through which producers communicate with one another (p. 16).

Concepts are terms or words used by the producers themselves. This could include words in titles and text. It can also include "assigned terminology or classification added through the publication process and studies that focus on the purpose or motivation of a citation" (Borgman, 1989, p. 588). These concepts can be used to help describe a structure that approximates the flow of ideas as they emerge, move, or fade within scientific or other communities (Borgman, 1989, 1990; Hinze, 1994; Paisley, 1989).

Despite the sophisticated analytical techniques evolving in information sciences, emerging fields and specialties provide additional difficulties. McCain and Whitney (1994) remark that: "Emerging interdisciplinary fields generally lack a well-defined core subject literature (Futas, 1980; Nadel, 1980) and in consequence, the identification of a body of work to be analyzed becomes more difficult" (p. 286). Furthermore, discipline

specific databases are subject to partial coverage of the specialty (McCain & Whitney, 1994).

Statement of the Problem

Simply put, the statement of the problem is "what is meant by computer-mediated communication?" As can be seen from above definitions and descriptions, current literature on the subject reflect views that are selective and often disparate. Rather than revisit debatable definitional issues, a more objective approach will be the focus of this inquiry. So the problem has been further refined into "what is meant by the field of computer-mediated communication?" Specifically, what producers, artifacts, and concepts populate the CMC scholarly literature?

The purpose of this dissertation, in regard to CMC, is similar to Dick and Blazek's (1995) examination of "Communication". Likewise, it is not to determine the magnitude that CMC occupies at the discipline, field, specialty, or sub-specialty area. Rather, it is to "identify its' component features in providing a tangible means of identification" (p. 291). For purposes of literary description, the term "field" as it is used in this dissertation is not a cataloguing designate, but rather a convenient moniker under which CMC resides. CMC is often described in the literature as a field. However, designates of specialty, or sub-field may be a more accurate term.

Bibliometric procedures appear to be particularly well adapted to these kind of analyses. Such an approach has a body of literature supporting its validity and reliability. Bibliometric procedures are also well suited to address some of the biases and limitations of the methodologies traditionally engaged within the communication discipline. While

they are arguably under the rubric of content-analysis, they target their development specifically at the publication domain and the dynamics that incorporates. Moreover, bibliometric procedures provide a theoretical base upon which relationships of theoretical inquiry can be based. Borgman & Rice (1992) state that "Bibliometric data are particularly useful for studying longitudinal trends in scholarly disciplines because of the massive datasets that can be utilized. Virtually no other method provides as comprehensive coverage of a topic in scholarly communication" (p. 400).

Identifying the Domain: Producers and Artifacts

Defining the literature domain provides its own set of difficulties. Because producers and artifacts are so closely linked, their definitions are necessarily intertwined. Producers are simply the authors of the selected artifacts. However, artifacts can be defined as any number of forms of scholarly communication. Conceptually, they could range from working papers to books (Borgman, 1989). The issue involved is deciding how far to extend the analysis.

The possibility of a census raises issues of necessary and available resources. Assuming one had the resources, they could spend large amounts of money and time looking for artifacts that may not be available through reasonable research channels. These would be artifacts not accessed by databases or bibliographies concerning the subject material. "Occam's razor" and the "law of diminishing returns" are widely accepted rules of thumb by science and industry. In both cases they admonish that exhaustive treatments concerning particular problems should not be viewed necessarily as the best treatments. Furthermore, there is no certainty that regardless of the resources

expended, the census would be complete. Callon, Courtial, and Laville (1991) remark (in regard to the field of polymers) on how difficult it is to put together a singular file that would be ideal:

> Ideally it should contain all articles dealing with polymers published by researchers anywhere in the world in any journal. In practice, such exhaustiveness is not possible. We must substitute for each file defined abstractly and generally a real, incomplete but representative file. (p. 158)

A common source for analyses has been Science Citation Index and its various derivatives such as the Journal of Citation Reports and Social Science Citation Index (Campanario, 1994; Small & Greenlee, 1989). However, even the Journal of Citation Reports has bibliographic weaknesses in general and specifically in regard to core journals of communication (Rice, Chapin, Pressman, Park, & Funkhouser, 1996). An additional limitation to its use is cost.

Moreover, there have been a number of other sources used for a variety of disciplines and issues. Examples include: Communication Yearbook (Dick & Blazek, 1995), Handbook of Communication Science (Beniger, 1988), International Encyclopedia of Communication (Beniger, 1990), Encyclopedia of Information Services for Physics, Electronics, and Computing (INSPEC) (Brooks, 1989; Hinze, 1994), SCISEARCH (McCain, 1989), PASCAL database from the Center Nationale de la Recerche Scientifique (CNRS) (Callon, Courtial, & Laville, 1991; Courtial, 1994), Encyclopedic Dictionary of Semiotics (Beniger, 1988), International Pharmaceutical Index (IPA) (Spasser, 1997) and personal databases extending other databases such as Journal of

Citation Reports (McCain & Whitney, 1991; Rice, et al., 1996). Various combinations of databases are also used such as Rice's 1984 counting of ". . . the number of articles and reports concerned with analysis of the 'new media' in four databases: ERIC, Sociological Abstracts, Management Contents, and Magazine Index." (Paisley, 1989, p. 706).

Taking a cue from Borgman's model, producers are both the senders and receivers of the information. One can pose the question: Should a convention paper, regardless of content, having very little impact on the field in general, be included with equal weight with journals with thousands of outlets? There are obvious positions on both sides of this question.

However, journals have long been considered a strong entry point for bibliometric analysis, particularly for structural characteristics of a field or discipline (Campanario, 1995; Price, 1965). Scholarly and academic journals are preferred over more popular outlets because of a more rigorous treatment of the subject at hand. Additionally, their affiliation with the bibliometric theory of problematic network analysis provides support for their representation of the scholarly activity that they purport to represent (Courtial, Callon, & Sigogneau, 1984). They are the primary conduit to communicate theories, research methods, and research results of a given field of study.

Another advantage of using journals over citations, as a bibliometric measure, is that they are believed to contribute to minimizing threats to validity. These threats are often caused by an individual author through excessive self-citation (Campanario, 1995; Rice, 1990). Pierce (1990) details a number of studies on the subject, adding that citation data does not always correlate with other measures. Cites often go to secondary sources

(obfuscating the real influence), and authors often do not hold the opinions that citation patterns attributed to them.

Furthermore, journals are easily accessible, searchable, and analyzable due to their predominance in storage mediums such as database vendors, mainframes, and commercial CD-ROMS. Issues of cost, speed, reliability, coverage, and flexibility are considered to impact final dataset production. Database vendors, such as ISI provide massive amounts of data, often with some bibliometric analysis tools included in the system. Data from these venders can be purchased and analyzed or accessed for an online fee basis. Some researchers consider this a cost effective vehicle for database acquisition (Ingwersen & Christensen, 1997).

CD-ROM databases such as ERIC are another alternative. Paisley (1989) makes the point that "to researchers who are not generously funded, these new optical disc databases are even more important because they incur no online access charges." (p.707). And while costs have dropped dramatically for online vendors, they are still a concern that impacts the design of research (Hinze, 1994; Katz & Hicks, 1997; McCain & Whitney, 1994). CD-ROMS are considered an intermediate alternative, providing a more flexible environment than online mediums and less costly than purchased data (Ingwersen & Christensen, 1997). While the initial time consumption in developing CD-ROM analysis techniques is extensive, subsequent analyses in other or similar fields using the same techniques and programs are minimal.

Brooks (1990a), in a comparison of the ERIC database against "comprehensive bibliographies", found that the ERIC database was far more extensive and showed no

significant difference on a number of bibliometric indicators. Furthermore, Brooks (1990a) concludes his analysis with the declaration that "Eliminating this distinction opens the way for future bibliometric studies to use downloaded files as comprehensive representatives of literatures (p. 192). Another consideration is that when research is being done in an area, CD usage may far exceed online vendor usage. This would suggest that this literature may be more visible to those trying to advance research utilizing CD databases than those paying vendor's for access.

Journal articles. For the purpose of this analysis, the extant literature is defined as one that producers predominate both as senders and receivers. Journal articles appear to be reasonable and available artifacts for identifying this area. CD-ROM databases appear as an acceptable frame to demarcate the literature domain. This is done for four reasons. First, they are more available to the "producer as receiver" of the information when doing research. Furthermore, they should capture the general features of the literature that most producers will experience when they, in turn, search the literature. Second, their availability makes this current analysis easier to replicate and contrast when used as a benchmark upon subsequent research. Third, they do not consume the financial resources inherent in most online services. Fourth, once procedures and methodologies are constructed for a database, those procedures are relatively easy to replicate using any subject matter that may be of interest. These procedures help make bibliometric analysis easier to perform across a range of subject matter and may make such analyses more accessible to disciplines outside of information science.

Because CMC is dispersed across a number of literatures, a single database such as ABI/INFORM might be inappropriate for a research frame (McCain & Whitney, 1994). One parsimonious solution suggested for this problem is to find a professional database that cuts across disciplinary lines (Spasser, 1997). However, an appropriate profession does not appear to be readily apparent for CMC. Spasser (1997) offers guidance in this direction suggesting that ". . . the problem could be approached through the parallel analysis of combined databases with different disciplinary orientations, corresponding collectively, to the area under investigation. . . " (p. 94). Multiple databases would appear to be a better treatment of this analysis, particularly when aligned with a range of perspectives.

It is for these reasons that Psychlit, Sociofile, Social Science Index, ERIC, and ABI/INFORM will be used. Their alignment with social science, psychology, sociology, education, and business, respectively, should provide a wide sampling of the social scientific and communication research literature. Additionally, their common availability at the university level makes them an appropriate conduit in that they are commonly distributed to, and accessed by, CMC producers. CommSearch (the communication discipline's database) was considered and discarded because it has not matured enough to provide the bibliographic data necessary for comparable analyses. With the artifacts being operationalized, a typical and appropriate operationalization of the producers is the authors of those artifacts (Borgman, 1990; Braam, Moed, & van Raan, 1991; Burnham, Shearer, & Wall, 1992; Brooks, 1990; Egghe, 1990; Lievrouw, 1989; Nichols,1989; Rice, et al.1996; Ungern-Steenberg, 1995). Therefore the aforementioned databases provide a

research frame from which to draw the artifacts, the level of analysis is at the journal level, and the producers are the authors of those journal articles.

Identifying the Domain: Concepts

Concepts by definition need to have a direct link to the producers and artifacts (Borgman, 1989). While, technically, any word written by the producer can be considered a concept, some of this verbiage is considered negligible in value (Borgman, 1989; Courtial, Callon, Sigogneau, 1984; Dick & Blazek, 1995; Leydesdorff, 1997). Typically, key words are "indexing terms assigned to documents by an indexing service or by the authors of the documents." (Diodato, 1994, p. 54). Using key words and specifically the ". . . analysis of the co-occurrences of the keywords used to index articles and other documents" (Ungern-Steenberg, 1995) has been described as particularly useful in the actual content of the research in a particular field of study (Ungern-Steenberg, 1995; Courtial, 1994; Hinze, 1994; Callon, Courtial, & Laville, 1991). Keywords provide data typically aligned with content-analysis. This would include a specific concept's frequency of occurrence. Additionally, they provide relationship information that is seen as critical in describing scientific inquiry.

Courtial, Callon, and Sigogneau (1984) provide a brief description of the theory underlying the relevance of this relationship information. It is built on the premise that scientific inquiry is built on a series of problems that hinge upon their relationship with each other. It does not matter that there are often contradictions and conflicts involved as the problems are cast into the networks or "problematisations" by their various producers. This is considered representative of how research forms the basis on which scientific

inquiry advances. "Co-word analysis represents an attempt to map the evolution and temporary stabilization of such problematisations" (Courtial, et al., 1984, p. 47). Some researchers make a distinction between co-word analysis and classification analysis. However, Hinze (1994) states that "it is assumed that co-assigned classification codes or common keywords reflect linkages between the papers concerned, and therefore, also between the underlying scientific and technological activities" (p. 354). Co-word analysis is seen as highly complimentary to more traditional historical and descriptive techniques (Cambrosio, et al., 1993). As such, it is seen as an acceptable method for the identification of the conceptual base in which the concepts reside (Courtial, 1984).

Research Questions

Rather than postulate any number of hypotheses, the current focus of this inquiry is more appropriate in the exploratory and descriptive domains. The original question of "What is meant by CMC?" has, as one possible answer, a bibliometric analysis into the nature of the emerging field. As such, research questions are posed largely based upon previous analyses of other emerging fields (Dick & Blazek, 1995; Brooks, 1989; Beniger, 1988; Courtial, 1994; Courtial, et al., 1984; Hinze, 1994; McCain & Whitney, 1994; Paisley, 1989; Rice, 1984; Zsindeley & Schubert, 1989).

In regard to the above literature framework, this dissertation poses four research questions concerning the field of computer-mediated communication. These questions are general in nature and align themselves theoretically with artifacts, producers, and concepts. The issue of concepts is somewhat more complex than general identification and demarcation which led to the creation of RQ4.

Simply put, the research questions posed are:

RQ1: What are the journals of CMC, and how are they positioned in respect to their various literatures?

RQ2: Who are the authors of CMC, and how are they positioned in respect to their various fields?

RQ3: What are the concepts of CMC, and how are they positioned in respect to their various fields?

RQ4: How do the concepts of CMC relate to each other?

Research question 1: Artifacts. Research question 1 will be addressed by the analysis of frequency data, core journals, literature size, literature density, and database overlap. A common dataset will be set up in regard to the literature base reviewed so that frequency and other component features can be identified. Frequency is commonly used to identify predominance in bibliometrics (Brooks, 1989; Callon, Courtial, & Laville, 1991; Rice, et al. 1996; see McCain & Whitney, 1994 for alternative measures). Once frequency counts are established, a number of other component features can be derived, such as most prolific journal in a specific database, and core journals in general. These two features will help identify whether one database is unduly weighted, as well as what journals predominate. Additionally, coverage overlap among the respective databases can be established so that journals that have an interdisciplinary impact can be identified, as well as establishing the relative uniqueness of the database. If there appears to be a high degree of overlap among databases, then their usefulness in expanding the literature examination diminishes.

One of the major laws in bibliometrics is Bradford's law[3]. Formulated by Samuel Clement Bradford in 1934, this law states that a few journals will produce a large number of the articles while a large number of journals will produce relatively few articles in a literature (Diodato, 1994). Core journals in bibliometrics have long been identified by Bradfordian analysis (Brooks, 1989; Diodato, 1994; Egghe, 1990a; Goffman & Warren, 1969).

Diodato (1994) gives a general description on how the analysis is typically executed.

- identify many or all items (usually articles) published in this field;
- list the sources (usually journals) that publish the articles (or items) in rank order beginning with the source that produces the most items;
- while retaining the order of the sources, divide this list into groups (or zones) so that the number of items produced by each group of sources is about the same (pp.16-17).

What this typically generates are zones with roughly the same number of articles produced by an increasing number of journals. The zone with the least number of journals contains the set of core journals. While it is generally thought that zones beyond the core zone must contain a greater number of articles, the question becomes, how are these zones decided? Zones could range from 2 to n, where n is the number of articles

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[3] Diodato (1994, p. 99) defines bibliometric laws as ". . . descriptions or hypotheses about patterns that seem to be common in the publication and use of information. They are not the formal, highly validated laws we associate with the physical sciences."

sampled. This significantly impacts other analyses such as clustering, projecting total literature size, and multipliers for subsequent zone (Brooks, 1990a, 1990b).

Bradford designed a graphical formulation of the above description called a "bibliograph" which helps facilitate some of the analyses (Brookes, 1969; Chung, 1994). It depicts the literature by plotting the cumulative number of articles against the log of the cumulative number of journals sorted by productivity.

Clustering and clustering indices can be generated from the composite frequency data indicating the density of a literature (Diodato, 1994). A high clustering index indicates a low number of singletons, regardless of the total number of journals (Brooks, 1990a). Singleton journals are those that have only produced one article on a particular subject (Brooks, 1989). Clustering index data can then be compared to other subject area literatures regardless of literature size, because the two are independent (Brooks, 1990a, 1990b).

Describing total literature size then becomes merely an exercise in determining the function required to describe that increasing number of journals in the Bradford zones. Leimkuhler's law has generally been agreed upon as that function (Diodato, 1994; Egghe, 1990b; Rousseau, 1990). Egghe (1985) articulates the mathematical derivation supporting linkage between Bradford and Leimkuhler. Egghe (1985) is a seminal piece providing support that the bibliometric laws of Bradford, Leimkuhler, Lotka, and Mandelbrot are mathematically equivalent. The mathematical expression of Leimkuhler is $R(r) = a \log(1 + br)$ (see Egghe, 1990b; Diodato, 1994). "R(r)" is the cumulative total number of all sources. "r" is the rank of items 1 through r. "a" and "b" are parameters

that are subject matter dependent. However, most literatures do not follow the linear growth rate predicted by Bradford (Chung, 1994; Diodato, 1994; Groo, 1967). Egghe (1990b) attributes a phenomena called Groo's droop to be an indicator of possible incomplete literature collection.

Application of Leimkuhler can be done when a literature is truncated before Groo's droop (Egghe, 1990b). Groo's droop is a phenomena that can be seen in the data's bibliograph (Diodato, 1994). A plateauing occurs toward the end of the data producing a "droop". If the plateauing does not occur, then it is assumed that the database is truncated or incomplete (Egghe, 1990b). Leimkuhler's law is somewhat distorted by this phenomena making predictions difficult. However if the data is truncated at Groo's droop, then Egghe's conceptualization of Leimkuhler's law can be used to make predictions toward the total literature size (Egghe, 1990b; see Nicholls, 1989 for alternative view).

The last area of examination is that of coverage overlap. Multiple databases are used in this examination because of their historical relationship with communication. However, since communication has its foundational research generated from a number of different fields, it would be useful to find out how unique these respective fields are in their contribution to the literature. Diodato (1994) describes coverage overlap as a simple indicator of the amount of articles that overlap between two databases.

Once coverage overlap is determined, then characteristics of boundary spanning articles can be examined. A boundary spanner is cross-referenced by more than one database. Is a "cross-referenced article" (CRA) more influential than other articles in

computer-mediated communication? If they are, then it is expected that CRAs are more likely to occur in the core zone. This can be examined by comparing CRAs in core versus other journals and calculating the odds (cross-product) ratio (Agresti, 1990). It would be analogous to determining the odds of a second-hand smoker getting cancer over a non-smoker. In respect to CMC, it will determine how much greater/less the odds are for CRAs to occur in core versus other zones.

Research question 2: Producers. Research question 2 asks "who are the authors of CMC, and how are they positioned in respect to their various fields?" It will be addressed by the analysis of frequency data concerning authorship, linkage of authors with core journals, and database overlap. Frequency of author publication rate will give a glimpse into the most prolific authors and has in the past been indicative of some of the major theoretical contributors to a field (Rice, et al., 1996). Authorship in a particular database may provide a possible indicator of selectivity in either the subject material or discipline by a particular author.

Frequency of publication at first seems to be straight foreword, but on closer examination produces many problems. One major problem is the "so what" question. Can you use frequency as a valid indicator of an author's contributions to literature (Lindsey, 1980; Nicholls, 1989)? At the core of this issue is the use of the data. Even though it has been shown to be strongly correlated to peer judgements, Narin (1976) questions if this single measure should be used for a decision on promotion or tenure. However, from a literature examination point of view, the artifacts' value is stronger and less contentious.

Another contributor to these difficulties is the idea of multiple authorship. There are primarily three ways used to calculate frequency: complete, adjusted, and straight count (Diodato, 1994; Lindsey, 1980; Nicholls, 1989). Complete count is where an author is credited with a publication, regardless of where their name resides in a multiple authorship. Adjusted count gives the author fractional credit for a publication based on the number of co-authors. A single author would receive a count of one, dual authors would receive a count of one-half, and so on. Straight count only considers the first author. All others are not counted, making first authorship the only visible data in this kind of counting. The way that this count is obtained directly effects calculation of Lotka's law.

Lotka's law is another of the major laws in bibliometrics (Diodato, 1994). Formulated in 1926 by Alfred Lotka, it is similar to Bradford's law except, it involves authors instead of journals (Diodato, 1994). Lotka proposed that a relatively few number of authors would be prolific while most would not be. This law is sometimes characterized as the "inverse exponential law" because " . . . $x^2y=c$ or $y=c/x^2$ . . . where y is the portion of the authors making x contributions each, and c is a parameter that depends on the field being analyzed" (Diodato, 1994, p. 107). Generally, Lotka considered the amount of authors to contribute one entry to be about 60% (1926). Burnham, Shearer, and Wall (1992) recount a figure close to 94% for authors contributing two or less journals.

After an extensive review of the validity research on Lotka and additional testing, Potter (1981) suggests the validity of Lotka's law is supported if the time period

examined is ten or more years and a broad authorship definition is used. Nichols (1989) recommends a complete count to be used for consideration of authorship. However, after examining 70 empirical authorship distributions, Nichols (1989) concludes that Lotka is robust when either complete or straight count is used.

Assuming that this data also has a large number of less productive authors, the results from RQ1 can be used to find out if the more prolific authors are contributing to the core journals. One would expect a high odds ratio for core authors in core journals as opposed to other journals. However, if the most prolific authors are contributing predominantly outside of the core journals, then one must speculate on the actual centrality of either the journal, author or both.

Finally, database overlap or identification, in this case, may suggest characteristics about the core authors. Predominance in one database may suggest where authors' perspectives reside. Production factors may help pinpoint loci of CMC literature. Similar to core journals, one would expect core authors to contribute CRAs at a greater rate than authors in the other zones.

Research question 3: Concepts. Research question 3 asks "what are the concepts of CMC, and how are they positioned in respect to their various fields?" This question will be addressed by the analysis of keywords. Frequency counts, and subsequently, counts by year and database will help profile the concepts of CMC. A glimpse into the semantic content of the articles can be provided by a simple count of keyword or indexing terms (Rice, et al., 1996). Keywords and indexing terms are considered more conservative in their estimation of the content of the article, and have a higher degree of

stability than other indicators such as the text itself or titles (Leydesdorff, 1997; Rice, et al., 1996). A higher frequency of keywords indicates a greater number of journal articles addressing a particular subject area. A greater number of journal articles would suggest a particular problematisation being more dominate in the field (Courtial, 1994; Courtial, Callon, & Sigogneau, 1984; Hinze, 1994). Breaking down such frequency counts by year helps establish the emergence and diminishing of such problematisations over time. Breaking down such frequency counts by database may indicate where the locus of a problematisation resides if it is discipline specific.

Research question 4: Relationship of concepts. Research question 4 asks "how do the concepts of CMC relate to each other?" It will be addressed through co-word analysis. This is generally done by analyzing the proximity that keywords have with one another (Diodato, 1994). As has been mentioned earlier, a number of different methodologies have been explored in this regard. Courtial and colleagues explore a technique utilizing a proprietary program called Leximappe. Others use more traditional data reduction techniques such as factor analysis, cluster analysis, and mutliple-dimensional scaling (MDS) derivatives.

Because the ultimate dataset is perceived as too large to be useful, some sort of parameters will have to be established. Rice, et al. (1996) demarcated a frequency dataset of the top two hundred terms. Courtial uses a linkage algorithm to reduce keyword data by a factor of ten. Hinze (1994) used terms that occurred in at least ten journals, capturing the majority of the total terms used. Because of the exploratory nature of this study, rather than setting a limit a priori, frequency data will be viewed to establish a

realistic threshold that will capture the majority of data. Obviously, single terms will be dropped since they have no co-word equivalent.

Hierarchical cluster analysis (HCA) will then be used to demarcate linkage of concepts. This kind of procedure is particularly useful in regard to the exploratory nature of the current examination. The lack of knowledge of current granularity needed to expose an emerging structure, should one exist, makes this procedure well suited. (McCain, 1989; Spasser, 1997). It has the added benefit of being comparable to similar studies involving other emerging fields (e. g. Hinze, 1994, Spasser, 1997). Results may indicate where loci of attention are being focused on CMC in the literature base.

Chapter 3: Methodology

Dataset Construction

Procedures similar to Brooks' (1989) examination of "superconductivity" were used as a model for initial collection and analyses of databases. Databases were examined from a research university in the Southwest. The only exception to this was Social Science Index (SSI) data which was acquired from a regional southwestern university.

The data was collected in June of 1998 utilizing the indexes of ABI/INFORM, ERIC, Psychlit, Social Science Index and Sociofile. All databases were searched through December of 1997. The selected databases are considered prominent resources in the areas of business, education, psychology, and the social sciences, respectively. A brief self-description from each database indicates that :

- ABI/INFORM indexes and abstracts more than 800 business and management periodicals.
- ERIC is a database sponsored by the U.S. Department of Education containing education related documents and journal articles. It is extracted from over 750 different serials with a depository of over 800,00 documents.
- Psychlit is a database in the field of psychology. It is compiled from over 1,300 hundred serials.
- Social Science Index covers a broad range of social science areas represented by over 344 journals.

– Sociofile is generated from sociology and related disciplines. It is compiled from over 2,000 journals.

These databases are noted for their strong affiliation with the communication discipline and have an intuitive link with CMC. Furthermore, all of them go outside of their respective field's journals to catalogue articles of interest including communication journals.

A keyword search of the respective databases was done for the variable "computer-mediated communication." Both hyphenated and unhyphenated variations of the term "computer-mediated" was used to insure breadth of coverage within the index. All abstracts, without regard to any other search criterion were downloaded into computer files for analysis. While this procedure produced files that contain many characteristics outside of the current examination, it also preserves those characteristics should they be needed in future studies for comparison or contrast purposes.

Techniques for combining the five databases are primarily modeled on Ingwersen & Christensen's (1997) suggestions for retrieving and processing multiple databases. Separate database files were standardized in their structure and combined into a common spreadsheet where the data could easily be manipulated. References were assigned document numbers for easy identification.

Each of the databases had idiosyncratic characteristics which made identical data extraction techniques, across all databases, impossible. However, all methodologies adhered to the following guidelines. Databases were examined to see if there were any inherent journal markers that would enable the extraction of journal articles. Books, book

reviews, conference papers, and other non-journal materials were eliminated. Extraneous information and fields were eliminated. Documents were then delimited and put into a spreadsheet. This procedure resulted in a spreadsheet document in which all database information was combined. This file included the fields: document number, ABI, ERIC, Psych, Socio, SSI, author, title, date journal, volume, number, page, and keywords. The document number in the first field was sequentially assigned after all the data was entered. The next five fields were used to identify database affiliations. Each database was assigned its own field so multiple affiliations could be identified. The six following fields contained key bibliographic information necessary for analyses. Keywords were identified in the last columns. These were listed in the same row as the other information, but took a number of columns which varied from entry to entry.

This format provided access to the data in a medium that is: 1) easily manipulated for sorting and counting procedures, and 2) accessible to various software packages used for analysis. With the exception of SSI, procedures for the respective databases were developed that could be executed reliably with the chance of data entry error minimized.

SSI data was obtained June 26, 1998. It was searched from February of 1983 through December of 1997. A total of forty-seven items were produced. Results were printed out and had to be manually entered due to library restrictions at the regional university where they were obtained. This was done by a research assistant and then verified by the primary researcher and another research assistant to minimize errors. Review of the SSI data resulted in some minor editing to correct typographical errors and

omissions. Individual data transformation procedures of ABI/INFORM, ERIC, Psychlit, and Sociofile are detailed in Appendix B.

Next, entries were sorted alphabetically by title, journal, and author respectively. This sort arranges citations sequentially, regardless of their database affiliation. Typically, this process exposes orthographic and other inconsistencies that require minor editing. This data was typical in that respect. Inconsistencies, as well as editorial differences were rectified (e.g., inaccurate citations, standardization of style, spacing, capitalization, etc.). This process was repeated with journal and date as the primary sort criterion in order to expose differences in the respective fields across references. All fields had to be converted to ASCII format (because of idiosyncratic software codes not apparent in the text) and brought into a wordprocessor for further standardization. Commas and end of line spaces were removed from all entries. The fields were then returned to the spreadsheet file. Duplicate items were collapsed into a common entry which identified all databases and all keywords that were affiliated. This was saved as the master database from which all analyses would be generated.

One primary area of concern in previous bibliometric research has been which reference should be deleted when redundant references occur across databases (Ingwersen & Christensen, 1997). This, primarily, impacts redundant entries from different databases with different keywords. However, this study differs from Ingwersen & Christensen as well as similar studies in information science by its focus. Information science is interested in, specifically, what key words come from what database. This study is

concerned with what problematisations are being examined from a particular database's perspective.

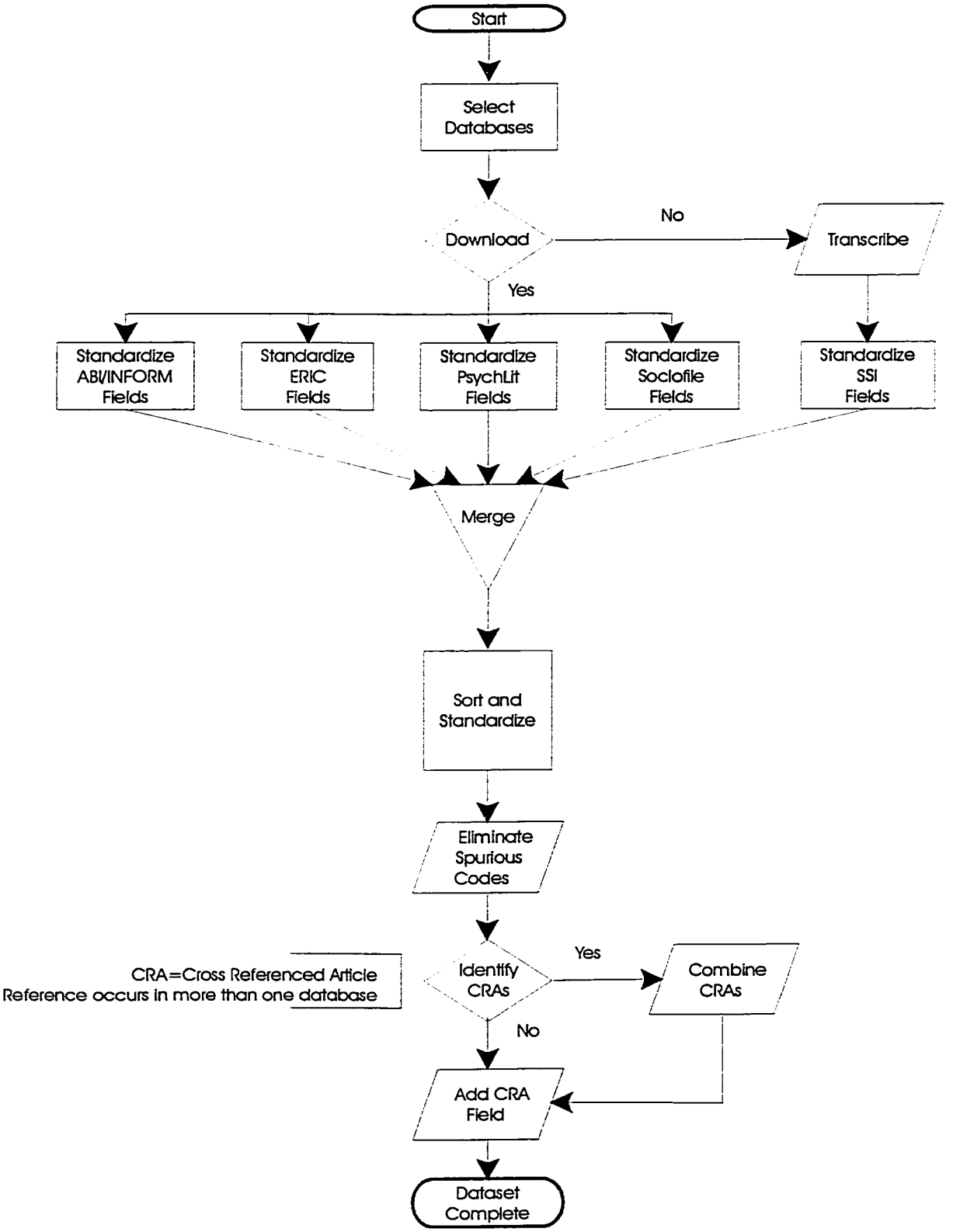
Keywords are used as an indicator of those problematisations. Those problematisations are assumed stable from article to article. Therefore, variations across databases were stabilized by including all unique keywords in an entry regardless of their genesis. If an article found in ABI/INFORM was also found in ERIC, the unique ERIC keywords were appended to the entry. Because the focus is on problematisation rather than on keywords the issue of redundant entries becomes moot when combined in the above manner.

Once CRAs were identified, an additional field was added to the spreadsheet titled CRA. In this field, CRAs were identified with a 1, while unique journal articles were identified with a zero. This made for easy identification and calculation of descriptive characteristics of articles cited in more than one database. Figure 1, on page 54, provides a graphical overview of the previously described dataset construction process.

Many of the descriptive computations were done with typical spreadsheet commands. More specialized data manipulation was done with SPSS 7.5 for windows and xlSTAT 3.4 (Fahmy, 1997). Bibliometric toolbox (Brooks, 1987) was used for confirmatory purposes and some of the more specialized computations. It specializes in bibliometric computations and has been used for bibliometric analyses in a number of scholarly journals (e.g., Brooks, 1989; Chung 1994).

Figure 1.

Dataset Construction Process



Data Analysis Methods

After CRAs were identified, frequency data was determined for their role overall and in respect to each other. This was done by calculating individual databases cross-referenced articles' frequency, CRAs percentage of respective database, and coverage overlap between databases.

Frequency provides a count of how many references are cited in two databases. CRAs percentage of respective database refers to how much of a database is occupied by CRAs. Coverage overlap is the amount of overlap between two databases such as a hypothetical database A and database B. It is identified by taking the number of entries in A intersection B and dividing them by A union B. Once database demographics were established, artifacts could be addressed.

Artifacts

The database was examined in terms of journal frequency in the master database and the five constituent databases. From this it could be determined the identity of CMC journals and how are they positioned in terms of the overall literature as defined by this dissertation. Subsequently, Bradford partitions were derived to identify the core zone of journals.

Selection of the size of Bradford zones is subjective, but the literature does provide some guidance. One prominent theoretical minimum is the smallest whole number greater than one-half of the singleton journals in a database (Diodato, 1994; Goffman & Warren, 1969). A theoretical maximum was derived by Egghe based on the most productive journal (1990b). It is generated by the formula $p = 2 \log(1.781\ Ym)$

where Ym is the number of articles from the most productive journal. "p" is rounded to the nearest integer to provide the projection.

Brooks (1989, 1990b) derived a method based on the "minimum perfect Bradford partion"(MPBP). This method only examines core zones that have journals evenly distributed by Bradfordian partitions based on Pratt's index of concentration. Pratt's index is regarded as one of the most predominant measures of concentration in Infometrics (Egghe & Rousseau, 1991; Diodato, 1994). It ranges from 0 to 1, with 0 being the minimum amount of concentration possible. The less concentrated a zone, the more equally distributed the journals. Normally, there are a number of configurations that have a Pratt index of 0. The vast majority of these will leave a small remainder of singleton journals (Brooks, 1989). The MPBP is the configuration with the smallest remainder.

While these provide guidance, they do not establish an absolute number of zones. Diodato (1994) explains actual minimums may pragmatically differ with theoretical ones. The journals' productivity distribution may not allow for the theoretical minimum. In light of this, the journal partitioning was examined using Goffman & Warren's (1969) formula to suggest a minimum size cohort, Egghe's (1990a) derivative to suggest the maximum number of partitions, and Brook's (1989) MPBP to suggest the optimal number of zones.

Density of the literature was measured by the clustering index established by Brooks (1989, 1990a). This index is calculated by dividing the recurring journal productivity by Goffman & Warren's minimum size cohort. This was done for all years

of journal publication in order to establish a pattern of how CMC is or is not developing as an emerging field. While it is expected that journals will appear and disappear over the course of time, this index shows growth trends.

Once the cumulative data was calculated, a bibliograph was derived in order to determine Groo's droop. This was necessary in order to make estimates of the theoretical total literature size based on the current data's distribution . Egghe's (1990b) treatment of Leimkueler was then used to estimate the total literature size.

After establishing characteristics for the master database, individual databases were examined in respect to each other and the master database. Descriptive statistics, such as frequencies and percentages were calculated to provide an indicator of core journals in relation to each other. Since this was exploratory analysis, odds ratios were then used to compute the relative odds of core journals vs. non-core journals in producing CRAs. Furthermore, core journals were examined to see if they contributed CRAs at a significantly different rate than non-core journals. Fischer's Exact Test is used because of the 2 X 2 comparison and its superior handling of interaction effects when compared to chi-square (Agresti, 1990).

Producers

Similar to many other studies, this examination was restricted to the straight count method of authorship because the entire set of multi-authorship data was not provided by the databases (e.g., Rice, et. al, 1996). Specifically, ERIC uses the term "and others" to denote multiple authorships. First authors were extracted from the master database, rank ordered, and standardized in formatting, initials, etc. First name abbreviations were not

used in this process. This was to make certain that identically initialed first names did not aggregate authors with the same last name.(e.g., Betty Smith would look identical to Bob Smith). The authors were then sorted in alpha order through Bibliometric Toolbox and examined for further standardization. Appropriate adjustments were made and the standardized author field was inserted into the database.

Frequency and cumulative data were then calculated. Data was compared to Lotka's theoretical distribution utilizing Komogorov-Smirnoff (K-S) two-sample test. Nichols (1989) details a number of reasons why this test is preferred over chi-square and other procedures. One reason given is the necessity of collapsing categories if $n<5$. A real difference may be in one of the collapsed categories only to be moderated by the combining of the two. Furthermore, cumulative data creates serious problems for chi-square's assumption of mutual exclusivity.

Establishing core authors is more difficult than establishing core journals. Nichols (1989) describes many of the difficulties. Data has been routinely truncated because the model does not fit for higher values of contributions. Reasons for this have been various: "extreme scores were considered anomalous, to obtain a more regular or compact table or curve, to maximize r^2 when estimating parameters of least squares, or to allow the application of a chi-square test" (p. 380). It appears that there are two different dynamics represented in the distribution when put in an authors x contributions (size frequency model) format: "a loglinear portion containing low and moderately productive authors, and a long straggling tail of prolific contributors." (p. 381). Nichols recognizes the problems but demonstrates that the size frequency model does provide an acceptable

overall fit for the entire distribution. Likewise, the CMC authors were analyzed from a authors x number of contributions format.

Chung (1994) and others use such a model based on Bradfordian analysis principles. The difference is frequency of authors is substituted for frequency of journals. Subsequently, "core authors" can be suggested by using the same indicators used for journals. Goffman and Warren parameters can be used for minimum zone size. Egghe parameters can be used for maximum number of zones.

The distribution was examined for natural breaks that would lend themselves to demarcating the more productive authors. These authors were then compared to core journals to find out if they had a greater tendency to publish there. Authors were also examined to see what role they played in references that spanned more than one database.

After establishing characteristics for authors overall, their contributions to individual databases were examined in respect to each other. Like the analysis of journals' descriptive statistics were calculated. These included frequencies and percentages to provide an indicator of "core authors" relationship to each other. Odds ratios were then used to compute the relative chance of a core authors producing CRAs vs. the other authors.

Concepts

Frequency of problematisations overall were calculated and analyzed for segmentation. This is not only critical for this research question, it is imperative for RQ4. Both Hinze's (1994) "10 journals or more" and Rice et al.'s (1996) "top 200 keywords" were considered exemplars in this regard. The decision was made to view the distribution

in terms of which kind of demarcation was most efficient while capturing the majority of the distribution. Fifty percent was considered the benchmark on which to base the comparisons. If both methods failed to produce at this level then the distribution would be examined for structural characteristics that might indicate a natural break. Obviously, if thousands of terms are required to define 50% of the distribution then the field of CMC would be considered non-existent. Justification would be based on the realization that scholars trying to communicate component features of the construct actually have very little in common, aside from a name under which to publish articles. This does not mean that the construct, CMC, may not emerge eventually. It would just mean that it has not done so yet.

Once segmentation was determined, then the core keywords were longitudinally examined for their visibility. This was done with a matrix comparison procedure. The overall database was sorted and divided by year, and then terms in the core group were matched against terms in the respective temporal ranges. This process resulted in a term x year matrix. This fine-grained analysis may obscure possible emergence patterns so the granularity of longitudinal analysis was reduced in a two-stage process. In the first stage data was collapsed in three four-year increments and 1996 and 1997 combined for the last increment. The second stage compares the first two increments (1984-1991) against the last two (1992-1997). Hinze (1994) suggests this kind of second stage comparison to expose possible emergence patterns. Early dominance was indicated if the 1984-1991 frequency was equal to or exceeded by the 1992-1997 frequency. Late emergence was indicated if a problematisation did not occur in the first two increments.

Observations were then compared to patterns observed in the first stage of the process for additional insights.

Core terms were also compared to their database proximity. Both single and multiple databases were examined. Specifically, core terms were identified that resided in either a single database or the entire set of databases. This would reveal a possible indicator of the dominance of a single database in the overall set. Occurrence across all databases is a possible indicator of the diversity of a term. Core terms were then put through a hierarchical cluster analysis procedure to identify possible conceptual linkages between terms.

Relationship of Concepts

A number of clustering procedures have been used in the analyses of emerging fields. However, specific clustering procedures potentially impact the results of an analysis (Aldenderfer & Blashfield, 1984; Johnson, 1998). The emerging nature of the field suggests some general guidelines in clustering procedures. Ward's method was considered and discarded due to its propensity to subsume smaller clusters into larger clusters (Aldenderfer & Blashfield, 1984; Jobson, 1992). The complete linkage method (furthest neighbor) is considered an appropriate initial procedure because of its rigor over the single linkage method and its comparability to similar studies (Aldenderfer & Blashfield, 1984; Hinze, 1994; Jobson, 1992).

Similarity between concepts was measured using a Pearsen-product moment correlation matrix. This measure has been used in a number of similar studies (e.g., Hinze, 1994; McCain, 1989; Spasser, 1997). It is well adapted for use in the current

examination because of its ability to reduce the scale in the raw data and its "...emphasis on the similarity of co-occurrence patterns as a whole" (Spasser, 1997, p. 88). Each correlation produced in the matrix represents the similarity of the two concepts across all of the articles examined (McCain, 1994). Furthermore, Hair, Anderson, and Tatham (1987) suggest that "clustering algorithms which are sensitive to outliers (e.g., complete linkage specifically, and more generally all of the hierarchical methods of clustering) seem to produce better solutions when Pearson product moment or intraclass correlations are used" (p. 332).

Chapter 4: Results

Dataset Demographics

Total references regarding 1,107 documents were obtained. Subsequent procedures narrowed the number of references based on the "journal" criterion to 687. Five-hundred and fifty-five references were unique to a singular database. Fifty-six items were cited in more than one database, accounting for 132 references. Cross-referenced articles (CRAs) were combined with the resulting dataset yielding 611 unique references. Appendix C details the 56 items and their genesis. CRAs accounted for only about 9% of unique references. However, because they were often cited in more than two databases, they accounted for about 19% of the total references in the master database.

Table 4, on page 63, provides demographics on the individual databases and how they positioned themselves. The "Overall" column is how much each database contributed when compared to the master database. Overall coverage overlap is the overlap between the respective databases and all other databases combined. The "Total" is the number of articles each database contributed to the master dataset.

The number of CRAs in each database ranged from 16 to 37. Percentage of CRAs overall from individual databases ranged from 12% to 28%. No databases' CRAs accounted for more than 5% of the master dataset.

Note that both "CRAs" and "coverage overlap between databases"[4] require only the lower diagonal matrix because they deal with symmetrical information. "CRAs percentage of column database's total" is asymmetrical because relationships vary depending on a particular database's total number of articles.

Table 4.

Cross-Referenced Articles (CRAs) Characteristics

	ABI cited in	ERIC cited in	PSY cited in	SSI cited in	SOC cited in	Overall
	CRAs					
ABI						16
ERIC	6					37
PSY	7	23				37
SSI	1	12	10			18
SOC	5	13	15	10		24
	CRAs % of column database's total					
ABI		1%	9%	2%	10%	12%
ERIC	11%		29%	26%	27%	28%
PSY	13%	5%		21%	31%	28%
SSI	2%	3%	13%		20%	14%
SOC	9%	3%	19%	21%		18%
	Coverage overlap between databases					
ABI						2%
ERIC	1%					5%
PSY	6%	4%				5%
SSI	1%	2%	9%			3%
SOC	5%	3%	13%	12%		3%
Total	54	459	78	47	49	687

Artifacts

[4] Coverage overlap in this context does not refer to the number of journals routinely indexed by the respective databases. That number would be misleading since some databases routinely scan additional journals for relevant articles but do not index them in toto. These numbers instead refer to the amount of overlap in the CMC context giving a better index of coverage from the respective databases.

RQ1 asked "What are the journals of CMC, and how are they positioned in respect to their various literatures?" At the most basic level this question is addressed by Appendix D. It provides a comprehensive listing of all the journals in the five databases sorted both alphanumerically and by frequency. Two hundred and fifty-four journals contributed the 687 references in the master dataset. Of these, 136 were singleton references. One hundred and eighteen contributed two or more references to the master database.

Table 5.

Journals with CRAs

Journal	Freq.	ABI	ERIC	PSY	SSI	SOC	Ref. Total	% of CRAs	Total Unique Cites	% of Journals Cited
Computers in Human Behavior	8	0	7	7	0	5	19	14%	16	50%
Communication Research	7	0	6	7	6	4	23	17%	9	78%
Communication Education	4	0	4	4	0	1	9	7%	6	67%
Human Communication Research	4	0	4	1	4	2	11	8%	9	44%
Journal of Communication	4	0	4	2	2	1	9	7%	7	57%
Organization Science	3	3	0	2	0	2	7	5%	6	50%
Information Processing & Management	2	2	2	0	0	0	4	3%	3	67%
Organizational Behavior and Human Decision Processes	2	2	0	2	0	0	4	3%	3	67%
subtotal	34	7	27	25	12	15	86	65%	59	58%
singleton references	22	9	10	12	6	9	46	35%	56	39%
Total	56	16	37	37	18	24	132	100%	115	49%

Table 5 details the loci of CRAs by journal and database. "Freq." is the number of CRAs in a particular journal. Journals that have only one CRA in a category are called

singleton references. "Total Unique Cites" is the number of unique articles that a particular journal produced regardless if it was cited by another database. "Percentage of Journal Cites" gives the percentage of articles from a particular journal that were CRAs.

No single journal article appeared in all five databases. However, three journals had articles appear in four of five databases (identified in Appendix C). These were Communication Research, Human Communication, and Human Relations. Communication Research. Human Communication and Human Relations had a single article. Communication Research and Human Communication were cited in all databases except ABI/INFORM. Human Relations was cited in all databases except ERIC.

Core Journals

The master dataset produced a theoretical minimum cohort size of 69 as determined by Goffman & Warren (1964) and a theoretical maximum number of partitions of 7, as determined by Egghe (1990b). Brook's (1989) Minimum Perfect Bradford Partician (MPBP) was determined to be 302 (7, remainder) journals in a zone. However, this figure split the distribution with 2 of 15 journals, having the same amount of productivity, being put in the second zone. The subsequent MPBPs of 200(10), 298(15), and 149(15) were tried with similar results. A value of 195(25) was determined not to split the distribution and to have a Pratt index of 0. This divided the journals into 3 Bradfordian zones as detailed by Table 6 on page 67.

Table 6.

Bradfordian Journal Distribution

Zones	# of Journals	# of Articles
1	22	195
2	54	196
3	153	195
Remainder	25	25

Productivity of these core journals ranged from a high of 16 to a low of 6. A complete listing of the core journals can be determined by looking at the first twenty-two items of the frequency sort in Appendix D. Likewise, the six journals whose "total unique cites" exceeded six in Table 5 are considered core. The core zone's CRAs produced 30 "total unique cites". This represents 54% of the total CRAs.

A more detailed description of core journals segmented by database and CRAs' is in Appendix E. The amount of core journals contributed from individual databases ranged from 5.64% to 84.10%. Core journals accounted for 31.91% of the total journal population.

Almost all of the databases had a higher contribution rate to the core zone than the "other" zones. The only exception was ABI which had 5.64% of the core journals and 10.34% of the "other" journals.

Core journals were more likely to have CRAs than other journals (see Appendix E). Core journals' contributions to CRAs ranged from 2.85% for ABI/INFORM to 12.82% for ERIC. All but one of the databases contributed to the CRAs at a greater rate than they contributed to the residual or "other" zones. Once again, the exception was ABI which contributed CRAs representing 2.85% of the core journals and 2.88% of the

"other" journals. The overall odds ratio of CRAs for core versus other journals was 4.8696. This means that it was almost five times more likely to have a CRA if a journal was located in the core zone. Odds ratios ranged from .7051 for ABI to 4.951 for ERIC. Fisher's exact test indicated that differences were significant, with the exception of ABI (p=.7865). Levels of significance were striking, ranging from .0031 for SSI to less than .0001 for ERIC and overall.

Table 7.

CMC Journal Longitudinal Clustering Index

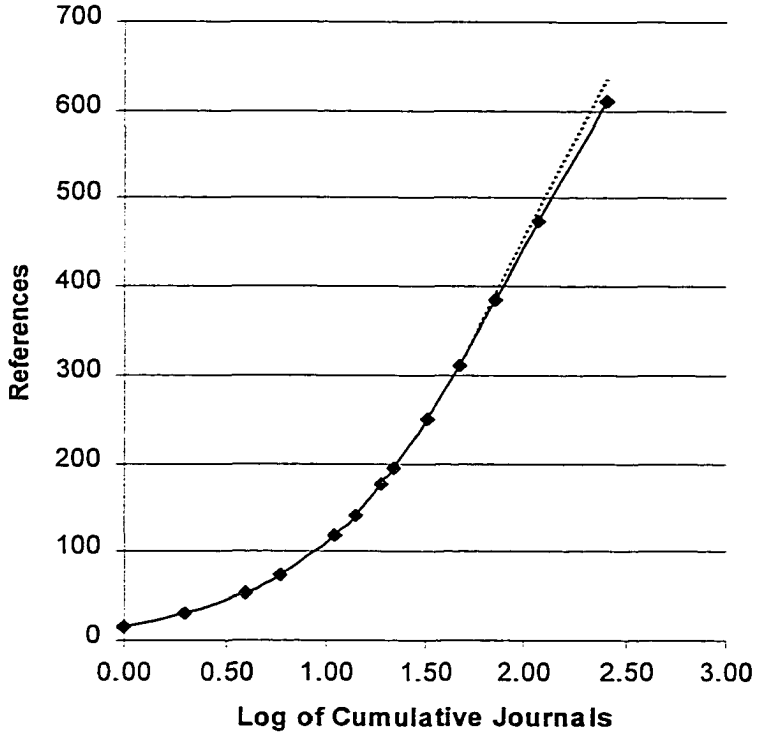
Date	Cumulative recurring journals	Cumulative singleton journals	Cumulative articles total	Clustering index
1984	0	3	3	0
1985	0	5	5	0
*1986	0	10	10	0
1987	1	17	19	0.21
1988	3	25	34	0.67
1989	4	32	43	0.65
1990	11	41	73	1.49
1991	14	49	97	1.88
1992	24	53	140	3.16
1993	28	63	176	3.48
1994	47	77	252	4.43
1995	82	94	405	6.48
1996	109	125	563	6.90
1997	118	136	611	6.88

*First year of ABI/INFORM

To get an idea how this distribution compared to other literature descriptions, it was tracked over time. The master dataset revealed CMC referenced in journals back to 1984. However, it was 1987 before the Journal of Communication became the first recurring journal linked to CMC. Annual density of the journals was calculated using Brooks (1990a) clustering index as detailed by Table 7.

Figure 2.

Bibliograph of CMC Journals



Records from ABI/INFORM were available starting in 1986, where two journal articles appeared. While no CMC related journals appear till 1984, databases were searched in previous years. Search dates started in 1966 for ERIC, 1971 for Psychlit and Sociofile, and 1983 for Social Science Index.

Figure 2 shows the bibliograph for the data. The vertical axis is the number of articles. The horizontal axis is the log of the cumulative number of journals sorted by productivity. The bibliograph starts to droop at the 118 journal level which produced 475 references.

Bibliometric Toolbox was used to produce a total literature size estimate based on Egghe's (1990b) estimate of unknown bibliographies (see Appendix F for supporting data and Leimkuhler's estimate of the current literature). While the current literature is divided into only three zones, Egghe recommends the use of ten zones for estimates of unknown literature sizes. Utilizing ten zones, the estimate of CMC literature as defined by this dissertation came to 773 references generated by 379 journals.

Producers

RQ2 asked "Who are the authors of CMC, and how are they positioned in respect to their various fields?" The CMC literature examined was heavily weighted toward authors producing only one article. Five hundred and six different first authors produced the 611 different references. Close to ninety-seven percent of the authors had one or two publications. They accounted for 87% of the articles produced. The remaining authors produced three or more publications accounting for 13% of the articles produced.

The dataset was significantly different from Lotka's theoretical distribution (D_{max}= .0.2216, $p<.01$, n=506). Lotka's estimates and the current database are detailed in Appendix F. The Bradfordian model could not break the data according to Bradford's definition. Goffman and Warren's miminum size cohort was 220. With only 172 "non-singleton" authors, the core zone would have to include some one-time authored articles.

Because of the exploratory and descriptive nature of this study, it was decided that authors with three or more references would be used as core. This formulation has the benefits of fitting within the general contention that authors producing one or two articles have the vast majority of the distribution (Diodato, 1994). Furthermore, it still captures a

reasonable section of the literature to examine for differentiating characteristics. Because of the substantially smaller n size, it is more conservative in its estimates than a distribution including two articles or more. This makes links to other component features in the dissertation more striking should significance be established.

Finally, a strong case can be made that two or less authors are not core. A number of studies have demonstrated that production of one or two articles often accounts for the overwhelming majority of the distribution of authors (e.g., 94% by Burnham, Shearer, & Wall 1992; 83% by Keenan, 1988). The case for these authors being considered core would be easily mitigated if the authors with two publications were included. On the other hand, because the production numbers were low in general, using more than three was considered too severe a threshold for an exploratory study.

These 21 core authors were published in 54 different journals producing eighty different articles (Table 8, on page 72). Twelve of these authors produced 21 of the 56 CRAs. Walther was not only the top ranked core author, but four out of eight of his articles were cited in all of the databases, except ABI/INFORM.

Table 8.

Core Author Distribution

Core Authors	Freq.
Walther, Joseph B.	8 (5)
Hiltz, Starr Roxanne	7 (3)
Rice, Ronald E.	5 (2)
Matheson, Kimberly	4 (1)
McMurdo, George	4 (1)
Phillips, Gerald M.	4 (1)
Collis, Betty	4
Harris, Judith B.	4
Schrum, Lynne	4
Olaniran, Bolanle A	3 (2)
Valacich, Joseph S.	3 (2)
Adrianson, Lillemor	3 (1)
Mantovani, Giuseppe	3 (1)
Snyder, Herbert	3 (1)
Zack, Michael H	3 (1)
Baym, Nancy K.	3
Dyrli, Odvard Egil	3
Lea, Martin	3
Riel, Margaret	3
Rojo, Alejandra	3
Weinberg, Nancy	3

( )=CRAs

The core authors published in 14 of the 22 core journals. Table 9, on page 73, details the distribution of these journals. This comprised 43.75% of the total core authors' publications. The distribution of core journals among these authors was compared with the overall distribution of core journals to see if they differed. A Kolmogorov-Smirnov analysis revealed that significantly greater frequency of core journals were found among core authors than in the overall distribution (D_{max}= .2215, $p<.01$, n=80).

Table 9.

Core Authors Contributions to Core Journals

Core Journals (A)	Freq. of "A" Among Core Authors (B)	Freq. of "A" Among All Journals (C)	"B"s % of Core Authors	"C"s % Among All Journals
Canadian Journal of Educational Communication	1	9	1.25%	1.47%
Learning and Leading with Technology	1	10	1.25%	1.64%
Journal of Computer-Mediated Communication	1	9	1.25%	1.47%
Communication Education	2	6	2.50%	0.98%
Journal of Communication	2	7	2.50%	1.15%
American Journal of Distance Education	2	11	2.50%	1.80%
Interpersonal Computing and Technology	2	11	2.50%	1.80%
Educational Technology	2	15	2.50%	2.45%
Behaviour and Information Technology	3	6	3.75%	0.98%
Human Communication Research	3	9	3.75%	1.47%
Computers in Human Behavior	3	16	3.75%	2.62%
Organization Science	4	6	5.00%	0.98%
Proceedings of the ASIS Annual Meeting	4	10	5.00%	1.64%
Communication Research	5	7	6.25%	1.15%
Total	35	132	43.75%	21.60%

Core authors segmented by database and CRAs are in Appendix E. Core authors contributed 34.09% of the total articles. The amount of core authors in individual databases ranged from 11.25% for SSI to 60% for ERIC. Almost all databases

contributed to core authors at a greater rate than other zones. The only exception was ERIC which contributed 77.4% of the other zone.

CRAs were contributed at a greater rate by core authors than other authors (see Appendix E). Core authors contributions of CRAs to the different databases ranged from 3.75% for ABI/INFORM to 17.50% for ERIC. All of the databases had a higher contribution rate of CRAs to the core zone than "other" zones. The overall odds ratio of CRAs for core vs. other authors was 6.5616. Odds ratios ranged from 1.5524 for ABI to 6.3523 for Sociofile. Once again, Fishers exact test indicated that differences were significant, with the exception of ABI (p=.7865) and Social Science Index (p= .0731). Levels of significance ranged from p=.0100 for the overall database to p=.0001 for both ERIC and Sociofile.

Concepts

RQ3 asked "What are the concepts of CMC, and how are they positioned in respect to their various fields?" Appendix G identifies all of the non-singleton terms within the dataset. The 686 articles contributed 1787 unique problematisations. There were 6,898 terms overall. This averaged to 10.05 terms per article. The 132 CRAs contributed 2,150 terms, averaging 16.29. The 555 Non-CRAs contributed 4,748 terms, averaging 8.54.

ERIC had the overwhelming number of terms with 5,800. Next was Psyclit with 824. This was followed by ABI/INFORM with 671, Sociofile with 526, and Social Science Index with 359.

The overall dataset was then examined for more dominant concepts. Both methods detailed earlier surpassed the 50 percent threshold. One hundred and sixteen terms surpassed Hinze (1994) demarcation of ten or more articles. It accounted for more than 3,687 or 53% of the total terms. Rice et al.(1996) "top 200" only increased the number to 4,300 or 62%. Rather than swell the terminology to be analyzed by over 70 percent, Hinze's method was used. A complete breakdown of all keywords less single entries is in Appendix G.

The "core" problematisations ranged in frequency from 457 to 10. They were then extracted by year for a longitudinal examination (Appendix G). Early dominance was defined by problematisations being more prolific from 1984-1991 than from 1992-1997. Late emergence was defined by a problematisation appearing in the dataset only after 1991. Only "Computer Mediated Communication Systems" met the criteria for early dominance. Table 10, on page 76, depicts the late emergers from Appendix G. Notably, two items missed being categorized as late emergers by having one article each in 1991. They were "Internet" and "Electronic Text". "Internet" was clearly the third term while "Electronic Text" was in the next to last cohort of terms with 11 references.

Of the total 116 key terms, 78 items occurred in more than one database. These contributions in rank order, with 25 contributions occurring in five databases, were 25, 21,18, 14. The 38 terms that represented one database all came from ERIC. Appendix H provides a comprehensive break down of all terms that occurred in more than one database.

Table 10.

Concepts Late Emergers

	Total	92-95	96-97
World Wide Web	29	3	26
Access To Information	24	12	12
Problems	17	10	7
Examples	16	11	5
Information Dissemination	14	6	8
Information Sources	14	8	6
Listservs	14	4	10
Teacher Student Relationship	14	8	6
Cooperation	13	7	6
Learning Environments	13	9	4
Social Studies	13	3	10
Undergraduate Students	13	9	4
Educational Resources	12	4	8
Interactive Video	12	7	5
Multimedia Instruction	12	7	5
Multimedia Materials	12	6	6
Nontraditional Education	12	6	6
Computer Literacy	11	9	2
Guidelines	11	6	5
Curriculum Development	10	7	3
Educational Change	10	8	2

Databases that contributed key terms at the greatest rate was then calculated. This was done by a frequency count of the number of modes each database contributed from Appendix H . Table 11, on page 77, depicts the breakdown of the mode of key terms by database. Terms that were equally occurring had the count added to all databases in which the mode occurred. Because of ERICs overwhelming dominance, the next most occurring database was calculated as well.

Table 11.

Core Term Mode Distribution

	Mode	Next
ABI	8	18
Eric	63	10
Psych	3	53
Soc	2	19
SSI	3	6

Relationship of Concepts

RQ4 asked "How do the concepts of CMC relate to each other?" The key terms were put into a 116 x 116 Pearson product correlation matrix. SPSS 7.5 for Windows was used to analyze the data with the complete linkage method clustering procedure (see Appendix K for discussion of complete linkage method and proximity matrix). Appendix I is the resulting dendrogram. Two solutions were demarcated. The first is a more rigorous solution that only features tightly clustered groups. It was demarcated at the earliest non-trivial solution and is identified by the solid vertical line in Appendix I. The second solution is a complete solution. Because of the loose coupling between items, clusters were demarcated at the earliest level that included all terms clustering in groups of two or more. It is identified by the dotted vertical line in Appendix I.

Solution one generated ten clusters. These ten clusters were given general descriptors based on a cursory examination of the underlying items. While somewhat arbitrary, in most cases they contain key terms that appear reflective of the conceptual collective. In order to provide linkage between concepts and the databases, solution one items were extracted from Appendix I and are displayed in Table 12 on page 78.

Table 12.

Conceptual Clusters Database Affiliation

Term	# of DBs	Total	Mode DB	Mode	Next	Next DB	ABI	Eric	Psych	SSI	Soc
Communication Systems											
Experimental Theoretical	4	42	ABI	42	6	Psych/Eric	42	6	6	0	3
Studies	4	38	ABI	38	6	Psych/Eric	38	6	6	0	3
Telecommunications Systems	4	29	ABI	29	3	Psych/Eric	29	3	3	0	2
Electronic Mail Systems	5	17	ABI	16	4	Psych	16	2	4	2	1
Communications Systems	3	10	ABI	10	2	Eric	10	2	1	0	0
Communication	5	26	ABI	18	10	Psych	18	8	10	4	8
Adult Computer Use											
Computer Applications	5	57	Psych	57	15	Eric	5	15	57	9	14
Adulthood	5	53	Psych	53	14	Eric	6	14	53	4	8
Communication Systems	5	21	Psych	21	4	Soc/Eric	2	4	21	3	4
Social Interaction											
Social Interaction	4	14	Soc/SSI	7	6	Psych	0	4	6	7	7
Communication Social Aspects	4	10	SSI	10	7	Eric	0	7	4	10	6
Software											
Computer Software	3	21	Eric	18	3	Psych	0	18	3	0	1
Databases	1	12	Eric	12			0	12	0	0	0
Instructional Effectiveness											
Student Participation	1	15	Eric	15			0	15	0	0	0
Instructional Effectiveness	1	14	Eric	14			0	14	0	0	0
Multimedia Instruction and Materials											
Multimedia Instruction	1	12	Eric	12			0	12	0	0	0
Multimedia Materials	1	12	Eric	12			0	12	0	0	0
Telecommunications and Secondary Education											
Telecommunications	5	101	Eric	81	29	Soc	5	81	10	6	29
Secondary Education	1	16	Eric	16			0	16	0	0	0
Cooperation and Learning Environments											
Cooperation	3	13	Eric	13	1	Soc/Psych	0	13	1	0	1
Hypermedia	1	15	Eric	15			0	15	0	0	0
Electronic Text	1	11	Eric	11			0	11	0	0	0
Information Systems and Teacher Student Relationships											
Teacher Student Relationship	2	14	Eric	14	1	Psych	0	14	1	0	0
Information Systems	4	17	Eric	14	3	Psych/ABI	3	14	3	1	0
Technology Advancement and Education Change											
Technological Advancement	2	30	Eric	30	1	ABI	1	30	0	0	0
Educational Change	1	10	Eric	10			0	10	0	0	0

Table 12 identifies the Number of Databases ("# of DBs") as the number of different databases where a term occurred. "Total" is the overall frequency of the term in the master dataset. "Mode DB" is the database in which a term occurred most often. "Mode" is the keyword count in the "Mode DB". "Next" is the next most frequent keyword count after the mode. "Next DB" is the Database counted in "Next". The remaining five columns in Table 12 are the frequency breakdown of the keywords by database.

Solution two items are identified and amplified in Appendix J. It includes the entire 116 core terms. These are segmented into 32 clusters. Similar to solution one, these clusters were given general descriptors that were related to the underlying items. As would be expected, many of solution two's clusters subsume solution one's. If appropriate, elements of solution one labels are included in solution two's. For example, solution one's "Multimedia Instruction and Materials" was subsumed into solution two's "Multimedia and Computer Oriented Programs". On page 80 is a listing of the descriptive labels.

BUSINESS COMMUNICATIONS AND BEHAVIOR

GROUP DYNAMICS AND DECISION MAKING

ONLINE USERS

ELECTRONIC INFORMATION DISSEMINATION

LEARNER CONTROLLED INSTRUCTION

ADULT COMPUTER USE

ORGANIZATIONAL AND INTERPERSONAL RESEARCH

SOCIAL ASPECTS

EXEMPLARS

NONTRADITIONAL EDUCATION

COOPERATIVE LEARNING AND INSTRUCTIONAL DESIGN

GROUP DISCUSSION

INTERACTION AND CMC SYSTEMS

TEACHER STUDENT INTERACTIONS

INSTRUCTIONAL TECHNIQUES AND EFFECTIVENESS

MAN MACHINE INTERACTION AND ANALYSIS

MULTIMEDIA AND COMPUTER ORIENTED PROGRAMS

EDUCATION AND THE WORLD WIDE WEB

COMPUTER NETWORKS AND THE INTERNET

INFORMATION ACCESS

TELECOMMUNICATIONS AND PROBLEMS

COOPERATION AND ONLINE SYSTEMS

SOFTWARE, INFORMATION SYSTEMS AND TECHNOLOGY

PROFESSIONAL DEVELOPMENT AND COMMUNICATION THOUGHT TRANSFER

FUTURES OF SOCIETY

TELECONFERENCING AND USE STUDIES

LITERATURE REVIEWS AND QUESTIONNAIRES

TEACHER ATTITUDES AND UNDERGRADUATE STUDENTS

CONTENT ANALYSIS AND RESEARCH METHODOLOGY

GRADUATE STUDENTS AND ELECTRONIC MAIL

COMPUTER USES AND TEACHING

TECHNOLOGICAL ADVANCEMENT AND COMPUTER MEDIATED COMMUNICATION

Chapter 5: Discussion

Overview

This dissertation analyzed "what is meant by computer-mediated communication?" While a number of suitable answers exist for this question it chose to let the "field" define itself as it exists in the extant literature concerning business, education, psychology, and the social sciences. A parallel analysis of multiple databases from different perspectives was used because of the perceived interdisciplinary nature of computer-mediated communication (CMC) (Ingwersen & Christensen, 1997; McLaughlin, 1994; Spasser, 1997).

Specifically, it considered CMC's artifacts, producers, and concepts within that domain. Bibliometric, information science, and communication scholars believe that this kind of analysis exposes characteristics and trends of scholarly communication (Beniger, 1990; Borgman, 1989, 1990; Borgman & Rice, 1992; Lievrouw, 1990). Artifacts and producers were identified based on their prevalence in the field and academic orientation (through database affiliation). A more fine-grained analysis was applied to the concepts of CMC. They were examined in terms of their prevalence, academic orientation and relationship to each other.

What was found was an area of scholarly communication that is still emerging. CMC, as represented in this dissertation, is heavily popularized in education related journals although other disciplines contribute. The databases representing these various disciplines had disparate foci. Where there was interdisciplinary overlap, the communication discipline appears to be the boundary spanner. However, this role did not

extend to businesses' ABI/INFORM. Moreover, the literature distribution was mainly populated by one-time authors. Conceptual clusters tended to be database affiliated. Those concepts with the most wide ranging support among all databases tended to come from topics traditionally associated with the communication discipline. Also "telecommunications", "information network" and "Internet" affiliated topics were widely indicated from a number of the databases.

This chapter presents a brief review of the results of this dissertation, discusses those results in light of each other, conducts post hoc analyses to amplify some of the findings, discusses the limitations of the study, and provides a summary with suggestions for the direction of future research.

Dataset Construction

A number of scholars detail the difficulty of investigating an interdisciplinary emerging field (Ingwersen & Christensen, 1997; McCain & Whitney, 1994; Spasser, 1997). These problems included CMC cutting across disciplinary lines, a lack of core subject literature, a lack of a discipline-specific database to extract the dataset and the difficulties of combining multiple databases. Spasser (1997) suggests that the first three problems could be addressed by using either a professional database that cuts across disciplines or the parallel analysis of multiple disciplines. Since the first option is not available to this literature, the parallel analysis was used to set up the dataset. Specifically, Psychlit, Sociofile, Social Science Index, ERIC, and ABI/INFORM databases were investigated in relation to their portrayal of CMC.

Combining multiple databases when duplicate items emerge presents a major difficulty (Ingwersen & Christensen, 1997). Which database's conceptual information do you delete when redundant items occur? Because this study's focus was on problematization rather than indexical identification, variations across databases were stabilized by including all unique keywords. This solution has three benefits. First, it rendered the previous concern moot. Second it standardized the problems addressed by an article regardless of their database affiliation. Third, all articles had only one conceptual set regardless of the number of databases in which they were referenced.

Artifacts

RQ1 asked "What are the journals of CMC, and how are they positioned in respect to their various literatures?" This dissertation responded to this question with six different kinds of analyses. The first three analyses were targeted at establishing the relationship of the CMC' journals among the various literatures. First, frequency data concerning journals was extracted from the master dataset. This was done to establish distribution characteristics of the underlying databases and their related perspectives. Next, cross-referenced articles were extracted from the dataset. This done to determine how unique their contributions were in regard to CMC journals. Additionally, this data was used to gauge the interdisciplinary impact of core journals and authors.

The next three analyses were targeted at establishing CMC journals' distinguishing characteristics. First, the master dataset was put through a Bradfordian analysis. This was done to demarcate the "core journals" of CMC. Next, the results from this analysis were used to calculate the theoretical total literature size. Lastly, a literature

density test was performed which allowed this literature to be compared to other literatures in terms of journal density.

The Relationship of CMC Journals Among Select Literatures

The derived dataset had several defining characteristics overall. One database heavily populated the overall dataset. Roughly 19% of total journals were cross-referenced between databases with no single database contributing more than 5%. Size of databases' total contributions were not indicative of how many of those contributions other databases selected. The communication discipline had the most articles of interest when compared to other perspectives. The business database did not select communication journals that were of interest to the other perspectives.

Initially, data collection procedures obtained 1,107 documents, but only 62% or 687 met the "journal criterion". ERIC contributed a disproportionate 459 references. Psychlit, ABI/INFORM, Sociofile, and Social Science Index contributed 78, 54, 49, and 47 respectively.

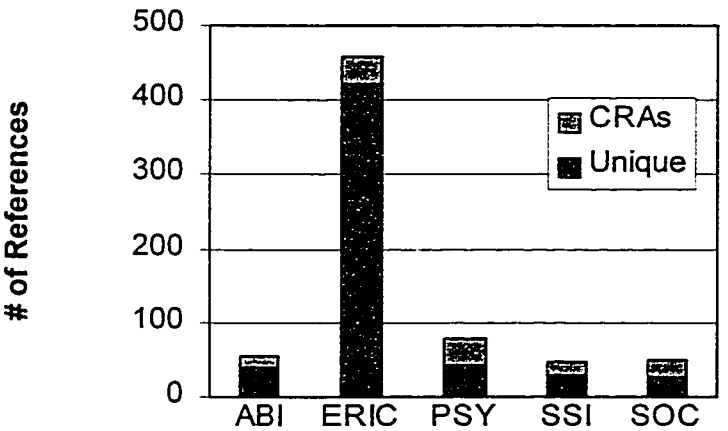
Cross-referenced articles (CRA)s were collapsed across databases resulting in 611 unique references. The 56 CRAs generated 132 (or 19%) of the total references from the five databases. CRAs had a disproportionate influence on the dataset.

Figure 3, on page 85, depicts the dataset's distribution characteristics. ERIC had close to six times the references of Psychlit. However, both contributed 37 CRAs. Sociofile was the most selective in terms of articles that were of interest to other perspectives. It had an average of 22% of its total journals cross referenced in other databases. It was followed by Psychlit and Social Science Index both having 17.5%,

ABI/INFORM having 8.8%, and ERIC having 3%. Regardless of the selectivity or size, none of the databases CRAs contributed more than 5% of the total articles.

Figure 3.

Distribution of Unique and Cross-Referenced Articles



	ABI	ERIC	PSY	SSI	SOC
CRAs	16	37	37	18	24
Unique	38	422	41	29	25

CRAs that had more than one entry contributed 34 of the 56 total. ERIC, or education, emerged as having the most multiple entry CRAs. However, Rice defines all of ERICs multiple entry CRAs as core journals belonging to the communication discipline (Rice et al., 1996). Communication Research, Communication Education, Human Communication Research, and Journal of Communication combined, contributed 19 references.

The psychology journals' Computers in Human Behavior and Organizational Behavior and Human Decision Making combined to contribute 10 references. Businesses' Organization Science contributed 3 references. Information science's Information Processing & Management contributed 2 references. While communication

emerged as the preferred boundary spanner across databases, this did not extend to business. ABI/INFORM did not cite any of the communication journals previously mentioned.

CMC journals' distinguishing characteristics. Key to establishing CMC journals' distinguishing characteristics was establishing the core journals. This was done through a Bradfordian' analysis that resulted in three zones or levels of journals. All zones contained either 195 or 196 journal articles. The core zone had the least number of journals producing these articles. In this zone, 22 journals produced 195 articles. Psychology's Computers in Human Behavior and education's Educational Technology head the list with 16 and 15, articles respectively.

Once a Bradfordian distribution was calculated and Groo's droop was identified a total literature size estimate could be made. Egghe (1990b) established estimating procedures for unknown bibliographies if the Bradfordian distribution was truncated at Groo's droop. Utilizing this procedure, the theoretical literature size of CMC would be 773 references with 379 journals. This compares with 611 references generated by 254 journals.

Typically, this disparity is caused by an incomplete file (Diodato, 1994). Callon, Courtial, & Laville, (1991) state that a complete file is very difficult to obtain, impossible to verify, and that a representative file is typical. Brooks (1990c) contends that downloaded files from appropriate databases are representative. The current analysis does not claim to be exhaustive, only representative of the CMC in the areas examined.

Education had the dominant database in regard to core journals. ERIC referenced one hundred and sixty-four (or 84%) of the core journals. Unlike CRAs, this dominance was not due to communication journals. Rice et al. (1996) identifies four of the twenty-two core journals as belonging to the communication discipline. These were Human Communication Research, Communication Research, The Journal of Communication, and Communication Education. The Internet based Journal of Computer-Mediated Communication was also considered a communication journal because of its affiliation with the Annenberg School for Communication. Even so, communication journals totaled only 38, or roughly 19%, of the total number of core journals' referenced.

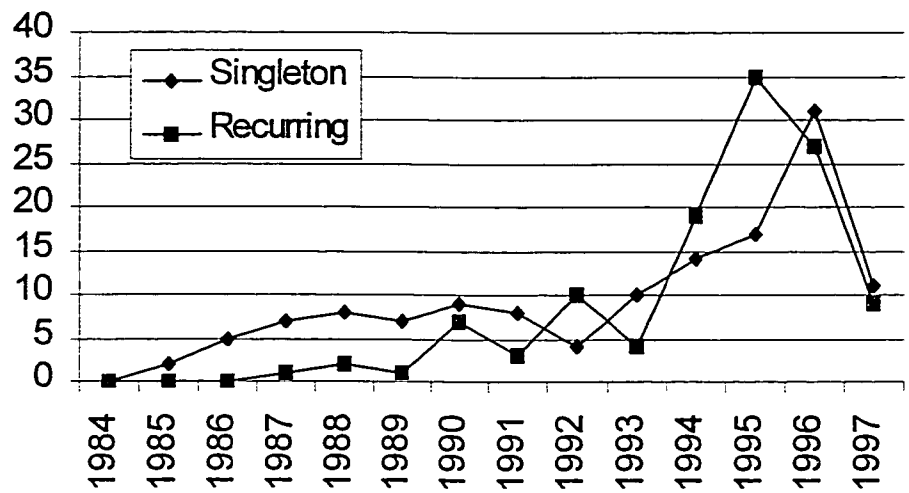
With the exception of ABI/INFORM, all of the databases had a higher percentage of articles in the core zone than in the non-core areas. Likewise, CRAs' percentage of articles were significantly higher in the core areas with the exception of ABI/INFORM. These indicators strongly suggest that ABI/INFORM has reduced visibility, regarding CMC, when compared to the other databases.

Longitudinal analysis of CMC journals. While the search for CMC journals extended as far back as 1966 in ERIC, the first three CMC articles to emerge occurred in 1984 (Czajkowski & Kiesler, 1984; Kiesler, Siegel, & McGuire, 1984; Staff, 1984). All databases were producing articles by 1986. However, these were sparse single occurrences in relation to the individual journals. It was 1987 before the Journal of Communication became the first journal to have recurring articles linked to CMC (Hiltz, 1986; Rice, 1987). Table 7, on page 68, detailed the ever increasing cumulation of singleton and recurring journals being added to the CMC literature. Table 7 culminated

in 136 singleton and 118 recurring journals producing the 611 references in the current examination. Figure 4 depicts the growth pattern imbedded in that table. What can be seen is a sporadically increasing growth rate until 1996 when a dip occurs in the number of new recurring journals.

Figure 4.

CMC Singleton and Recurring Journals' Growth



The decline in 1997 was expected. This kind of decline is typical in the last year of an analysis due to a database effect that captures the lag between production of journals and indexing (Brooks, 1990c; Hinze, 1994). However, the database effect does not explain the decline in recurring journals in 1996. This could be attributable to a plateauing of the CMC literature expansion or, also plausible, merely a temporary decline such as the ones experienced in 1991 and 1993. The growth curve concerning CMC may flatten out or decline for any number of reasons. Scholarly interest may have waned or shifted to more interesting topics. Journals supporting this area of inquiry may have seen

their audience shift and are responding. In the case of CMC magazine, an Internet offering directed solely toward CMC, the editor no longer had the time or resources to maintain the resource.

However, a temporary decline seems more likely unless the steep decline in 1997 is not entirely due to the database effect. Since 1991, the graph depicts a consistent trend of the recurring journals' growth rate that mirrors the direction of the singleton growth rate from the prior year. This makes intuitive sense because the greater the number of singleton journals, the larger the pool from which recurring journals can emerge. Since singleton journals increased to 31 in 1996, it would be expected to transfer into a strong increase in recurring journals.

Another indicator of CMC's emergence as a field is the degree of clustering that has occurred in the recurring articles. Brooks (1990c) defines a strongly clustered journal series as one with a clustering index exceeding 3.5. Since 1994, CMC would be considered a strongly clustered literature. Furthermore, this trend has continued, culminating with an index of 6.9 in 1996. While 1997 has an index of 6.88, this is considered spuriously low due to the database effect. Similar to Brooks' study of superconductivity, CMC growth indicates "a well ordered information channel clustering around a core set of primary journals" (Brooks, 1990c p. 240). Restated, CMC has most of its information localized in a small number of journals.

Producers

RQ2 asked "Who are the authors of CMC, and how are they positioned in respect to their various fields?" This dissertation responded to this question with three different kinds of analyses. These were frequency data concerning authorship, linkage of authors with cores journals, and database overlap. The frequency analysis was done to give a picture of authors' productivity. It was also used to compare this distribution with other literature theoretical distributions. The linkage between authors and core journals helped support the claim that those selected were core to CMC. Database overlap was used to profile boundary spanning authors.

Similar to other studies, this examination was constrained to using a straight count for authorship (Nichols, 1989; Rice & Crawford, 1992; Rice et al., 1996). This was done because some authorship data was unavailable. Specifically, ERIC used the term "and others" to truncate their multiple authorship listings. Therefore, only first authors were considered.

CMC Authors Among Select Literatures

The CMC authors had several defining characteristics. Most notably, their distribution was significantly different from what one would theoretically expect. The overwhelming majority had only one or two journals, with 87% having a single publication. The atypical size of the single publication authors produced difficulties in establishing core authors. Bradfordian techniques could not be used because the distribution could not support the establishment of zones without single authored publications being included in the core zone (Diadato, 1994; Goffman & Warren, 1964).

This is a strong indicator that CMC has not yet emerged with characteristics typically attributed to a field of study (Diadato, 1994; Nichols, 1989; Potter, 1981).

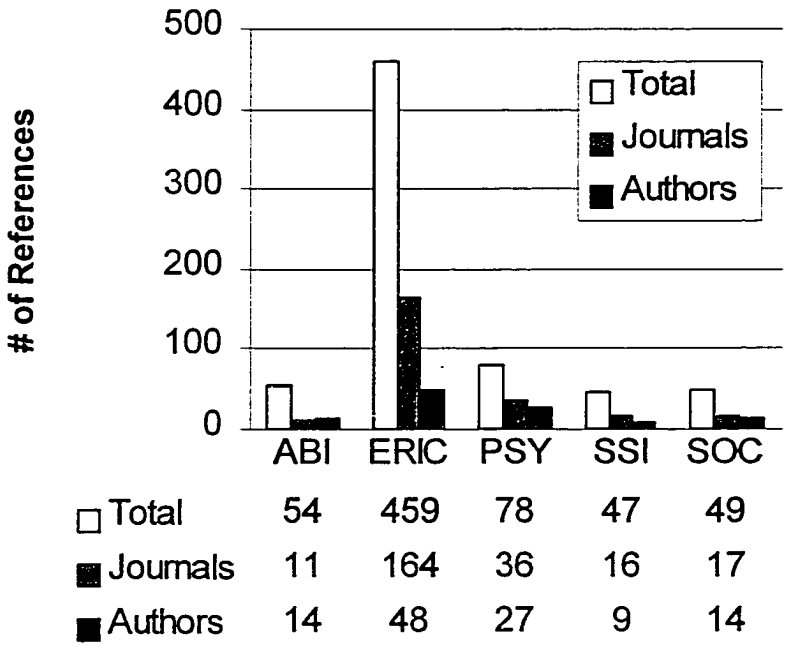
However, due to the exploratory nature of this examination, a reasonable demarcation was made in consideration of the distribution and previous research concerning author distributions (Burnham, Shearer, & Wall 1992; Diadato, 1994; Keenan, 1988). Specifically, authors with three or more publications were considered "core". This formulation did allow for the distinction of some notable characteristics.

Overall, 506 different first authors contributed to the dataset. Twenty-one authors, producing 80 publications were demarcated as "core". Their contributions reached a maximum of eight. While they accounted for only 3% of the total author distribution, they produced 13% of the articles. The distribution separates the top three authors from the rest of the field. These were Joe Walther, Roxanne Hiltz, and Ron Rice with eight, seven, and five references, respectively. All three of these authors had at least 40% of their articles cross referenced with Walther topping the list at 62.5%. This strongly suggests that these authors were engaged in issues that were of interest to a wide range of perspectives. Walther and Rice have strong connections to the communication discipline, while Hiltz is affiliated with computer and information science.

Core authors' share of the core journals was significantly higher than that of the overall population. Figure 5, on page 92, contrasts the core author, core journal, and overall distributions of the various databases. Surprisingly, ABI/INFORM had more articles from core authors than from core journals. This, once again, suggests that ABI/INFORM's interests differ from those of the other databases.

Figure 5.

A Comparison of Core Author and Core Journal Distributions



	ABI	ERIC	PSY	SSI	SOC
Total	54	459	78	47	49
Journals	11	164	36	16	17
Authors	14	48	27	9	14

Post Hoc ABI/INFORM Author Analysis

Further investigation was done on ABI/INFORM's authors for possible clues as to differences from the rest of the dataset and specifically from the communication discipline. Authors with more than one publication in ABI/INFORM were extracted resulting in the table 13 on page 93. Additionally, overall core authors referenced in ABI/INFORM were included for comparative purposes. Ten authors met these criteria.

All authors were academically affiliated with web pages which made identification of discipline affiliation possible. Furthermore, the current dataset, commsearch 95 and web based vitae's were searched respectively to find if the authors

had published in communication discipline related journals. All authors that did not have publications in the current dataset had a record of publications on the web.

Table 13.

ABI/INFORM Core Author Distribution

Authors	Freq. In ABI	Freq.	Affiliation	Pub. In Comm. Journals
Hiltz, Starr Roxanne	4 (2)	7 (3)	Information Science	X
McMurdo, George	2 (1)	4 (1)	Information Science	
Zack, Michael H	2 (1)	3 (1)	Business	
Severinson-Eklundh, Kerstin	2	2	Computer Science	
Snyder, Herbert	1 (1)	3 (1)	Information Science	
Olaniran, Bolanle A	1 (1)	3 (2)	Communication	X
Valacich, Joseph S.	1 (1)	3 (2)	Business	X
Mantovani, Giuseppe	1 (1)	3 (1)	Psychology	
Lea, Martin	1	3	Psychology	X
Walther, Joseph B.	1	8 (5)	Communication	X

The majority of core authors overall and non-single publication ABI/ INFORM authors had CRAs. However, only Mantovani (1994) in Human Relations was cited in more than one database outside of business.

While numbers are too small for any generalizeable conclusions, it is apparent there is a clear split between the more productive business authors and the overall core authors. No authors affiliated with social science disciplines had more than a single article. Furthermore only one of the top four business authors published in communication journals at all.

One possible explanation is that while core authors have topics that are of interest to core journals, the focus of core journals may not always be in line with some core authors. This means that ABI/INFORM is selecting authors with compelling topics.

Those topics just do not seem to be in line with the more popular CMC publishing outlets, the social sciences, and the communication discipline.

For the most part, core authors contributed CRAs at a significantly higher rate than did the rest of the distribution. Two databases were exceptions to this trend. These were Social Science Index with significance at the .073 level and ABI/INFORM at the .453 level. SSIs non-significant findings might be attributable to having the smallest n size of any of the databases. However, ABI/INFORM's lack of significance clearly differed from the other databases' significance in a striking manner.

Concepts

RQ3 asked "What are the concepts of CMC, and how are they positioned in respect to their various fields?" This dissertation responded to this question with two different kinds of analyses. First, concepts' frequency data was extracted from the master dataset. This was done to establish distribution characteristics of the underlying databases and their related perspectives. Next core concepts or "problematisations" were analyzed longitudinally. This was done to identify the emergence or diminishing of a problematisation over time.

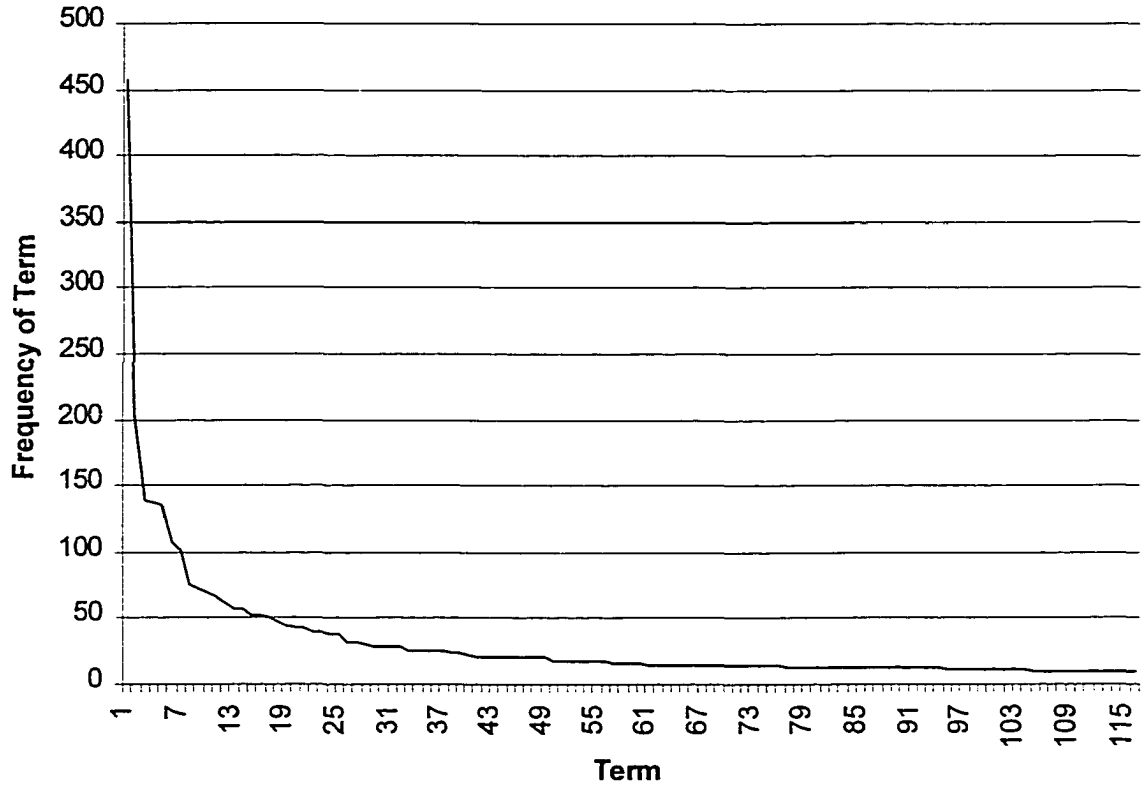
CMC Concepts Among Select Literatures

The CMC concepts had several defining characteristics. The dataset had 6,898 terms overall with 1,787 of them unique. CRAs produced 31% of the total number of terms. ERIC contributed the overwhelming number of concepts. It was followed by Psychlit, ABI/INFORM, Sociofile and Social Science Index.

The more prominent concepts accounted for in 10 or more journals were then segmented for analysis. This resulted in the selection of 116 key terms that accounted for 53% of the total terms. Figure 6 gives an idea of the resulting distribution. The x axis number or "Term" reflects the rank order in Appendix G. "Computer-mediated communication" is the most common term with a frequency of 457.

Figure 6.

Conceptual Key Term Frequency Distribution



"Computer mediated communication" occurred in ERIC followed by "higher education" also occuring in ERIC. Psychlit's top two terms were "computer applications" and "adulthood". Sociofile's top two terms were "telecommunications" and "computers".

Social Science Index's top two terms were "computer mediated communication" and "interpersonal communication". ABI/INFORM's top two terms were more indexical than conceptual. These were "experimental theoretical" and "studies". ABI's next two terms were "telecommunications systems" and "organizational behavior".

Only 17 terms had a frequency greater than 50. The majority of those terms had over 10 times the concepts occurring in the most common database compared with the next most common. There were six exceptions to that trend. These were "telecommunications", "interpersonal communication", "computer applications", "adulthood", "computers", and "information technology". With the exception of "information technology", all of them were previously mentioned in the top two list. This was no coincidence. Without exception, these terms were competing against ERICs overwhelming dominance in the distribution.

Next, this dissertation examined key terms longitudinally for possible trends. This was done through a two-step procedure that reduced the granularity of the analysis so that prominent trends would be more apparent. Two kinds of characteristics were looked for in the distribution, early dominance and late emergence. Early dominance meant that a term had the majority of its distribution before 1992. Only "computer mediated communication systems" met this criterion. Three of its 20 references occured after 1991. One possible explanation is that since CMC has become so ubiquitous a term, it is easier to use it as a descriptor whether systems are involved or not. Another possible explanation is that since the explosion of the Internet so many of the computers used are networked that "systems" are a given.

Twenty-one late emergers were identified representing 270 references. Four of these have the majority of their distribution in the last two years. These are "world wide web", "listserves", "social studies", and "educational resources". All of these have ERIC as the dominant database. In fact, 14 of the 21 late emergers have their most significant presence in ERIC.

Post Hoc Conceptual Trend Analysis

Strong performers. Frequency trends can be deceiving. A long period of low to moderate interest is indistinguishable from short time periods of strong performance. In an effort to identify possible trends that may be emerging or diminishing, strong performers were distinguished from the rest of the distribution. Strong performance was characterized as items that had two or more years in which they exceeded the 10 journal threshold. Appendix G has identified those terms and marked the first year they exceeded the journal threshold. Following is a listing of the terms sorted by that initial date. In parentheses is the number of years in which it exceeded 10 journals.

1990
(8) Computer Mediated Communication
(7) Higher Education
(6) Computer Assisted Instruction

1992
(4) Electronic Mail
(5) Computer Networks

1994
(4) Internet
(2) Interpersonal Communication
(2) Educational Technology

1995
(2) Distance Education
(2) Information Networks
(2) Computer Uses in Education
(2) Online Systems
(2) Communication Research

Clearly, education is a strong focus. But strong interests are also indicated in computer networks (most notably the Internet) and different kinds of communication.

Low to moderate "long" term performers. Overall, the vast majority of the 116 key terms had their "most productive years" in either 1995 or 1996. The database effect would be a reasonable explanation for the decline in 1997. Because of the explosion of interest in the most recent years of analysis, unless an item was discussed above as a strong performer, it is difficult to tell if they have a long term link with CMC or just a trendy affiliation.

However, there were 18 exceptions to this general trend. Table 14, on page 99, extracts those exceptions from Appendix G. Years of maximum productivity have been enhanced for easier identification. "Interpersonal communication" emerged as the only area categorized as a "strong performer" that had a "most productive year" earlier than 1995.

A consistent trend emerged with the CMC affiliated issues. The overwhelming majority have had the majority of their work done since 1992. Furthermore, these issues' most popularized single year occurred in the same time frame. Because of the small time frame, it is difficult to tell if these are genuine emerging areas of interest, or merely passing fads.

The exceptions to this trend were "organizational behavior", "computer mediated communication systems", and "writing instruction". These terms had some of their most productive years before 1992. Of these, only "organizational behavior" had more than a diminutive presence since 1994. Its strong affiliation with ABI/INFORM suggests an area where business has had a consistent interest concerning CMC.

Table 14.

Low to Moderate Concepts Longitudinal Analysis

Problematisations	Total	84	85	86	87	88	89	90	91	92	93	94	95	96	97	84 87	88 91	92 95	96 97	EARLY	LATER
Interpersonal Communication	67	1	1	0	4	3	0	6	2	3	8	13	13	9	4	6	11	37	13		
Communication Thought Transfer	31	1	0	0	1	0	1	1	0	8	6	6	5	2	0	2	2	25	2		
Case Studies	29	0	0	0	1	2	0	2	1	3	3	6	6	4	1	1	5	18	5		
Organizational Behavior	26	0	1	1	1	1	5	2	0	0	1	5	5	2	2	3	8	11	4		
Student Attitudes	25	0	0	1	0	2	0	2	1	1	1	6	6	5	0	1	5	14	5		
Tables Data	22	0	0	0	0	0	1	0	1	10	4	1	3	2	0	0	2	18	2		
Communication Systems	21	0	1	0	0	2	1	1	1	4	0	6	3	2	0	1	5	13	2		
Teacher Role	21	0	0	0	1	1	0	3	0	3	1	6	2	4	0	1	4	12	4		
Computer Mediated Communication Systems	20	0	0	0	2	5	1	7	2	0	2	0	1	0	0	2	15	3	0	X	
Content Analysis	17	0	0	0	2	1	0	0	1	5	1	4	1	1	1	2	2	11	2		
Research Needs	16	0	0	0	0	2	0	0	2	6	1	3	1	0	1	0	4	11	1		
Graduate Students	14	0	0	1	0	0	0	1	1	0	0	5	4	2	0	1	2	9	2		
Privacy	12	0	0	0	0	0	1	0	0	0	0	6	0	5	0	0	1	6	5		
Learner Controlled Instruction	11	0	0	0	0	0	0	1	0	3	3	1	1	2	0	0	1	8	2		
Teacher Education	11	0	0	0	0	0	0	0	2	1	3	1	2	2	0	0	2	7	2		
Communications Systems	10	0	0	0	0	1	3	1	0	0	0	4	0	1	0	0	5	4	1		
Man Machine Systems	10	0	0	0	0	0	0	0	2	3	1	1	1	2	0	0	2	6	2		
Writing Instruction	10	0	0	0	0	0	0	4	0	3	0	1	0	0	2	0	4	4	2		

Conceptually, this dataset is overwhelmingly dominated by the educational database followed by that of psychology's. A quick look at the key term concepts shows a predominance of education issues. This may be a long term trend or merely a developmental phase. Clearly other perspectives outside of education are impacting the field of CMC. However, they are smaller in number.

However, the dominant databases for each term were removed in Appendix H. This was done in order to expose other databases' interests. The relatively large number of single digit frequencies tends to suggest that these interests are nominal over the entire range of issues. So, while CMC has a wide range of conceptual issues from the respective datasets, most seem to be discipline specific with only a minority of overlap between disciplines.

Relationship of Concepts

RQ4 asked "How do the concepts of CMC relate to each other?" This dissertation responded to this question with a hierarchical cluster analysis of the key terms identified in RQ3. Because of the exploratory nature of this dissertation, two different clustering solutions were explored. The first is a more rigorous solution reflecting the level of clustering found in other bibliometric studies (Hinze, 1994; Spasser, 1997). This solution is offered as formulation of what issues are currently linked in the CMC literature as it stands in this examination.

The second is a broader solution, encompassing the tightest clustering configuration inclusive of the entire dataset. Linkages in this solution may be tenuous.

However, this solution is offered to identify possible emerging or dissolving linkages that may be further explored by future studies.

Current CMC Conceptual Linkages

The current CMC conceptual linkages are identified in Table 12, on page 78, and Appendix I. Solution one explored ten clusters. Descriptive labels were created for identification and discussion purposes. These were:

- Communication Systems
- Adult Computer Use
- Social Interaction
- Software
- Instructional Effectiveness
- Multimedia Instruction and Materials
- Telecommunications and Secondary Education
- Cooperation and Learning Environments
- Information Systems and Teacher Student Relationships
- Technology Advancement and Education Change

The first three clusters appear to be of interdisciplinary interest with a particular focus. "Communications Systems" centers around "telecommunication systems". The particular focus for this cluster is from businesses' ABI/INFORM (ABI). Furthermore, it appears to be of particular interest to four out of five of the databases, with the exception being Social Science Index (SSI).

This does not mean that SSI does not have an interest in telecommunications. Its interests are more in tune with the lines of inquiry being explored by education's cluster of "telecommunications and secondary education". Interestingly enough, these two "telecommunications" clusters were widely separated. This may be due to the nature of the analysis. However, it may also be an indication of a disparate focus.

"Adult computer use" was clearly linked to psychology. One hundred percent of the items were cited by Psychlit. Additionally, it had broad interdisciplinary support. It is the only cluster in solution one's group that had all items appearing in all databases.

"Social Interaction" was primarily of social science interest. It had a balanced interdisciplinary spread with no items cited in ABI/INFORM. More than likely, this cluster was strongly influenced by the research program of Joe Walther. Many of the occurrences were affiliated with his articles in communication journals.

The rest of the clusters were strongly affiliated with education with only a mild interest from the other disciplines. "Instructional effectiveness" and "multimedia instruction and materials" came entirely from ERIC. The only exception to this trend was "telecommunications and secondary education". The term "telecommunication" appeared in all databases and, with the exception of ABI, at a higher level than "telecommunication systems". A tangential scan of the dendrogram suggests that at a broader, level this might be an Internet related linkage.

Four out of education's seven clusters had key elements that were "late emergers". These were " multimedia instruction and materials", " cooperation and learning environments", "information systems and teacher student relationships", and "technology advancement and education change". This suggests that these items' current interests have only developed since 1992.

Comprehensive Examination CMC's Conceptual Linkages

A comprehensive clustering solution is presented in Appendices I and J. Solution two explored 32 clusters. All but nine were overwhelmingly affiliated with education. These nine were:

- Business Communications and Behavior
- Group Dynamics and Decision Making
- Adult Computer Use
- Organizational and Interpersonal Research
- Social Aspects
- Group Discussion
- Computer Networks and the Internet
- Telecommunications and Problems
- Software, Information Systems and Technology

Three of these had wide ranging support from all five of the databases. These were "group dynamics and decision making", "adult computer use", and "organizational and interpersonal research". "Adult computer use" was the same cluster found in solution one. Both of the other categories appear to align themselves with units of analysis, commonly associated with communication (interpersonal, small group, and organizational).

"Computer networks and the internet" has pseudo-wide ranging support. Of the three items "computer networks" and "internet" were referenced in all databases. However, "information networks" was not referenced in either Psychlit or Sociofile.

"Business communications and behavior" is an expansion of solution one's "communication systems". It broadened its scope to include "organizational behavior". As would be expected, it remains strongly affiliated with ABI/INFORM.

"Social aspects" and "telecommunications and problems" contain solution one's "social interactions" and "telecommunications and secondary education". "Social aspects" broadens to include software . "Telecommunications and problems" is merely solution one's formulation with the addition of "problems".

"Software, Information Systems and Technology" has a more complex relationship. It is an expansion of solution one's "information systems and teacher student relationships". "Information systems" is linked with "teacher student relationships" while "information technology" is linked with "software & systems". More than likely, this cluster is held together by these two items being related, rather than some overall commonality.

The other 23 clusters were strongly affiliated with education. Two of these, "cooperative learning and instructional design" and "information access", were exclusively referenced by ERIC. Two other clusters, "nontraditional education" and "education and the world wide web" had only a modicum of references from Psychlit.

Had the eight items in "Instructional techniques and effectiveness" not included "computer aided instruction" (CAI) it would have fallen in this group as well. However, CAI is an area of interest for both psychology and sociology.

Several of the clusters were strongly affiliated with analytical concerns. These concerns included subject demographics and types of analytical technique (e.g. content analysis, surveys, questionnaires, discourse analysis).

Lastly, computer mediated communication appeared in two of the education clusters. One included "computer mediated communication systems" and "interaction".

More than likely it is the result of the CMC systems research discussed earlier. The term "computer mediated communication" has strong support in all databases except ABI/INFORM. However, the three items most closely associated with it clearly have an educational focus. "Technological advancement" had only one cite from ABI/INFORM. "Educational change" had none. The other term was "higher education". The above study provides compelling evidence that the majority of scholarly communication concerning CMC is education discipline related.

Limitations

The exploratory nature of this study necessarily dictated a balance between rigor and latitude. Several limitations must be considered in this respect. These include generalizations, design limitations, and theoretical assumptions.

First, operationalization of the domain impacts the use of the findings. The domain databases were selected due to their breadth of coverage, accessibility, and intuitive link with CMC. However, additional areas of CMC may exist currently or emerge in the future.

Additionally, a number of databases were collapsed into a single master database in order to provide a macro view of CMC. These are not mutually exclusive categories. As such, accommodations had to be made. The amount of cross-referencing is identified throughout the findings so that the reader can consider how much weight to give to their impact. Therefore, results from this analysis do not claim to identify characteristics of CMC beyond the domain examined.

Second, the selection of cluster analysis over other classifying procedures has a number of inherent limitations. Cluster analysis is well suited to exposing structures at a variety of levels of granularity in a single analysis. This was considered a necessary condition given the emerging nature of the field. However, cluster interpretation is difficult at best and, at worst, will produce partitions for datasets even if they do not exist (Aldenderfer & Blashfield, 1984; Jobson, 1992, Johnson, 1998). Emergence (or lack of emergence) of clusters will have to be weighed against the non-random nature of their partitioning.

Third, the design proved to be somewhat difficult in terms of theoretical assumptions. The bibliometric theories pursued impacted a broad range of outcomes, including the establishing domains and core areas within those domains. Due to the sheer volume of data under consideration, this study had to make decisions of what areas to present as "core". Arguably, co-citation analysis could be used to establish those domains and core areas. This would present a domain influenced by popularized citations. Such a view would present scholars' preferences toward CMC. The current analysis does not discriminate based on the popularity of a citation nor give preferential treatment of one reference over another. Its focus has been on the content of CMC in the domain described. Moreover, this dissertation depicts the scholarly communication typically accessed through database searches. As such, it is seen as a compliment to such a conceptualization rather than a competitive choice (Cambrosio, et al., 1993).

While bibliometric theory provides guidance in terms of artifacts, producers and concepts, it does not present an absolute methodology. Artifacts and producers' core

areas are affected by number of zones, statistical benchmarks, and counting methods. Concept core areas were established based on similar studies examining scholarly communication among other literatures. Comparability to these studies had a strong influence in their selection. Clearly, different demarcations can be made. This limitation was addressed in the traditional way for exploratory studies. Detailed explanations, including supporting literature, were provided for choices made.

Another caveat for future research is that the method designed for data extraction was more cumbersome than originally conceptualized. It did provide for a medium in which data matrices and queries were able to be constructed from a number of different perspectives. However, some of these manipulations require automation designs beyond the scope of the typical academic researcher. Because of this, either professional computer assistance is recommended or the analysis should be constrained to small or medium datasets of less than 1,000 journal entries.

Future Research

Part of the importance of an exploratory study is the direction and issues that can be pursued in future research. Many of these issues can be aligned with major categories within this dissertation. These categories include further exploration of the trends, producers, artifacts, and concepts discussed.

Clearly, this study detailed the early years of CMC's scholarly communication. CMC's development into more than an interest area for scholars is still uncertain. Questions posed by the 1996 downturn in recurring journal growth need subsequent longitudinal analysis. Future studies should extend the current analyses to see if this is a

temporary aberration or the beginning of either stagnation or abandonment of CMC as a variable. If CMC maintains a dramatic growth patterns, bi-annual updates may be informative. However, the longer lens of five or ten years would provide more stable conclusions in regard to trend analysis.

Database data limited the kind of count applied to CMC authors. Additional resources should expand the current identification of authors to a complete count. Specifically, the ERIC dataset needs to have the terms "and other" clarified through either cross database identification or more manual means. While, Nicholls (1989) concedes the robustness of the straight count, an exhaustive identification of authorship will more fully answer questions concerning ranking issues and omissions.

Furthermore, the indexed literature does not always reflect the centrality of artifacts and producers. The invisible university is a term given to scholarly communication whose valence scholars have not tied to frequency of production, but rather to frequency of usage. The current analysis focused on work being produced without discrimination in regard to usage. Identification of CMC's invisible university would provide complementary information to the current study.

Specifically, either co-citation analysis or bibliographic coupling could expand the findings concerning artifacts and producers. Co-citation analysis could pursue either journals or authors as links to the particular subject areas. Bibliographic coupling could align articles with scholarly communication that the articles have in common. Both of these methods present a literature based on the degree of scholarly interest rather than on

actual work being produced (Chung, 1994; Diodato, 1994; Lievrouw, 1989; Persson, 1994).

Therefore, some of the basic assumptions of the data would vary from the current analysis. Authors popularity in terms of the scholarly literature would be the indicator of dominance rather than productivity. Conceptual linkages would be based cross-citation patterns rather than indexical conceptual similarity.

A comparative analysis between the two methodologies would help explore linkages between conceptual underpinnings and actual literature. Furthermore, it would help shed light on whether theoretical or pragmatic issues are driving CMC's scholarly communication.

This dissertation produced two conceptual clustering solutions. Both indicated a literature predominately occupied by higher education related work. It is unlikely that people using computers to communicate are overwhelmingly engaged in an education related phenomena. If the study of CMC is to more accurately reflect current usage patterns, it should be aggressively broadened in other areas.

Clearly, topics for study abound. However, even examining the literature from a broader level, omissions were apparent. While, some societal institutions, such business and education were clearly represented, others were not. No significant representations of political, religious, mass media or legal contexts emerged.

Examples regarding the pervasiveness of CMC in these additional areas abound. In the 1996 presidential race, both candidates had web sites. Many areas of religious worship, have web sites and are now able to network extensively utilizing CMC. New

issues of personal and professional privacy are just now being explored (e.g. If you are in an office, during work hours, using a company machine, do they have the option of surveiling your communicative activities?) Mass-media news cycles have been further reduced. There are a number of examples where web-based stories are in play long before the early edition of the newspaper arrives. Perhaps, it is due to the infancy of the literature. However, these are areas that permeate society and are impacted by CMC. Future examinations of CMC should see these broad-based areas more widely represented in the literature.

Clearly, conceptual linkages exposed by this dissertation are formative at best. The majority do not have sufficient longevity or prevalence in the literature to support more than the most preliminary of conclusions. Future studies should rigorously examine both the linkages and the conclusions in regard to their longevity and stability.

Summary

This dissertation approached the question "What is meant by computer-mediated communication?" It did not constrain itself to a single discipline's perspective. Rather, it chose databases affiliated with some of human beings' more common activities. These were thinking, education, business, socialization and communication. What was found was an area of scholarly communication, heavily popularized in education related journals. Psychology and other social science affiliated disciplines contributed in a less prolific fashion. There were disparate foci between disciplines of differing perspectives. Although the low degree of overlap between databases did support their usefulness in expanding the exploration of CMC scholarly communication.

One implication of this dissertation in terms of both authors and journals is their relative localized focus. While it is understandable that databases and journals would have narrowed foci, some authors' interests regarding CMC may be more fully addressed in the exploration of other disciplines' literature. This may take the form of either importing the literature from other disciplines or publishing findings in other discipline's journals. Both options are more in line with CMC's cross-disciplinary nature.

One would not expect a coherent maturing of CMC research to be constrained by traditional discipline boundaries. However, this was the case in the majority of CMC's authorship distribution. The communication discipline appears to be the exception. Perhaps it is due to the interdisciplinary roots of the communication discipline (Craig, 1999; Delia, 1987; Littlejohn, 1982). Unfortunately, it did not have the critical mass of productive authors to significantly impact CMC's overall core authorship.

Currently, multi-disciplinary with some interdisciplinary linkages would be a good description of CMC. Where there was interdisciplinary overlap, the communication discipline appears to be the boundary spanner in the majority of cases. This role did not extend to businesses' ABI/INFORM. Its focus was extremely segmented from the other databases in this examination.

While "field" has been used as a convenient moniker for identification, it is not an accurate descriptor of the area of CMC. A more accurate description would be an emerging area of inquiry. While it is too early to tell, CMC appears to be poised for an expansion both in terms of maturity of journals and general production. A rapidly

expanding singleton journal base may be the precursor of expansion among recurring journals.

The distribution of first authors was overwhelming populated by one time authorship. This differed significantly from theoretically defined literatures associated with a field of study. Moreover, CMC's articles tended to be localized in a relatively few journals. However, there was a trend toward expansion indicated.

Conceptually, CMC was constituted by a wide array of emerging areas of inquiry. Clusters of topics tended to be database affiliated. Those with the most wide ranging support among all databases tended to come from topics traditionally associated with the communication discipline.

Also, "telecommunications", "information network" and "Internet" affiliated topics were widely indicated from a number of the databases. One area of interest that appears to be fading in popularity is that of "computer mediated communication systems". This may be due to semantic convenience rather than lack of interest.

This dissertation has attempted to identify the evolution and position of CMC as it exists during the years of analysis. Its breadth should spur future studies to make better use of those research streams. However, if CMC is more than an academic footnote, then we are in the infancy of its development. While this study focused on appearances, future research should continue to monitor the trends and also look for omissions.

To conclude, CMC is not CMC is not CMC. What this means is that e-mail is not voice mail which is not video conferencing. While this dissertation provides encouragement for the development of topics, it also should encourage academic

communication to include more detailed definition beyond the use of the moniker computer-mediated communication.

References

Adler, R. B., & Elmhorst, J. M. (1996). Communicating at work: Principles and practices for business and the professions (5th ed.), New York: McGraw-Hill.

Adrianson, L., & Hjelmquist, E. (1993). Communication and memory of texts in face-to-face and computer-mediated communication Special Issue: Swedish research on learning and instruction with computers. Computers in Human Behavior, 9 (23), 121-135.

Agresti, A. (1990). Categorical data analysis. New York: John-Wiley & Sons.

Aldenderfer, M. S., & Blashfield, R. G. (1984). Cluster analysis. Newbury Park, CA: Sage.

Allen, B. J. (1995). Gender and computer-mediated communication. Sex Roles, 32 (7-8), 557-563.

American Psychological Association. (1994). Publication manual of the American Psychological Association (4th ed.), Washington, DC: Author.

Auter, P. J. (1996). The internet and the world wide web. In A. E. Grant (Ed.), Communication technology update (5th ed.)(pp. 131-146). Boston: Focal Press.

Barnes, S., & Greller, L. M. (1994). Computer-mediated communication in the organization. Communication Education, 43 (2), 129-142.

Bellman, B., Tindimubona, A., & Arias, A. Jr. (1993). Technology transfer in global networking: Capacity building in africa and latin america. In L. Harisim (Ed.), Global networks (pp. 237-254). Cambridge, MA: MIT Press.

Beniger, J. R. (1990). Identifying the important theorists of communication: Use of latent measures to test manifest assumptions in scholarly communication. In C. Boreman (Ed.), Scholarly communication and bibliometrics, (pp. 254-277). Newbury Park, CA: Sage.

Beniger, J. R. (1988). Information and communication: The new convergence. Communication Research, 15(2), 198-218.

Berelson, B. (1952). Content analysis in communication research. Glencoe, IL: The Free Press.

Bochner, A. P. (1985). Perspectives on inquiry: Representation, conversation, and reflection. In M. L. Knapp & G. M. Miller (Eds.) Handbook of interpersonal communication (pp. 27-58). Beverly Hills, CA: Sage.

Bogen, N. (1997). In-stat in-sights: Home PCs to grow. Available: http://www.sumnet.com/enews/

Borgman, C. L. (1989). Bibliometrics and scholarly communication: Editors note. Communication Research, 16(5), 583-599.

Borgman, C. L. (Ed.). (1990). Scholarly communication and bibliometrics. Newbury Park, CA: Sage.

Borgman, C. L., & Rice, R. E. (1992). The convergence of information science and communication: A bibliometric analysis. Journal of the American Society for Information Science, 43(6), 397-411.

Bordia, P. (1997). Face-to-face versus computer-mediated communication: Synthesis of the experimental literature. Journal of Business Communication, 34(1), 99-120.

Braam, R. R., Moed, H. F., & van Raan, A. F. J. (1991). Mapping of science by combined co-citation analysis. II: Dynamical aspects. Journal of the American Society for Information Science, 42(4), 252-266.

Brookes, B. C. (1969). Bradford's law and the bibliography of science. Nature, 224, 953-956.

Bresler, L. (1990). Computer-mediated communication in a high school: The users shape the medium: I. Journal of Mathematical Behavior, 9 (2), 131-149.

Brooks, T. A. (1987). Bibliometric Toolbox (v. 2.8). Available: ftp://ftp.u.washington.edu/public/tabrooks/toolbox/

Brooks, T. A. (1989). Core journals of the rapidly changing research front of "superconductivity". Communication Research , 16(5), 682-694.

Brooks, T. A. (1990a). Clustering in comprehensive bibliographies and related literatures. Journal of the American Society for Information Science, 41(3), 183-192.

Brooks, T. A. (1990b). Perfect bradford multipliers: A definition and empirical investigation. In L. Egghe and R. Rousseau (Eds.) Infometrics 89/90 (pp. 45-55).Amsterdam: Elsevier Science Publishers.

Brooks, T. A. (1990c). Core journals of the rapidly changing research front of "superconductivity". In C. Borgman (Ed.), Scholarly communication and bibliometrics (p. 235-248). Newbury Park, CA: Sage.

Brooks, T. A. (1996). Dictionary of bibliometrics (book reviews). Library Quarterly, 66(1), 103-106.

Burnham, J. F, Shearer, B. S., & Wall, B. C. (1992). Combining new technologies for effective collection development: A bibliometric study using CD-ROM and a database management program. Bulletin of the Medical Library Association, 80, 150-156.

Callon, M., Courtial, J. P., & Laville, F. (1991). Co-word analysis as a tool for describing the network of interactions between basic and technological research: The case of polymer chemistry. Scientometrics, 22(1), 155-205.

Cambrosio, A., Limoges, C., Courtial, J. P., & Laville, F. (1993). Historical scientometrics? Mapping over 70 years of biological safety research with co-word analysis. Scientometrics, 27(2), 119-14.

Campanario, J. M. (1995). Using neural networks to study networks of scientific journals. Scientometrics, 33(1), 23-40.

Chung.Y. K. (1994). Bradford's distribution and core authors in classification systems literature. Scientometrics, 29(2), 253-269.

Compton, D., White, K., & DeWine, S. (1991). Techno-Sense: Making sense of computer-mediated communication systems. Journal of Business Communication, 28(1), 23-43.

Conger, S. (1992). An exploration of the use of information technologies for inter-unit coordination. In U. E. Gattiker (Ed.), Technology mediated communication (pp. 630-117). New York: Walter de Gruyler.

Courtial, J. P. (1994). A co-word analysis of scientometrics. Scientometrics, 31(3), 251-260.

Courtial, J. P., Callon, M., & Sigogneau, M. (1984). Is indexing trustworthy? Classification of articles through co-word analyses. Journal of Information Science, 9, 47-56.

Craig, R. T. (1999). Communication theory as a field. Communication Theory, 9(2), 119-161.

Czajkowski, A., & Kiesler, S. (1984). Computer-mediated communication: Or, the new next best thing to being there. National Forum, 64(3) , 31-34.

Daft, R. L., & Lengel, R. H. (1984). Information richness: A new approach to managerial behavior and organizational design. Research in Organizational Design, 6, 191-223.

Davis, D. M. (1995). Illusions and ambiguities in the telemedia environment: an exploration of the transformation of social roles. Journal of Broadcasting & Electronic Media, 39, 517-554.

December, J. (January, 1997a). Notes on defining computer-mediated communication. Available: http:/www.december.com/cmc/mag/1997/jan/december.html

December, J. (January, 1997b). CMC studies center. Resources. Available: http:/www.december.com/cmc/study/resources.html

December, J. (January, 1997c). CMC studies center. Resources. Available: http:/www.december.com/net/tools/cmc.html

December, J. (January, 1997d). CMC involves communication via computers. Available: http:/www.december.com/cmc/mag/1997/jan/deccom.html

December, J. (1996a). Units of analysis for Internet communication. Journal of Communication, 46 (1), 14-38.

December, J. (July, 1996b). Call for articles: Definition of Computer-mediated communication. Available: http://www.december.com/cmc/mag/1996/jul/calldef.html

December, J. (1994). Computer-mediated communication perspectives. Available: http://www.december.com/cmc/images/cmcper.gif

December, J. (1993). Selected readings in computer-mediated communication, communication theory, computer networks, and the internet. Available: http://www.december.com/john/papers/cmcbib93.txt

Delia, J. G. (1987). Communication research: A history. In C. R. Berger & S. H. Chaffee (Eds.) Handbook of communication science (pp. 20-98). Newbury Park, CA: Sage.

Diodato, V. (1994). Dictionary of bibliometrics. New York: Haworth Press.

Dick, J., & Blazek, J. (1995). The nature of the discipline: A bibliometric study of communication with some comparisons to library reference/information work. In J. B. Whitlatch (Ed.), Library users and reference services (pp. 289-304). New York: Haworth Press.

Dubrovsky, V, Kiesler, S., & Sethna, B. (1991). The equalization phenomenon: Status effects in computer-mediated and face-to-face decision making groups. Human Computer Interaction, 6, 119-146.

Eadie, B. (1997, July). Hot topics draw wide interest at 1997 convention. Spectra, 33, 9.

Easterbrook, S. (1993). Computer supported cooperative work. New York: McMillan.

Egghe, L. (1985). Consequences of Lotka's law for the law of Bradford. Journal of Documentation , 41, 173-189.

Egghe, L. (1990a). A Note on Different Bradford Multipliers. Journal of the American Society for Information Science, 41(3), 204-209.

Egghe, L. (1990b). Applications of the theories of Bradford's law to the calculation of Leimkuhler's law and to the completion of bibliographies. Journal of the American Society for Information Science, 41(7), 469-492.

Egghe, L., & Rousseau, R. (1991). Transfer principles and a classification of concentration measures. Journal of the American Society for Information Science, 42(7), 405-413.

Ely, D. P. (1990). Trends and issues in educational technology, 1989. In G. J. Anglin (Ed.). Instructional technology (pp. 34-58). Englewood, CO: Libraries Unlimited Inc.

Everett, J. E., & Pecotich, A. (1991). A combined loglinear/MDS model of mapping journals by citation analysis. Journal of the American Society for Information Science, 42(6), 119-146.

Fahmy, T. (1998). xlSTAT (Version 3.4) [Computer Software]. Paris: Author.

Federal Networking Council (1995). FNC resolution: Definition of the internet. Available: http://www.fnc.gov/Internet_res.html

Ferris, P. (1997). What is CMC? An overview of scholarly definitions. Available: http:/www.december.com/cmc/mag/1997/jan/deccom.html

Fidler, R. (1997). Mediamorphasis: Understanding new media. Thousand Oaks, CA: Pine Forge Press.

Foust, J. C. (1995). Computer Technology. In A. E. Grant (Ed.), Communication technology update (4th ed., pp. 137-146). Boston: Focal Press.

Fulk, J., Schmitz, J., & Steinfield, C. (1990). A social influence model of technology use. In J. Fulk & C. Steinfields (Eds.), Organizations and communication technology (pp.117-140) Newbury Park, CA: Sage.

Fulk, J., Schmitz, J. A., & Schwartz, , D. (1992). The dynamics of context-behavior interactionism computer-mediated communication. In M. Lea (Ed.) Contexts of computer-mediated communication (pp.7-29). London: Harvester-Wheatsheaf.

Garfield, E. (1979). Citation indexing: Its theory and application in science, technology, and the humanities. New York: Wiley.

Goffman, W., & Warren, K. S. (1969). Dispersion of papers among journals based on a mathematical analysis of two diverse medical literatures. Nature, 221, 1205-1207.

Greenbaum, H. H., Hellweg, S. A., & Falcione, R. L. (1988). Organizational communication evaluation: An overview 1950 - 1981. In G. M. Goldhaber & G. A. Barnett (Eds.) Handbook of organizational communication (pp. 275-318). Norwood, NJ: Ablex Publishing.

Gregor, S. D., & Cuskelly, E. F. (1994). Computer mediated communication in distance education. Journal of Computer Assisted Learning, 10 (3), 168-181.

Griffith, T. L., & Northcraft, G. B. (1994). Distinguishing between the forest and the trees: Media, features, and methodology in electronic communication research. Organization Science, 5 (2), 272-285.

Groo, O. V. (1967). Bradford law's and the Keenan-Atherton data. American Documentation, 18, 46.

Harasim, L. M. (1990). Online education: an environment for collaboration and intellectual amplification. In L. M. Harasim (Ed.), Online education: Perspectives on a new environment (pp. 15-38). New York: Praeger.

Hightower, R., & Sayeed, L. (1995). The impact of computer-mediated communication systems on biased group discussion. Computers in Human Behavior, 11 (1), 33-44.

Hiltz, S. R. (1986). The "virtual classroom": Using computer mediated communication for university teaching. Journal of Communication, 36(2), 95-104.

Hiltz, S. R., & Johnson, K. (1989). Measuring acceptance of computer-mediated communication systems. Journal of the American Society for Information Science, 40 (6), 386-397.

Hiltz, S. R., Turoff, M., & Johnson, K. (1989). Experiments in group decision making, 3: Disinhibition, deindividuation, and group process in pen name and real name computer conferences. Decision Support Systems, 5 (2), 217-232.

Hinze, S. R. (1994). Bibliographical cartography of an emerging interdisciplinary discipline; The case of bioelectronics. Scientometrics, 29(3), 353-376.

Hollingshead, A. B. (1996). Information suppression and status persistence in group decision making: The effects of communication media. Human Communication Research, 22 (2), 193-219.

Hollingshead, A.B., McGrath, J.E., & O'Connor, K.M. (1993). Group task performance and communication technology: A longitudinal study of computer-mediated versus face-to-face work groups. Small-Group-Research, 24(3), 307-333.

Holsapple, C. W., Johnson, L. E., & Waldron, V. R. (1996). A formal model for the study of communication support systems. Human Communication Research, 22 (3), 422-447.

Holsti, O. R. (1969). Content analysis for the social sciences and humanities. Reading, MA: Addison-Wesley.

Howell R. C., & Mellar, H. (1996). A methodology for the analysis of patterns of participation within computer mediated communication courses. Instructional Science, 24 (1), 47-69.

Hunter, J. E., & Schmidt, F. L. (1990). Methods of meta-analysis: Correcting error and bias in research findings. Newbury Park, CA: Sage.

Ingwersen, P., & Christensen, F. H. (1997). Data set isolation for bibliometric online analyses of research publications: Fundamental methodological issues. Journal of the American Society for Information Science, 48(3), 205-217.

Jacobson, D. (1996). Contexts and cues in cyberspace: the pragmatics of naming in text -based virtual realities. Journal of Anthropological Research, 52 (4), 461-479.

Jessup, L. M., & Valacich, J.S. (Eds.) (1993). Group support systems. New York: McMillan.

Jobber, D., & Simpson, P. (1988). A citation analysis of selected marketing journals. International Journal of Research in Marketing, 5, 137-142.

Katz, J. S., & Hicks, D. (1997). Desktop scientometrics. Scientometrics, 38(1), 141-153.

Keenen, M. (1988). Report on the 1987 membership survey. Journal of Finance, 43, 767-777.

Kerr, E. B., & Hiltz, S. R. (1982). Computer-mediated communication systems. New York: Academic Press.

Kiesler, S., Siegel, J., & McGuire, T.W. (1984). Social psychological aspects of computer-mediated communication. American Psychologist, 39(10), 1123-1134.

Kiesler, S., & Sproull, L. (1992). Group decision making and communication technology. Organizational Behavior and Human Decision Processes, 52, 96-123.

Korzenny, L. (1978). A theory of electronic propinquity: Mediated communication in organizations. Communication Research, 5(1), 3-24.

Krippendorf, K. (1980). Content analysis: An introduction to its methodology. Beverly Hills: Sage.

Kuehn, S. A. (1994). Computer-mediated communication in instructional settings: A research agenda. Communication Education, 43(2),171-183.

Latting, J. K. (1994). Diffusion of computer-mediated communication in a graduate social work class: Lessons from "the class from hell". Computers in Human Services, 10 (3), 21-45.

Lengel, R. H., & Daft, R. L.(1988). The selection of communication media as an executive skill. Academy of Management Executive, 2 (3), 225-232.

Levinson, P. (1990). Computer conferencing in the context of the evolution of media. In L. M. Harasim (Ed.). Online education: Perspectives on a new environment (pp. 3-14). New York: Praeger.

Leydesdorff, L. (1997). Why words and co-words cannot map the development of the sciences. Journal of the American Society for Information Science,48(5), 418-427.

Li, T. (1990). Computer-mediated communications and the chinese students in the U.S. Information Society, 7 (2), 125-137.

Lievrouw, L. H. (1989). The invisible college reconsidered: Bibliometrics and the development of scientific communication theory. Communication Research, 16(5), 615-628.

Lievrouw, L. H. (1990). Reconciling structure and process in the study of scholarly communication. In C. Borgman (Ed.), Scholarly communication and bibliometrics (pp. 59-69). Newbury Park, CA: Sage.

Lindsey, D. (1980). Production and citation measures in the sociology of science: The problem of multiple authorship. Social Studies of Science, 10, 145-162.

Littlejohn, S. W. (1982). An overview of communication theory from other disciplines. In F. E. X. Dance (Ed.), Human communication essays: Comparative essays (pp.243-285). New York: Harper & Row.

Lotka, A. J. (1926). The frequency distribution of scientific productivity. Journal of the Washington Academy of Sciences, 16 (12),317-323.

Mantovani, G. (1994). Is computer-mediated communication intrinsically apt to enhance democracy in organizations? Human Relations, 47(1), 45-62.

Mabrito, M. (1992). Computer mediated communication and high apprehensive writers: Rethinking the collaborative process. Bulletin of the Association for Business Communication, 55(4), 26-29.

Matheson, K., & Zanna, M. P. (1988). The impact of computer-mediated communication on self-awareness. Computers in Human Behavior, 4 (3), 221-233.

McCain, K. W. (1989). Mapping authors in intellectual space. Communication Research, 16(5), 667-681.

McCain, K. W., & Whitney, P. J. (1994). Contrasting assessments of interdisciplinarity in emerging specialties. Knowledge: Creation, Diffusion, Utilization 15(3), 285-306.

McComb, M. (1994). Benefits of computer-mediated communication in college courses. Communication Education, 43 (2), 159-170.

McCormick, N. B., & McCormick, J. W. (1992). Computer friends and foes: Content of undergraduates' electronic mail. Computers in Human Behavior, 8 (4), 379-405.

McGrath, J. E., & Hollingshead, A. B. (1994). Groups interacting with technology. Thousand Oaks, CA: Sage.

McLaughlin, M. (1994). Announcing the journal of computing mediated communication. Available: http://sunsite.unc.edu/cmc/mag/1994/jul/jcmc.html

McMurdo, G., & Meadows, A. J. (1996). Acceptance and use of computer-mediated communication by information students. Journal of Information Science, 22 (5), 335-348.

Mennecke, B. E., Hoffer, J. A., & Wynne, B. E. (1992). The implications of group development and history for group support system theory and practice. Small Group Research, 23 (4), 524-572.

Murray, P. (1997). A rose by any other name. Available: http:/www.december.com/cmc/mag/1997/jan/murray.html

Moed. H. F. (1989). The use of bibliometric indicators for the assessment of research performance in the natural and life sciences. Leiden, Netherlands: DWSO Press.

Narin, F. (1976). Evaluative bibliometrics: The use of publication and citation analysis in the evaluation of scientific activity. Cherry Hill, NJ: Computer Horizons.

Nicholls, P. (1989). Bibliometric modeling processes and the empirical validity of Lotka's law. Journal of the American Society for Information Science, 40 (6), 379-385.

Olaniran, B. A (1996). Group process satisfaction and decision quality in computer-mediated communication: An examination of contingent relations. In R. S. Cathcart, L. A. Samovar, & L. D. Henman (Eds.), Small group communication: Theory and practice (pp. 134-146). Dubuque, IA: Brown & Benchmark.

Olaniran, B. A. (1995). Perceived communication outcomes in computer-mediated communication: An analysis of 3 systems among new users. Information Processing & Management, 31 (4), 525-541.

Olaniran, B. A. (1994). Group Performance in Computer-Mediated and Face to Face Communication Media. Management Communication Quarterly, 7 (3), 256-81 .

Olaniran, B. A, Friedrich, G. W., & VanGundy, A. B. (1992, November). Computer-mediated communication. Paper presented at the Annual Meeting of the International Communication Association, Miami, FL.

Paisley, W. (1984). Communication in the communication sciences. In B. Dervin & M. J. Voight (Eds.), Progress in the communication sciences (vol 5, pp. 1-43). Norwood, NJ: Ablex.

Paisley, W. (1986). The convergence of communication and information science. In H. Edelman (Ed.) Libraries and information science in the electronic age (pp. 122-153). Philadelphia: ISI Press.

Paisley, W. (1989). Bibliometrics, communication, and communication research. Communication Research , 16(5), 701-718.

Paisley, W. (1990). The future of bibliometrics. In C. Boreman (Ed.), Scholarly communication and bibliometrics (p. 281-299). Newbury Park, CA: Sage.

Parks, M. R., & Floyd, K. (1996). Making friends in cyberspace. Journal of Communication, 46 (1), 80-97 .

Paulsen M.F. (1995). The online report on pedagogical techniques for computer-mediated communication (ISBN 82-562-3690-6). Available: http://www.hs.nki.no/~morten/cmcped.htm

Pavlik, J. V. (1998). New media technology: Cultural and commercial perspectives. (2nd ed.). Boston: Allyn & Bacon.

Persson, O. (1994). The research fronts and intellectual base of JASIS 1986-1990. Journal of the American Society for Information Science, 45(1), 31-38.

Phelps, R. H., Wells, R. A., Ashworth, R. L., & Hahn, H. A. (1991). Effectiveness and costs of distance education. The American Journal of Distance Education, 5(3), 7-19.

Phillips, G. M., & Santoro, G. M. (1989). Teaching group discussion via computer-mediated communication. Communication Education, 38 (2), 151-161.

Pickering, J. M., & King, J. L. (1995). Hardwiring weak ties: Interorganizational computer-mediated communication, occupational communities, and organizational change . Organization Science, 6 (4), 479-486.

Potter, W. G. (1981). Lotka's law revisited. Library Trends, 31(1), 21-39.

Price, D. J. (1965). Networks of scientific papers, Science, 149, 510-515.

Pritchard, A. (1969). Statistical bibliography or bibliometrics? Journal of Documentation, 25, 348-350.

Qureshi, S. (1995). Meeting and working on an electronic social space: behavioural considerations and implications for cross cultural end user computing. Journal of End User Computing, 7 (4), 12-21 .

Rafaeli, S., & Sudweeks, F. (1994). ProjectH: Bibliography on CMC. Available: ftp.arch.su.edu.au File: /pub/projectH/bibliography

Rice, R. E. (1984). The new media: Communication, research, and technology. Beverly Hills, CA: Sage.

Rice, R. E. (1987). Computer-mediated communication and organizational innovation. Journal of Communication, 37(4), 65-94 .

Rice, R. E. (1990). Hierarchies and clusters among communication and library and information science journals, 1977-1987. In C. Boreman (Ed.), Scholarly communication and bibliometrics (pp. 138-153). Newbury Park, CA: Sage.

Rice, R. E. (1992). Task analyzability, use of new media, and effectiveness: A multi-site exploration of media richness. Organization Science, 3 (4), 475-500.

Rice, R. E. (1993). Media appropriateness: Using social presence theory to compare traditional and new organizational media. Human Communication Research, 19, 451-484.

Rice, R. E. , Chapin, J., Pressman R., Park, S., & Funkhouser, E. (1996). What's in a name? Bibliometric analysis of 40 years of the journal of broadcasting (& electronic media). Journal of Broadcasting & Electronic Media, 40, 511-539.

Rice, R. E., & Crawford, G. A. (1992). Analysis of citations between communication and library and information science articles. Proceedings of the ASIS Annual Meeting, 29, 8-12.

Rice, R. E., & Love, G. (1987). Electronic emotion: Socioemotional content in a computer mediated communication network. Communication Research, 14(1), 85-108.

Romiszowski, A. J. (1992). Computer-mediated communication: A selected bibliography. Englewood Cliffs, NJ: Educational Technology Publications.

Rosenthal, R. (1991). Meta-analytic procedures for social research (Rev. ed.), Newbury Park, CA: Sage.

Rousseau, R. (1990). Relations between continuous versions of bibliometric laws. Journal of the American Society for Information Science, 41, 197-203.

Rubincam, I. (1987). Frequently cited authors in the literature on computer application to education. Journal of Computer Based Education, 14, 150-167.

Rudy, I. (1995). Bibliography of organizational computer-mediated communication. Available: http://shum.cc.huji.ac.il/jcmc/rudybib.html

Savicki, V., Kelley, M., & Lingenfelter, D. (1996a). Gender and group composition in small task groups using computer-mediated communication. Computers in Human Behavior, 12 (2), 209-224.

Savicki, V., Kelley, M., & Lingenfelter, D. (1996b). Gender, group composition, and task type in small task groups using computer-mediated communication. Computers in Human Behavior, 12 (4), 549-565.

Scharlott, B. W., & Christ, W. G. (1995). Overcoming relationship-initiation barriers: The impact of a computer-dating system on sex role, shyness, and appearance inhibitions. Computers in Human Behavior, 11 (2), 191-204.

Scrivener, S. A. (Ed.) (1994). Computer-supported cooperative work : The multimedia and networking paradigm (unicom applied information technology). Brookfield, VT: Ashgate Publishing.

Schaefermeyer, M.J., & Sewell, E.H. (1988). Communicating by electronic mail. American Behavioral Scientist, 32(2), 112-123.

Sherblom, J. (1988). Direction, function, and signature in electronic mail . Journal of Business Communication, 25 (4), 39-54.

Short, J., Williams, E., & Christie, B. (1976). The social psychology of telecommunications. London: Wiley.

Siegel, J., Dubrovsky, V., Kiesler, S., & McGuire, T. W. (1986). Group processes in computer mediated communication. Organizational Behavior and Human Decision Processes, 37(2), 157-187.

Small, H., & Greenlee. (1989). A co-citation study of AIDs research. Communication Research , 16(5), 642-666.

Smilowitz, M., Compton, D. C., & Flint, L. (1988). The effects of computer mediated communication on an individual's judgment: A study based on the methods of Asch's social influence experiment. Computers in Human Behavior, 4 (4), 311-321.

Snyder, H., & Kurtze, D. (1996). Chaotic behavior in computer mediated network communication . Information Processing & Management, 32 (5), 555-562.

Spears, R., & Lea, M. (1994). Panacea or panoption? The hidden power in computer-mediated communication. Communication Research, 21, 427-459.

Sproull, L. S., & Kiesler, S. (1991a). Connections: New ways of working in the networked organization. Cambridge: MIT Press.

Sproull, L.S., & Kiesler, S. (1991b). Computers, networks, and work. Scientific American, 6(1), 84-91.

Staff (1984). Computer mediated communication as a force in language change. Visible Language, 18 (2), 118-41.

Staff (1995, April 4). Pulse. PC Computing, 36.

Steinfield, C. W. (1992). Computer-mediated communication in organizational settings: Emerging conceptual frameworks and directions in research. Management Communication Quarterly, 5, 348-365.

Stone, W. S., & Allen, M. W. (1990). Assessing the impact of new communication technologies on organizational dynamics. Consultation An International Journal, 9 (3), 229-240.

Straus, S. G., & McGrath, J. E. (1994). Does the medium matter? The interaction of task type and technology on group performance and member reactions. Journal of Applied Psychology, 79 (1), 87-97.

Trevino, L. K., Daft, R. L., & Lengel, R. H. (1990). Understanding managers' media choices: A symbolic interactionist perspective. In J. Fulk & C. Steinfield (Eds.), Organizations and communication technology (pp. 71-94). Newbury Park, CA: Sage Publications.

Trevino, L. K., Lengel, R. H., & Daft, R. L. (1987). Media symbolism, media richness, and media choice in organizations: A symbolic interactionist perspective. Communication Research, 14 (5), 553-74.

Trevino, L. K., & Webster, J. (1992). Flow in computer-mediated communication: Electronic mail and voice mail evaluation and impacts. Communication Research, 19, 539-573.

Tijsen, R. J. W. (1992). Cartography of science: Science metric mapping with multidimensional scaling. Leiden, Netherlands: DWSO Press.

Ungern-Steenberg, S. (1995). Applications in teaching bibliometrics. Libraries of the Future. 61st International Federation of Library Associations and Institutions Conference Proceedings.Istanbul, Turkey - August 20-25. Available: http://www.nlc-bnc.ca/ifla/IV/ifla61/61-ungs.htm

Valacich, J. S.; Paranka, D.; George, J. F., & Nunamaker, J. F. (1993). Communication concurrency and the new media: A new dimension for media richness. Communication Research, 20 (2), 249-276.

Valacich, J. S.; Wheeler, B. C.; Mennecke, B. E., & Wachter, R. (1995). The effects of numerical and logical group size on computer-mediated idea generation. Organizational Behavior and Human Decision Processes, 62 (3), 318-329.

Virnoche, M. E., & Marx, G. T. (1997). Only connect-E. M. Forster in an age of electronic communication: Computer-mediated association and community networks. Sociological Inquiry, 67 (1), 85-100.

Walther, J. B. (1997). Group and interpersonal effects in international computer-mediated collaboration. Human Communication Research, 23 (3), 342-369.

Walther, J. B. (1996a). Computer-mediated Communication: Impersonal, interpersonal, and hyperpersonal interaction. Communication Research, 23(1), 3-43.

Walther , J. B. (1996b). CMC Bibliography. Available: http://walther.llc.rpi.edu/

Walther, J. B. (1994). Anticipated ongoing interaction versus channel effects on relational communication in computer-mediated interaction. Human Communication Research, 20 (4), 473-501.

Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. Communication Research, 19 (1), 52-90.

Walther, J. B., Anderson, J. F., & Park, D. W. (1994). Interpersonal effects in computer mediated interaction: A meta analysis of social and antisocial communication. Communication Research, 21(4), 460-487.

Walther, J. B., & Burgoon, J. K. (1992). Relational communication in computer-mediated interaction. Human Communication Research, 19(1), 50-88.

Weisband, S. P (1992). Group discussion and first advocacy effects in computer-mediated and face-to-face decision making groups. Organizational Behavior and Human Decision Processes, 53, 352-380.

Weisband, S. P.; Schneider, S. K., & Connolly, T. (1995). Computer-mediated communication and social information: Status salience and status differences. Academy of Management Journal, 38 (4), 1124-1151.

Winett, R. A. (1986). Information and behavior: Systems of influence. Hillsdale: NJ, Lawrence Earlbaum.

Zack, M.H. (1993). Interactivity and Communication Mode Choice in Ongoing Management Groups. Information Systems Research, 4(3) , 207-239.

Zack, M. H., & McKenney, J. L. (1995). Social context and interaction in ongoing computer-supported management groups Electronic communication and changing organizational forms. Organization Science, 6 (4), 394-422.

Zakon, R.H. (1997). Hobbes' Internet Timeline v3.0. Available: http://info.isoc.org/guest/zakon/Internet/History/HIT.html

Zeffane, R. (1992). The dual character of computer-related achievements in an organizational context. In U. E. Gattiker (Ed.), Technology mediated communication (pp. 15-63). New York: Walter de Gruyler.

Zimmerman, D. P. (1987). A psychosocial comparison of computer-mediated and face-to-face language use among severely disturbed adolescents. Adolescence, 22 (88), 827-840.

Zsindely, S., & Schubert, A. (1989). Editors-in-chief in medical journals: Are the experts, authorities, both, or neither? Communication Research, 16(5), 695-700.

- December (1997b). "Computer-mediated communication is the process by which people create, exchange, and perceive information using networked telecommunications systems that facilitate encoding, transmitting, and decoding messages." (Internet)

- Ferris (1997). "In general, the term computer-mediated communication refers to both task-related and interpersonal communication conducted by computer. This includes communication both to and through a personal or a mainframe computer, and is generally understood to include asynchronous communication via email or through use of an electronic bulletin board; synchronous communication such as "chatting" or through the use of group software; and information manipulation, retrieval and storage through computers and electronic databases."(Internet)

- Fidler (1997). "Forms of interactive communication that involve personal computers connected to a wide-area network" (p.277)

- Olaniran (1996) "CMC can be defined as communication taking place between people through the use of computers. ...More broadly, CMC can be defined as an electronically mediated communication system, that is, a computer that facilitates communication interaction through electronic mail (e-mail) messages between two or more persons who are not physically present at the same time." (p. 134, 135)

- Paulsen (1995) "Transmission and reception of messages using computers as input, storage, output, and routing devices. CMC includes information retrieval, electronic mail, bulletin boards, and computer conferencing." (P. 3)

- Kuehn (1994) . . . "Computer-mediated communication (Phillips, Santoro, & Kuehn, 1988) involves two or more computer users who use their machines to share messages." (P. 172)

- Montavoni (1994). "CMC tools, ranging from distance-spanning and time-synchronous systems, like teleconferencing, to distance-spanning and time asynchronous systems, like electronic mail (E-mail), share some common characteristics dependent on 'the powers of computer for storing, editing, and channeling information, and for creating, and using databases (Kiesler & Sproull 1992 p. 97)' " (p. 46).

- Spears and Lea (1994) ". . . the medium of text-based electronic communication. . . " (p. 427).

- Seaton (1993). "CMC is a communication system which is telecommunications based; that is, it primarily uses electronic mail and computer conferencing software to connect dispersed individuals asynchronously." (Citing: Nipper, S., 1989) (p.50).

- Walther (1992). "Computer-mediated communication (CMC) is synchronous or asynchronous electronic mail and computer conferencing by which senders encode in text messages that are relayed from senders' computers to receivers'." (p. 52).

- Lea (1991). "The information view of CMC is that it is an impersonal medium that is efficient for transmitting task-related information, but not personal and social contextual information." (p. 157).

- Hiltz and Johnson (1990) "CMCS's use a computer to facilitate communication among people who are (usually) dispersed in time or place" (p. 740).

- Winett (1986). "Computer-mediated communication is most simply the introduction of the computer as the channel for sending, receiving, and storing textual and group discussion information. This medium allows for geographically dispersed individuals to interact simultaneously during real time, or at any time of a group member's choosing. The basic hardware and software is relatively simple: modems, a telephone line, terminals, at least one PC, and specifically designed programs for interaction, storage, and retrieval. Files in the system can be shared and worked on at any time. Messages and conferences can be public or private and involve individuals, or defined subgroups. A popular and burgeoning example of computer-mediated interactions is computer-bulletin-boards (see the following) now used for varying personal, social and entrepreneurial interest." (p. 125).

Appendix B: Dataset Construction

The following procedures detail dataset conversion from ABI/INFORM, ERIC, Psychlit, and Sociofile into a delimited format. They use WordPerfect 5.1 which has particular idiosyncratic characteristics that make some of the procedures possible. Substituting other word processing programs will alter these characteristics and render the following procedures ineffective. Macro code is provided in a table following each of database conversion procedures. Item numbers in the macro code table correspond with the respective procedures' numbers. After procedure was completed, the file was opened in WordPerfect 8.0 and copied into Excel 97 for additional manipulation.

ABI/INFORM Data Conversion

1. The data was obtained on 6/1/98. ABI/INFORM was searched from Jan. 1986 to Dec. 1997. A total of 64 entries were obtained.

2. Page breaks were inserted to separate abstracts into individual records. This was done by searching for "Access No:" and replacing it with a page break code (code is "HPg" , keystroke is ctrl-enter). HPg was preceded by a hard return "HRt". A blank page was inserted after the last record.

3. Records were put in a 1 point font with an extended page 50 inches wide so that no abstract would be more than a line long (The non-wysiwyg nature of WP51 allows for easy manipulation of small fonts). A verification check of data yielded the number of pages equaling the number of articles, plus one for the first blank page.

4. Records were removed with abiabrm.wpm. (Most macros are nested within themselves creating a do-loop that executes until no more instances of task are found). Excessive HPg codes were eliminated with search and replace.

5. Header information was removed with abhdrm.wpm.

6. Volume, issue, and page fields were created using search and replace. For example, one would search for " Vol: " and replace it with "{HRt} VO:" (keystrokes would be enter, VO:, space, space). This puts relevant fields on separate lines. Vol: was replaced with VO:, Iss: was replaced with NU:, Date was replaced with YR:; and page was replaced with PG:. Other fields were truncated to two letter descriptors as well. Title was replaced with TI:, Authors was replaced with AU:, Journal was replaced with JN:, Subjects was replaced with SU:, and Codes: was replaced with CO:.

7. Extraneous information between JN: and VO: was eliminated with abjnvob.wpm.

8. Information was eliminated from between PG: and SU: with abpgsub.wpm.

9. All articles were checked for PG: field with pgchk.wpm. All records contained field.

10. Bibliographic information TI: through PG: was removed to a separate file with bibrm.wpm so that code keyword data could be manipulated without contaminating other bibliographic fields. Bibliography file was saved as abibib98 and keyword file was saved as abikw98.

Abibib98

11. All fields and lines were moved flush left using ablnfl.wpm.

12. Excessive line breaks were pulled out of TI: field with tilnfx.

13. Excessive line breaks were pulled out of AU: field with aulnfx.

14. Redundant volume information was deleted from YR: field with yrdel.wpm.

15. All occurrences of two or more spaces, in file, were eliminated with search and replace procedures.

16. Bibliographic information was delimited by substituting tabs for field descriptors. All occurences of HRt were removed. Files were copied into spreadsheet. Spreadsheet cells were formatted for text only so that accurate transference was maintained.

Abikw98

17. Method left "Geo places:" between fields. This was extracted with georm.wpm.

18. Parentheses and numbers were removed from CO: field with abparm.wpm.

19. Keywords were put on a single line by removing HRt and ; and delimiting them with tabs. HPg was then replaced with HRt.

20. Files were then combined using copy, and pasted into a composite spreadsheet file called abi98.xls where they were matched with their respective citations.

21. Duplicates were removed using data sort procedures based on journal, title, author. This resulted in 54 unique citations.

ABI/INFORM			
Step#	Macro Name	Description	Macro Code
4	Abiabrm.wpm	Pulls abstracts from data	{Search}Abstract:·{Search}{Home}{Home}{Left}{Block}{Search}{HPg}{Search}{Up}{Del}y{Block}{Word Left}{Right}{Home}{Home}{Right}{WordRight}{Left}{Left}{Left}{Del}y{NEST}abiabrm.wpm~
5	Abhdrm.wpm	Removes header information	{Search}Title:·{Search}{Home}{Home}{Left}{Block}{SearchLeft}{HPg}{Search}{Del}y{Down}{NEST}abhdrm.wpm~
7	Abjnvob.wpm	Eliminates info from between jn: and vo:	{Search}JN:··{Search}{Search}[{Search}{Left}{Block}{Search}VO:·{Search}{Up}{Home}{Home}{Right}{Del}y{NEST}abjnvob.wpm~
8	Abpgsub.wpm	Eliminates information between pg: and su: fields	{Search}PG:·{Search}{Home}{Home}{Right}{Block}{Search}SU:·{Search}{Home}{Home}{Left}{Del}y{Enter} {NEST} abpgsub.wpm~
9	Pgchk.wpm	Checks for pg: field in records	{Search}PG:·{Search}{Search Left}{HPg}{Search}{Block}{Search}{HPg}{Search}{Move}b1{Switch}{Enter}{Home}{Home}{Down}{Switch}{NEST}pgchk.wpm~
10	Bibrm.wpm	Pulls abi ti:-pg:	{Search}TI:·{Search}{Home}{Home}{Left}{Block}{Search}PG:·{Search}{Home}{Home}{Right}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{HPg}{Switch}{NEST}bibrm.wpm~
11	Ablnfl.wpm	Makes all lines left flush	{Search}{Enter}{Search}{Block}{Word Right}{Del}y {NEST}ablnfl.wpm~
12	Tilnfx.wpm	Excessive line breaks removed from ti:	{Search}TI:·{Search}{Home}{Home}{Right}{Left}{Block}{Search}AU:·{Search}{Replace}n{Enter}{Search}·{Search}{Enter}{NEST}tilnfx.wpm~
13	Aulnfx.wpm	Excessive line breaks removed from au:	{Search}AU:·{Search}{Home}{Home}{Right}{Left}{Block}{Search}JN:·{Search}{Replace}n{Enter}{Search}·{Search}{Enter}{NEST}aulnfx.wpm~
14	Yrdel.wpm	Pulls extra info from abi yr: field	{Search}YR:·{Search}{Home}{Home}{Left}{Search}:{Search}{Block}{Search}19{Search}{Left}{Left}{Del}y·{NEST}yrdel.wpm~

Step#	Macro Name	Description	Macro Code
17	Georm.wpm	Pulls extraneous geo: field	{Search}Geo·Places:·{Search}{Home}{Home}{Left}{Block}{Home}{Home}{Right}{Del}y{Del}{NEST}georm.wpm~
18	Abparm.wpm	Removes parenths . from abi co: field	{Search}){Search}{Backspace}{Search Left}({Search}{Backspace}{Block}{Word Left} {Del}y {NEST}abparm.wpm~

Note: "·" in macro code (e.g., {Search}AN:·E, look before the E) denotes a space.
Be sure that a page break precedes first document and all macros are started with the cursor on that page and not on the first data page.

ERIC Data Conversion

1. The data was obtained on 6/1/98. ERIC databases were searched from January 1966 to December 1997. A total of 846 entries were obtained.

2. All search criterion data was deleted from the top of the file so that the a page break and then first abstract appear at the top of the screen.

3. Articles were put in a 1 point font with an extended page 50 inches wide. Pages equaled the number of articles, plus one.

4. Page breaks were put in between all abstracts using search and a replace keying in on HRt AN: and replacing it with HPg AN:.

5. Search criterion was deleted between appended file of multiple ERIC CDs.

6. Journal articles were separated from the other abstracts using "EJ" identifier that precedes the ERIC document number with erjrar.wpm

7. The procedure resulted in a frame of 459 journal abstracts

8. Headers and id numbers were removed down through CHN with pullhdr.wpm

9. All articles were checked for absent author field with auchk.wpm (3 articles fell in this category).

10. The author field was then added to these articles. The monicker staff was used to denote the author.

11. All articles were checked for absent journal field with jnchk.wpm (0 articles fell in this category).

12. All articles were checked for absent descriptor fields with dechk.wpm (0 articles fell in this category).

13. Articles abstracts and following fields were removed with pullab.wpm.

14. Bibliographic information was extracted and placed in another file with bibrem.wpm. Bibliographic information was saved as erbib98, keywords were saved as erkw98.

Erbib98

15. Volume field (VO:) was established with ervo.wpm.

16. Markers were inserted to establish missing fields. "VO: n" was replaced with "VO: v* n", "VO: p" was replaced with "VO: v* n* p".

17. Number field (NU:) was established with ernu.wpm. Visual inspection revealed a special issue of "Computers and Composition" which did not follow standard formatting. VO: field and marker for NU: were manually inserted.

18. Records with missing field had markers inserted."NU: p" is replaced with "NU: n* p".

19. PG; field was inserted with erpg.wpm.

20. PG: p was changed to *G: p, remaining PG: records had extraneous information eliminated with erpgcl.wpm.

21. Other *G: files had extraneous information eliminated with ergcl.wpm.

22. This information was delimited with procedures similar to those used with ABI/INFORM and put in a spreadsheet with search and replace. The spreadsheet file and the residual key word file were kept in the same order for reintegration.

Erkw98

23. Fields above descriptors were removed with hdabderm.wpm.

24. Fields below the descriptors were removed with rmfe.wpm.

25. A ";" was put at the end of every line with search and replace keyed in on HRt.

26. ERIC numbering was removed with ernbrm.wpm.

27. The aformentioned procedures left DE:, ID:, fields as a dataset for subsequent analysis. The DE: moniker, and ID: field descriptors were replaced with nothing (eliminating them from the file).

28. Both " ;" and "; " were replaced with ";". "-" was replaced with a space. Both HRt and "*" were replaced with nothing (eliminating them from the file).

29. Delimiting ;'s were replaced with delimiting tabs. The files, erbib98 and erkw98 were combined into spreadsheet eric98.

ERIC			
Step#	Macro Name	Description	Macro Code
6	Erjrar.wpm	Pulls journal articles	{Search}{HPg}AN:·EJ{Search}{Home}{Home}{Left}{Block}{Search}{HPg}{Search}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{Switch}{Up}{NEST}erjrar.wpm~
8	Pullhdr.wpm	Deletes headers and numbers to CHN	{Search}CHN:{Search}{End}{Block}{SearchLeft}{HPg}{Search}{Del}y{Del}{NEST}pullhdr.wpm~
9	Auchk.wpm	Seperates authorless articles	{Search}AU:·{Search}{Home}{Home}{Left}{Block}{Search}{HPg}{Search}{Up}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{HPg}{Switch}{NEST}auchk.wpm~
11	Jnchk.wpm	Seperates journaless articles	{Search}JN:·{Search}{SearchLeft}{HPg}{Search}{Block}{Search}{HPg}{Search}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{Switch}{NEST}jnchk.wpm~
12	Dechk.wpm	Seperates descriptorless articles	{Search}DE:·{Search}{SearchLeft}{HPg}{Search}{Block}{Search}{HPg}{Search}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{Switch}{NEST}dechk.wpm~
13	Pullab.wpm	Pulls abstract and subsequent text in document	{Search}AB:·{Search}{Home}{Home}{Left}{Block}{Search}{HPg}{Search}{Up}{Del}y{Del}{HPg}{NEST}pullab.wpm~
14	Bibrem.wpm	Pulls bibliographic data	{Search}AU:·{Search}{Home}{Home}{Left}{Block}{Search}JN:·{Search}{Home}{Home}{End}{Move}bm{Del}{Switch}{Enter}{Home}{Home}{End}{Home}{Home}{Down}{HPg}{Switch}{NEST}bibrem.wpm~
15	Ervo.wpm	Inserts volume field	{Search}JN:·{Search}{Search};{Search}{Enter}VO:·{NEST}ervo.wpm~
18	Ernu.wpm	Inserts NU: field	{Search}VO:·{Search}{WordRight}{Enter}NU:·{NEST}ernu.wpm~
19	Erpg.wpm	Inserts pg field following NU:	{Search}NU:·{Search}{Word Right}{Enter}PG:·{NEST}erpg.wpm~
20	Erpgcl.wpm	Purges extraneous info in PG: field	{Search}PG:·{Search}{Block}{Home}{Home}{Right}{Del}y{NEST}erpgcl.wpm
21	Ergcl.wpm	Pulls extraneous info from *G: field	{Search}*G:·p{Search}{WordRight}{Block}{Home}{Home}{Right}{Del}y{NEST}ergcl.wpm~
23	Hdabderm.wpm	Remove fields above DE:	{Search}{HPg}{Search}{Block}{Search}DE:·{Search}{Up}{End}{Del}y{Del}{NEST}hdabderm.wpm~

24	Rmfe.wpm	Remove left over fields	{Search}IS:·{Search}{Home}{Home}{Left}{Block}{Home}{Home}{Right}{Search}{Enter}{Search}{Del}y{NEST}rmfe.wpm~
26	Embrm.wpm	Removes eric numbering	{Search}{HPg}{Search}{Block}{SearchLeft};{Search}{Del}y{HPg}{NEST}embrm.wpm~

Psychlit Data Conversion

1. The data was obtained on 6/1/98. Psychlit was searched from January 1971 to December 1997. A total of 78 entries were obtained.

2. All search data was deleted from the top of the file so that a HPg and then first record appears at the top of the screen.

3. Page breaks were put in between all records with socpgbk.wpm.

4. Search criteria was deleted between appended files of multiple Psychlit CDs.

5. Records were put in a 1 point font with an extended page so that no abstract would be more than a page in length.

6. The resulting dataset was stripped of excess page breaks that resulted from the procedure. Records equaled number of entries obtained from search, 78.

7. All records were checked for AU: field with auchk.wpm (0 articles had omissions).

8. All records were checked for JN: field with jnchk.wpm (0 articles had omissions).

9. All records were checked for vol descriptor with volchk.wpm (0 articles had omissions).

10. Headers and id numbers were removed with soplhdr.wpm.

11. Bibliographic data was separated from keywords with sobibdat.wpm. Bibliography file was saved as psybib98 and keyword file was saved as psykw98.

Psybib98

12. Fields between JN: and PY: fields were eliminated using soplfld.wpm. This eliminates a number of undesired fields between the two.

13. Fields between the AU: and JN: fields were eliminated with soplfld2.wpm.

14. The above procedure left the four fields (TI, AU, JN, PY). Volume field was inserted with voins.wpm.

15. NU: field was inserted with nuins.wpm.

16. PG: field was inserted with pgins.wpm.

17. Extraneous information was removed from JN: field with psjncln.wpm.
18. Parentheses were removed from NU: field with psnucln.wpm.

19. This information was delimited with procedures similar to those used with ABI/INFORM and put in psy98.xls with search and replace.

Psykw98

20. DE: fields were pulled from abstracts using dextract.wpm. (A decision was made not to use Key phrases "KP:"because of the analytical and conceptual difficulties that their use of natural language caused)

21. DE: descriptor was removed with search and replace.

22. Word seperators "-" were converted to spaces with search and replace.

23. "Space;" was replaced with ";".

24. ";space" was replaced with ";".

25. "SpaceHPg" was repaced with "HPg".

26. ; was converted to tabs for delimiting.

27. HPg was replaced with HRt.

28. Keywords were then appended to their respective citation in psy98.xls.

Psychlit			
Step#	Macro Name	Description	Macro Code
3	Socpgbk.wpm	Inserts page breaks	{Search}AN:·{Search}{Home}{Home}{Left}{Down}{HPg}{NEST}socpgbk.wpm~
7	Auchk.wpm	Seperate authorless articles	{Search}AU:·{Search}{Home}{Home}{Left}{Block}{Search}{HPg}{Search}{Up}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{HPg}{Switch}{NEST}auchk.wpm~
8	Jnchk.wpm	Separates other abstracts from journals	{Search}JN:·{Search}{SearchLeft}{HPg}{Search}{Block}{Search}{HPg}{Search}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{Switch}{NEST}jnchk.wpm~
9	Volchk.wpm	Checks for vol marker	{Search}·Vol·{Search}{SearchLeft}{HPg}{Search}{Block}{Search}{Search}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{Switch}{NEST}volchk.wpm~
10	Soplhdr.wpm	Deletes headers to TI:	{Search}TI:·{Search}{Home}{Home}{Left}{Block}{SearchLeft}{HPg}{Search}{Del}y{Down}{NEST}soplhdr.wpm
11	Sobibdat.wpm	Pulls bib data	{Search}TI:·{Search}{Home}{Home}{Left}{Block}{Search}PY:·{Search}{Home}{Home}{Right}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{HPg}{Switch}{NEST}sobibdat.wpm~
12	Soplfld.wpm	Eliminates fields between JN: and PY:	{Search}JN:·{Search}{Home}{Home}{Right}{Block}{Search}PY:·{Search}{Home}{Home}{Left}{Del}y{Enter}{NEST}soplfld.wpm~
13	Soplfld2.wpm	Eliminates fields between AU: and JN:	{Search}AU:·{Search}{Home}{Home}{Right}{Block}{Search}JN:·{Search}{Home}{Home}{Left}{Del}y{Enter}{NEST}soplfld2.wpm~
14	Voins.wpm	Inserts VO: field for psy	{Search}JN:·{Search}{Search}·Vol·{Search}{Enter}VO:·{NEST}voins.wpm~
15	Nuins.wpm	Inserts NU: field for psy	{Search}VO:·{Search}{Search}({Search}{Left}{Enter}NU:·{NEST}nuins.wpm~
16	Pgins.wpm	Insert PG: field in psy	{Search}NU:·{Search}{Word Right}{Enter}PG:·{NEST}pgins.wpm~
17	Psjncln.wpm	Cleans psy JN:	{Search}JN:·{Search}{Search};{Search}{Block}{Home}{Home}{Right}{Del}y{NEST}psjncln.wpm~
18	Psnucln.wpm	Parentheses are removed from psy NU:	{Search}NU:·{Search}{Del}{Search}){Search}{Backspace}{NEST}psnucln.wpm~

20	Dextract.wpm	Pulls DE: field from psy file	{Search}DE:{Search}{Home}{Home}{Left}{Block}{Home}{Home}{Right}{Move}bc{Switch}{Enter}{Home}{Home}{Right}{HPg}{Switch}{NEST}dextract.wpm~

Sociofile Data Conversion

1. The data was obtained on 6/1/98. Sociofile databases were searched from January 1971 to December 1997. A total of 66 entries was obtained.

2. Page breaks were put in between all records with socpgbk.wpm.

3. Journal abstracts were pulled with soabpul.wpm. This effectively deletes association papers, book reviews, and book chapter abstracts. The resulting procedure left 49 records.

4. Records were put in a 1 point font with an extended page so that no abstract would be more than a page in length.

5. All records were checked for AU: field with auchk.wpm (0 articles had omissions).

6. All records were checked for JN: field with jnchk.wpm (0 articles had omissions).

7. Headers and id numbers were removed with soplhdr.wpm.

8. Bibliographic data was separated from keywords with sobibdat.wpm. Bibliography file was saved as socbib98 and keyword file was saved as sockw98.

Socbib98

9. Fields between JN: and PY: fields were eliminated using soplfld.wpm.

10. Fields between the AU: and JN: fields were eliminated with soplfld2.wpm.

11. The above procedure left the four fields (TI, AU, JN, PY). Page field was inserted with sopgfld.wpm.

12. Journal information was pre-processed for additional field inclusion with somoflds.wpm.

13. VO: & NU: were inserted with soflde.wpm.

14. Entries were compared with previous count and one entry was found missing. Sociological Review Monograph had no VO or NU information included and was not picked up by somoflds.wpm. Two records were impacted. Reil (1995) was repaired and Baym (1995) was manually inserted after Reil to coincide with original order. Data integrity was maintained.

15. Extraneous information was removed from JN: field with psjncln.wpm.

16. This information was delimited with procedures similar to those used with ABI/INFORM and put in soc98.xls with search and replace.

Sockw98

17. Fields preceeding De: fields were pulled using sopride.wpm.

18. Fields following the last DE: descriptor in a record were removed with soposde.wpm. This macro was started in the first record (required).

19. HRt was replaced with ;HRt and "HPg" was replaced with ";HPg".

20. ";;" were replaced with ";".

21. Code numbers and parentheses were removed with soparm.wpm.

22. * was eliminated with search and replace.

23. DE: space was removed with search and replace.

24. Word seperators "-" were converted to spaces with search and replace function

25. "Space;" was replaced with ";". This was repeated till all spaces preceding ; were removed.

26. ";space" was replaced with ";".

27. ; were converted to tabs for delimiting.

28. HPg was replaced with Hrt..

29. Keywords were then appended to their respective citation in psy98.xls.

Sociofile			
Step#	Macro Name	Description	Macro Code
2	Socpgbk.wpm	Insert page breaks	{Search}AN:·{Search}{Home}{Home}{Left}{Down}{HPg}{NEST}socpgbk.wpm~
3	Soabpul.wpm	Pulls journal abstracts	{Search}DT:·aja·{Search}{SearchLeft}{HPg}{Search}{Block}{Search}{Search}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{Switch}{NEST}soabpul.wpm~
5	Auchk.wpm	Separates authorless articles	{Search}AU:·{Search}{Home}{Home}{Left}{Block}{Search}{HPg}{Search}{Up}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{HPg}{Switch}{NEST}auchk.wpm~
6	Jnchk.wpm	Separates other abstracts from journals	{Search}JN:·{Search}{SearchLeft}{HPg}{Search}{Block}{Search}{HPg}{Search}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{Switch}{NEST}jnchk.wpm~
7	Soplhdr.wpm	Deletes headers to TI:	{Search}TI:·{Search}{Home}{Home}{Left}{Block}{SearchLeft}{HPg}{Search}{Del}y{Down}{NEST}soplhdr.wpm
8	Sobibdat.wpm	Pulls bib data	{Search}TI:·{Search}{Home}{Home}{Left}{Block}{Search}PY:·{Search}{Home}{Home}{Right}{Move}bm{Switch}{Enter}{Home}{Home}{Down}{HPg}{Switch}{NEST}sobibdat.wpm~
9	Soplfld.wpm	Eliminates fields between JN: and PY:	{Search}JN:·{Search}{Home}{Home}{Right}{Block}{Search}PY:·{Search}{Home}{Home}{Left}{Del}y{Enter}{NEST}soplfld.wpm~
10	Soplfld2.wpm	Eliminates fields between AU: and JN:	{Search}AU:·{Search}{Home}{Home}{Right}{Block}{Search}JN:·{Search}{Home}{Home}{Left}{Del}y{Enter}{NEST}soplfld2.wpm~
11	Sopgfld.wpm	Inserts pg fields	{Search}PY:·{Search}{Search Left}.{Search}{Word Left}{Enter}PG:·{Search}.{Search}{Backspace}{Down}{NEST}sopgfld.wpm~
12	Somoflds.wpm	Put in additional lines for vol etc.	{Search}JN:·{Search}{Search};{Search}{Block}{Home}{Home}{Right}{Replace}n,{Search}{Enter}{Search}{NEST}somoflds.wpm~
13	Soflde.wpm	Put field descriptor for vol & nu	{Search}JN:·{Search}{Down}{Home}{Home}{Left}VO:{Down}{Home}{Home}{Left}NU:{Home}{Home}{Right}{Block}{Search}PG:·{Search}{Home}{Home}{Left}{Del}y{Enter}{NEST}soflde.wpm~
15	Psjncln.wpm	Cleans JN:	{Search}JN:·{Search}{Search};{Search}{Block}{Home}{Home}{Right}{Del}y{NEST}psjncln.wpm~

17	Sopride.wpm	Eliminates data preceding DE	{Search}{HPg}{Search}{Block}{Search}DE:·{Search}{SearchLeft}{Enter}{Search}{Del}y{NEST}sopride.wpm~
18	Soposde.wpm	Pulls data following last DE: field	{Search}{HPg}{Search}{Left}{Block}{SearchLeft}DE:·{Search}{Home}{Home}{Right}{Del}y{Search}{HPg}{Search}{NEST}soposde.wpm~
21	Soparm.wpm	Pulls parenths from DE:	{Search};{Search}{Left}{Block}{Search Left}({Search}{Left}{Del}y{Right}{NEST}soparm.wpm~

Appendix C: Cross Referenced Articles

Below is a listing of cross-referenced articles (CRAs), sorted by frequency of journal, journal name, and date respectively.

* = Items cross-referenced in four databases

#	ABI	ERIC	PSYC	SSI	SOC	Author	Journal	Date
1		X	X		X	Savicki, V.; Kelley, M., & Lingenfelter, D.	Computers in Human Behavior	1996a
2		X	X		X	Savicki, V.; Kelley, M., & Lingenfelter, D.	Computers in Human Behavior	1996b
3		X	X		X	Hightower, R., & Sayeed, L.	Computers in Human Behavior	1995
4		X			X	Scharlott, B. W., & Christ, W. G.	Computers in Human Behavior	1995
5		X	X			Adrianson, L., & Hjelmquist, E.	Computers in Human Behavior	1993
6		X	X			McCormick, N. B., & McCormick, J. W.	Computers in Human Behavior	1992
7			X		X	Matheson, K., & Zanna, M. P.	Computers in Human Behavior	1988
8		X	X			Smilowitz, M.; Compton, D. C., & Flint, L.	Computers in Human Behavior	1988
9*		X	X	X	X	Walther, J. B.	Communication Research	1996
10*		X	X	X	X	Spears, R., & Lea, M.	Communication Research	1994
11*		X	X	X	X	Walther, J. B.; Anderson, J. F., & Park, D. W.	Communication Research	1994
12		X	X			Valacich, J. S.; Paranka, D.; George, J. F., & Nunamaker, J. F.	Communication Research	1993
13			X	X		Trevino, L. K., & Webster, J.	Communication Research	1992
14*		X	X	X	X	Walther, J. B.	Communication Research	1992
15		X	X	X		Rice, R. E., & Love, G.	Communication Research	1987
16		X	X		X	Barnes, S., & Greller, L. M.	Communication Education	1994

#	ABI	ERIC	PSYC	SSI	SOC	Author	Journal	Date
17		X	X			Kuehn, S. A.	Communication Education	1994
18		X	X			McComb, M.	Communication Education	1994
19		X	X			Phillips, G. M., & Santoro, G. M.	Communication Education	1989
20		X		X		Walther, J.B.	Human Communication Research	1997
21		X		X	X	Hollingshead, A. B.	Human Communication Research	1996
22		X		X		Holsapple, C. W., Johnson, L. E., & Waldron, V. R.	Human Communication Research	1996
23*		X	X	X	X	Walther, J. B.	Human Communication Research	1994
24		X	X			December, J.	Journal of Communication	1996
25		X		X	X	Parks, M. R., & Floyd, K.	Journal of Communication	1996
26		X		X		Rice, R. E.	Journal of Communication	1987
27		X	X			Hiltz, S. R.	Journal of Communication	1986
28	X				X	Pickering, J. M., & King, J. L.	Organization Science	1995
29	X		X			Zack, M. H., & McKenney, J. L.	Organization Science	1995
30	X		X		X	Griffith, T. L., & Northcraft, G. B.	Organization Science	1994
31	X	X				Snyder, H., & Kurtze, D.	Information Processing & Management	1996
32	X	X				Olaniran, B. A.	Information Processing & Management	1995
33	X		X			Valacich, J. S.; Wheeler, B. C.; Mennecke, B. E., & Wachter, R.	Organizational Behavior and Human Decision Processes	1995
34	X		X			Siegel, J.; Dubrovsky, V.; Kiesler, S., & McGuire, T. W.	Organizational Behavior and Human Decision Processes	1986
35	X		X			Weisband, S. P.;	Academy of Management	1995

#	ABI	ERIC	PSYC	SSI	SOC	Author	Journal	Date
						Schneider, S. K., & Connolly, T.	Journal	
36		X	X			Zimmerman, D. P.	Adolescence	1987
37			X	X		Kiesler, S.; Siegel, J., & McGuire, T. W.	American Psychologist	1984
38			X		X	Latting, J. K.	Computers in Human Services	1994
39			X		X	Stone, W. S., & Allen, M. W.	Consultation	1990
40	X				X	Hiltz, S. R.; Turoff, M., & Johnson, K.	Decision Support Systems	1989
41*	X		X	X	X	Mantovani, G.	Human Relations	1994
42	X				X	Li, T.	Information Society	1990
43		X	X			Howell R. C., & Mellar, H.	Instructional Science	1996
44				X	X	Jacobson, D.	Journal of Anthropological Research	1996
45	X		X			Straus, S. G., & McGrath, J. E.	Journal of Applied Psychology	1994
46		X		X		Davis, D. M.	Journal of Broadcasting & Electronic Media	1995
47	X	X				Sherblom, J.	Journal of Business Communication	1988
48		X	X			Gregor, S. D., & Cuskelly, E. F.	Journal of Computer Assisted Learning	1994
49	X	X				Qureshi, S.	Journal of End User Computing	1995
50	X	X				McMurdo, G., & Meadows, A. J.	Journal of Information Science	1996
51		X	X			Bresler, L.	Journal of Mathematical Behavior	1990
52	X	X				Hiltz, S. R., & Johnson, K.	Journal of the American Society for Information Science	1989

#	ABI	ERIC	PSYC	SSI	SOC	Author	Journal	Date
53		X			X	Olaniran, B. A.	Management Communication Quarterly	1994
54			X	X		Allen, B. J.	Sex Roles	1995
55			X		X	Hollingshead, A. B.; McGrath, J. E., & O'Connor, K. M.	Small Group Research	1993
56				X	X	Virnoche, M. E., & Marx, G. T.	Sociological Inquiry	1997

Appendix D: Listings of CMC Journals

Below are the alphanumeric listings of CMC Journals from ABI/INFORM, ERIC, Psychlit, Social Science Index, and SOCIOFILE through 12/97.

Academy of Management Journal 1
ACM Computing Surveys 1
Adolescence 1
Advertising Age's Business Marketing 1
American Behavioral Scientist 1
American Journal of Distance Education 11
American Psychologist 1
American School Board Journal 2
American Society for Information Science. Bulletin 1
Annual Review of Applied Linguistics 4
Annual Review of Information Science and Technology (ARIST) 1
Annual Review of Sociology 1
Behavior Research Methods Instruments and Computers 4
Behavioral & Social Sciences Librarian 2
Behaviour and Information Technology 6
British Journal of Educational Technology 2
British Journal of Social Psychology .. 1
Bulletin of the Association for Business Communication 4
Business Communication Quarterly .. 2
Business Education Forum 1
CALICO Journal 3
Canadian Journal of Educational Communication 9
Canadian Journal of University Continuing Education 1
Canadian Library Journal 2
Canadian Social Studies 1
Child & Family Behavior Therapy ... 1
Chronicle of Higher Education 1
Clearing House 2
Cognitive Science 1
Communication Education 6
Communication Research 7
Communication Research Reports 2
Communication World 1
Communication: Journalism Education Today (C:JET) 1
Communications of the ACM 1
Community College Journalist 1
Computer Networks & ISDN Systems 1
Computer Supported Cooperative Work 5
Computers & Education 8
Computers and Composition 9
Computers and the Humanities 2
Computers in Human Behavior 16
Computers in Human Services 2
Computers in Libraries 4
Computers in the Schools 4
Computing Teacher 3
Consultation An International Journal . 1
Current Anthropology 1
Database 1
Decision Sciences 1
Decision Support Systems 1
Distance Education 3
Distance Education Report 1
Distance Educator 3
E Magazine 1
ED Education at a Distance 4
ED Journal 1
Education for Information 3
Education in Science 1
Educational and Training Technology International 5
Educational Leadership 1
Educational Media International 7
Educational Psychology 1
Educational Researcher 1
Educational Technology 15
Educational Technology Research and Development 3
Educational Technology Review 1

Educom Review 9
Electronic Journal of Communication La Revue Electronique de Communication 1
Electronic Library 5
Electronic Networking: Research Applications and Policy 1
Elementary School Guidance & Counseling 4
ELT Journal 1
English for Special Purposes 1
English in Texas 1
Ergonomics 1
ETC: A Review of General Semantics 2
Futures 2
Futurist 1
Government Information Quarterly ... 1
Green Teacher 3
Group Decision and Negotiation 1
Health & Social Work 2
Higher Education 1
Hispanic 1
History Computer Review 1
Human Communication Research 9
Human Computer Interaction 2
Human Relations 1
Humanities 1
IEEE Transactions on Professional Communication 5
Illinois Libraries 1
inCite 1
Information & Management 4
Information Infrastructure and Policy . 1
Information Management and Technology 1
Information Processing & Management 3
Information Resources Management Journal 1
Information Services & Use 3
Information Society 7
Information Systems Research 1
Information Technology and Libraries 1
Innovations in Education and Training International 1
Instructional Science 1
Interacting with Computers 2
Interactive Learning Environments ... 2
Interactive Learning International 1
International Forum on Information and Documentation 1
International Journal of Instructional Media 3
International Journal of Man Machine Studies 2
International Journal of Rehabilitation Research 1
International Journal of Social Education 1
Internet Reference Services Quarterly . 1
Internet Research 8
Internet World 2
Interpersonal Computing and Technology 1
Javnost / Public 2
Journal of Adventure Education and Outdoor Leadership 1
Journal of Anthropological Research .. 1
Journal of Applied Psychology 2
Journal of Applied Social Psychology . 1
Journal of Broadcasting & Electronic Media 4
Journal of Business and Technical Communication 1
Journal of Business Communication .. 3
Journal of Communication 7
Journal of Computer Assisted Learning 4
Journal of Computer-Mediated Communication 9
Journal of Computers in Mathematics and Science Teaching 2
Journal of Computing in Childhood Education 2
Journal of Developmental Education .. 2
Journal of Distance Education 5
Journal of Documentation 3
Journal of Economic Education 1
Journal of Educational Computing Research 7
Journal of Educational Multimedia and Hypermedia 2

Journal of Educational Technology Systems 2
Journal of Educational Television 1
Journal of End User Computing 2
Journal of Humanistic Psychology ... 1
Journal of Information Science 4
Journal of Interactive Instruction Development 3
Journal of Interlibrary Loan Document Delivery & Information Supply 2
Journal of Library Administration 1
Journal of Marital and Family Therapy 1
Journal of Mathematical Behavior 2
Journal of Personality and Social Psychology 1
Journal of Research on Computing in Education 4
Journal of Science Education and Technology 1
Journal of Staff Development 1
Journal of Teacher Education 1
Journal of Teaching Writing 1
Journal of Technology and Teacher Education 4
Journal of the American Society for Information Science 5
Journal of Urban Technology 1
Journal of Visual Literacy 4
Journalism Educator 2
Language in Society 1
Learning and Leading with Technology 10
Library Hi Tech 3
Library Hi Tech News 1
Library Journal 1
Library Trends 3
Link-Up 1
Machine Mediated Learning 2
Management Communication Quarterly 3
Management Science 1
Media Culture & Society 2
Media in Education and Development . 1
Medical Teacher 1
Medijska Istrazivanja (Media Research: Croatian Journal for Journalism and the Media) 1
Microcomputers for Information Management 1
MultiCultural Review 2
MultiMedia Schools 2
National Forum 1
New Jersey Journal of Communication 5
New Statesman 1
NewMedia 2
Nordicom Review 2
OAH Magazine of History 2
Office: Technology & People 2
Ohio Media Spectrum 1
On Call 1
Online 5
Open Learning 1
Organization Science 6
Organizational Behavior and Human Decision Processes 3
Perceptual and Motor Skills 1
Performance and Instruction 1
Perspectives in Education and Deafness 1
Political Communication 1
Proceedings of the ASIS Annual Meeting10
Proceedings of the ASIS Mid Year Meeting 3
PS: Political Science and Politics 3
Psychological Science 2
Psychology Today 2
Public Enterprise 1
Public Libraries 1
Public Management 1
Public Opinion Quarterly 1
Public Relations Review 1
Qualitative Sociology 1
Quarterly of the National Writing Project and the Center for the Study of Writing and Literacy 1
Quill and Scroll 1
Reading Research Quarterly 1

Reference Librarian 1
Research in the Teaching of English .. 1
Research Policy 1
Research Strategies 2
Research-on-Language-and-Social-Interact ion 1
Scandinavian Journal of Educational Research 1
School Library Journal 1
School Library Media Activities Monthly 1
Science 1
Science & Technology Libraries 1
Science and Engineering Ethics 1
Science Communication 1
Searcher 1
Sex Roles 2
Sistemi Intelligenti 1
Small Group Research 3
Social Behaviour 1
Social Education 5
Social Policy 1
Social Science Computer Review 3
Social Studies 1
Social Studies and the Young Learner . 1
Social Studies of Science 1
Social Work with Groups 1
Sociological Inquiry 5
Sociological Review Monograph 2
Soviet Journal of Psychology 1
T.H.E. Journal 5
Teachers & Writers 1
Teaching Music 1
Teaching of Psychology 3
Teaching Pre K 8 1
Teaching Sociology 1
Technical Communication: Journal of the Society for Technical Communication 4
Technology & Learning 3
Technology Connection 1
Technology Review 2
TECHNOS 3
TechTrends 8
Telecommunications 2
Telematics and Informatics 2
The Journal of Social Issues 1
Update on Law Related Education 1
Visible Language 1
WE International 1
Western Journal of Communication .. 1
Wilson Library Bulletin 3
Writing Notebook 2
Written Communication 1
Yale Law Journal 1

Below are the frequency listings of CMC Journals from ABI/INFORM, ERIC, Psychlit, Social Science Index, and SOCIOFILE through 12/97.

Computers in Human Behavior 16
Educational Technology 15
American Journal of Distance Education 11
Interpersonal Computing and Technology 11
Learning and Leading with Technology 10
Proceedings of the ASIS Annual Meeting 10
Canadian Journal of Educational Communication 9
Computers and Composition 9
Educom Review 9
Human Communication Research 9
Journal of Computer-Mediated Communication 9
Computers & Education 8
Internet Research 8
TechTrends 8
Communication Research 7
Educational Media International 7
Information Society 7
Journal of Communication 7
Journal of Educational Computing Research 7
Behaviour and Information Technology 6
Communication Education 6
Organization Science 6
Computer Supported Cooperative Work 5
Educational and Training Technology International 5
Electronic Library 5
IEEE Transactions on Professional Communication 5
Journal of Distance Education 5
Journal of the American Society for Information Science 5
New Jersey Journal of Communication 5
Online 5
Social Education 5
Sociological Inquiry 5
T.H.E. Journal 5
Annual Review of Applied Linguistics 4
Behavior Research Methods Instruments and Computers 4
Bulletin of the Association for Business Communication 4
Computers in Libraries 4
Computers in the Schools 4
ED Education at a Distance 4
Elementary School Guidance & Counseling 4
Information & Management 4
Journal of Broadcasting & Electronic Media 4
Journal of Computer Assisted Learning 4
Journal of Information Science 4
Journal of Research on Computing in Education 4
Journal of Technology and Teacher Education 4
Journal of Visual Literacy 4
Technical Communication: Journal of the Society for Technical Communication 4
CALICO Journal 3
Computing Teacher 3
Distance Education 3
Distance Educator 3
Education for Information 3
Educational Technology Research and Development 3
Green Teacher 3
Information Processing & Management 3
Information Services & Use 3
International Journal of Instructional Media 3
Journal of Business Communication .. 3

Journal of Documentation 3
Journal of Interactive Instruction Development 3
Library Hi Tech 3
Library Trends 3
Management Communication Quarterly 3
Organizational Behavior and Human Decision Processes 3
Proceedings of the ASIS Mid Year Meeting 3
PS: Political Science and Politics 3
Small Group Research 3
Social Science Computer Review 3
Teaching of Psychology 3
Technology & Learning 3
TECHNOS 3
Wilson Library Bulletin 3
American School Board Journal 2
Behavioral & Social Sciences Librarian 2
British Journal of Educational Technology 2
Business Communication Quarterly .. 2
Canadian Library Journal 2
Clearing House 2
Communication Research Reports 2
Computers and the Humanities 2
Computers in Human Services 2
ETC: A Review of General Semantics 2
Futures 2
Health & Social Work 2
Human Computer Interaction 2
Interacting with Computers 2
Interactive Learning Environments ... 2
International Journal of Man Machine Studies 2
Internet World 2
Javnost / Public 2
Journal of Applied Psychology 2
Journal of Computers in Mathematics and Science Teaching 2
Journal of Computing in Childhood Education 2
Journal of Developmental Education .. 2
Journal of Educational Multimedia and Hypermedia 2
Journal of Educational Technology Systems 2
Journal of End User Computing 2
Journal of Interlibrary Loan Document Delivery & Information Supply 2
Journal of Mathematical Behavior 2
Journalism Educator 2
Machine Mediated Learning 2
Media Culture & Society 2
MultiCultural Review 2
MultiMedia Schools 2
NewMedia 2
Nordicom Review 2
OAH Magazine of History 2
Office: Technology & People 2
Psychological Science 2
Psychology Today 2
Research Strategies 2
Sex Roles 2
Sociological Review Monograph 2
Technology Review 2
Telecommunications 2
Telematics and Informatics 2
Writing Notebook 2
All other journals are singletons

Appendix E: Core Journal and Core Author Database Relationship

Below is the journal and author broken down by core database, CRA, and core elements. Significance is calculated on core elements vs. the remaining distribution in the respective databases..

Core Journals Characteristics by Database

Type	#	N	ABI	ERIC	PSY	SSI	SOC	Overall
Core	>5	195	11	164	36	16	17	244
Others	<6	416	43	295	42	31	32	443
Total		611	54	459	78	47	49	687
% Core	>5	195	5.64%	84.10%	18.46%	8.21%	8.72%	35.52%
% Others	<6	416	10.34%	70.91%	10.10%	7.45%	7.69%	64.48%
% Overall		611	8.84%	75.12%	12.77%	7.69%	8.02%	100.00%
CRAs								
Core	>5	195	4	25	23	12	16	80
Others	<6	416	12	12	14	6	8	52
Total		611	16	37	37	18	24	132
% Core	>5	195	2.05%	12.82%	11.79%	6.15%	8.21%	60.61%
% Others	<6	416	2.88%	2.88%	3.37%	1.44%	1.92%	39.39%
% Overall		611	2.62%	6.06%	6.06%	2.95%	3.93%	100.00%
Odds Ratio			0.7051	4.9510	3.8397	4.4809	4.5587	4.8696
2-Sided Exact Test			p=.7865	p<.0001	p=.0002	p=.0031	p=.0005	p< .0001

Core Authors Characteristics by Database

Type	#	N	ABI	ERIC	PSY	SSI	SOC	Overall
Core	>2	80	14	48	27	9	14	112
Others	<3	531	40	411	51	38	35	575
Total		611	54	459	78	47	49	687
% Core	>2	80	17.50%	60.00%	33.75%	11.25%	17.50%	16.30%
% Others	<3	531	7.53%	77.40%	9.60%	7.16%	6.59%	83.70%
% Overall		611	8.84%	75.12%	12.77%	7.69%	8.02%	100.00%
CRAs								
Core	>2	80	3	14	12	5	11	45
Others	<3	531	13	23	25	13	13	87
Total		611	16	37	37	18	24	132
% Core	>2	80	3.75%	17.50%	15.00%	6.25%	13.75%	34.09%
% Others	<3	531	2.45%	4.33%	4.71%	2.45%	2.45%	65.91%
% Overall		611	2.62%	6.06%	6.06%	2.95%	3.93%	100.00%
Odds Ratio			1.5524	4.6851	3.5718	2.6564	6.3523	6.5616
2-Sided Exact Test			p=.4530	p=.0001	p=.0013	p=.0731	p=.0001	p=.0100

Appendix F: Bibliometric Literature Size Comparisons of Journals and Authors

Rank list truncated at: 118
Number of zones: 10
Multiplier: 1.40
Q Prime rank: 4

Estimated truncating rank: 111
Estimated sum of articles at this point: 462
Approximate zone cohort: 77.00
Estimated sources in first rank: 6.83

Leimkuhlers formula: $R(r) = 229.87 \log(1 + 0.0582\ r)$
Estimation of parameters for complete bibliography:
Estimate of Total Articles: 770
Estimate of Total Journals: 377

Leimkuhlers formula:
$R(r) = 229.87 \log(1 + 0.0582\ r)$

Journals' Rank Distribution and Predictions

A Number of Entries	B Frequency of Each Entry	Running Sum of A "r"	Running sum of A x B "R (r) observed"	"R(r) Predicted"
1	116	1	16	13.01
1	15	2	31	25.32
2	11	4	53	48.12
2	10	6	73	68.87
5	9	11	118	113.77
3	8	14	142	137.03
5	7	19	177	171.22
3	6	22	195	189.53
11	5	33	250	246.42
15	4	48	310	306.54
25	3	73	385	381.17
45	2	118	475	474.22
136	1	254	611	634.25

Authors' Actual and Theoretical Distribution

Articles Contributed (A)	# of Authors (B)	Lotka's Prediction (C)	A*B (D)	Cum. A*B	Difference B - C	Percentage of All Unique Articles	
						D	Cum. D
8	1	6.86	8	8	5.86	1.31%	1.31%
7	1	8.96	7	15	7.96	1.15%	2.45%
5	1	17.56	5	20	16.56	0.82%	3.27%
4	6	27.44	24	44	21.44	3.93%	7.20%
3	12	48.78	36	80	36.78	5.89%	13.09%
2	46	109.75	92	172	63.75	15.06%	28.15%
1	439	303.60	439	611	*135.40	71.85%	100.00%

* = Maximum Difference

Appendix G: Keyword Analysis

Below is a keyword analysis divided into three sections. The first section is a longitudinal analysis of the top 116 keywords analyzed. The second section is non-singleton keywords sorted by frequency that did not meet the 10 journal criterion. The third section is an alphanumeric listing of all non-singleton keywords.

Top Keyword Frequency Listing and Longitudinal Analysis

Indicated are the problematisation and the years that the problematisations appear. The following columns contain data collapsed under the boundary years indicated. Early is the label for early dominance. It is defined by a problematisations being more prolific from 1984-1991 than from 1992-1997. Later is the label for later emergence. It is defined by a problematisation appearing in the dataset only after 1991. Lined items mark the first year of terms that have put together more than a single year surpassing the 10 journal threshold.

Problematisations	Total	84	85	86	87	88	89	90	91	92	93	94	95	96	97	84 87	88 91	92 95	96 97	EARLY	LATER
Computer Mediated Communication	457	1	0	0	1	7	1	13	14	34	26	57	127	135	41	2	35	244	176		
Higher Education	204	0	0	1	2	5	1	14	6	16	18	34	52	43	12	3	26	120	55		
Internet	139	0	0	0	0	0	0	0	1	3	2	14	49	60	10	0	1	68	70		
Electronic Mail	137	0	0	0	2	6	2	6	8	15	8	18	39	29	4	2	22	80	33		
Computer Networks	136	1	0	2	2	3	0	6	4	15	10	23	42	26	2	5	13	90	28		
Computer Assisted Instruction	107	0	0	1	1	4	1	13	4	12	13	11	13	25	9	2	22	49	34		
Telecommunications	101	0	0	0	1	2	1	3	3	6	10	18	32	22	3	1	9	66	25		
Distance Education	76	0	0	0	2	3	1	4	6	8	4	7	19	15	7	2	14	38	22		
Information Networks	72	0	0	0	2	4	0	3	3	9	7	7	25	11	1	2	10	48	12		
Computer Uses In Education	69	0	0	0	0	2	0	0	0	3	3	4	25	25	7	0	2	35	32		
Interpersonal Communication	67	1	1	0	4	3	0	6	2	3	8	13	13	9	4	6	11	37	13		
Teleconferencing	62	0	0	2	2	3	2	6	5	8	3	8	9	9	5	4	16	28	14		
Computer Applications	57	1	0	1	2	4	2	8	5	3	5	11	6	9	0	4	19	25	9		
Foreign Countries	57	0	0	0	2	1	2	6	5	7	5	7	9	8	5	2	14	28	13		
Adulthood	53	0	1	3	2	5	2	3	5	5	6	7	7	6	1	6	15	25	7		
Computers	53	2	1	3	3	2	2	2	2	1	6	6	9	12	2	9	8	22	14		

Problematisations	Total	84	85	86	87	88	89	90	91	92	93	94	95	96	97	84 87	88 91	92 95	96 97	EARLY	LATER
Information Technology	51	0	0	0	0	2	0	2	1	4	1	6	13	18	4	0	5	24	22		
Educational Technology	48	0	0	0	1	2	0	2	2	3	1	11	9	12	5	1	6	24	17		
Online Systems	44	0	0	0	0	2	0	1	0	3	1	5	17	12	3	0	3	26	15		
Group Dynamics	43	0	0	1	0	2	3	3	0	2	3	5	13	9	2	1	8	23	11		
Experimental Theoretical	42	0	0	1	1	1	4	2	1	0	0	6	13	9	4	2	8	19	13		
Elementary Secondary Education	39	0	0	0	0	1	0	3	1	0	1	7	9	13	4	0	5	17	17		
Teaching Methods	39	0	0	0	1	1	1	5	1	1	2	3	10	11	3	1	8	16	14		
Communication Research	38	0	0	0	1	2	0	1	0	2	1	9	10	11	1	1	3	22	12		
Studies	38	0	0	1	0	1	4	1	1	0	0	5	13	9	3	1	7	18	12		
Futures Of Society	32	0	0	0	0	0	0	3	1	4	4	4	11	3	2	0	4	23	5		
Communication Thought Transfer	31	1	0	0	1	0	1	1	0	8	6	6	5	2	0	2	2	25	2		
Technological Advancement	30	0	0	0	1	2	0	0	0	1	1	1	9	11	4	1	2	12	15		
Case Studies	29	0	0	0	1	2	0	2	1	3	3	6	6	4	1	1	5	18	5		
Telecommunications Systems	29	0	0	2	2	1	3	2	0	0	1	4	10	1	3	4	6	15	4		
World Wide Web	29	0	0	0	0	0	0	0	0	0	0	0	3	18	8	0	0	3	26		X
Models	28	0	0	0	1	1	0	0	2	6	3	4	7	3	1	1	3	20	4		
Communication	26	0	0	1	1	1	3	1	1	0	1	6	3	8	0	2	6	10	8		
Organizational Behavior	26	0	1	1	1	1	5	2	0	0	1	5	5	2	2	3	8	11	4		
Cooperative Learning	25	0	0	0	0	0	0	1	1	1	3	2	9	7	1	0	2	15	8		
Student Attitudes	25	0	0	1	0	2	0	2	1	1	1	6	6	5	0	1	5	14	5		
United States	25	0	0	0	0	0	2	3	1	1	0	3	10	3	2	0	6	14	5		
Access To Information	24	0	0	0	0	0	0	0	0	1	1	2	8	9	3	0	0	12	12		X
Group Discussion	23	0	0	0	1	2	0	0	0	1	3	3	3	9	1	1	2	10	10		

Problematisations	Total	84	85	86	87	88	89	90	91	92	93	94	95	96	97	84 87	88 91	92 95	96 97	EARLY	LATER
Tables Data	22	0	0	0	0	0	1	0	1	10	4	1	3	2	0	0	2	18	2		
Communication Systems	21	0	1	0	0	2	1	1	1	4	0	6	3	2	0	1	5	13	2		
Comparative Analysis	21	0	0	0	0	0	0	1	3	5	2	2	4	2	2	0	4	13	4		
Computer Software	21	0	1	0	1	0	0	2	0	2	1	1	5	6	2	2	2	9	8		
Teacher Role	21	0	0	0	1	1	0	3	0	3	1	6	2	4	0	1	4	12	4		
Use Studies	21	0	0	0	0	0	1	2	1	4	0	1	5	6	1	0	4	10	7		
Computer Mediated Communication Systems	20	0	0	0	2	5	1	7	2	0	2	0	1	0	0	2	15	3	0	X	
Instructional Innovation	20	0	0	0	0	0	1	1	0	1	0	2	5	8	2	0	2	8	10		
Interaction	20	0	0	0	0	1	0	4	0	2	0	0	1	12	0	0	5	3	12		
Users Information	20	0	0	0	0	1	0	1	3	2	1	1	4	7	0	0	5	8	7		
Decision Making	18	0	0	0	0	1	2	1	0	0	2	2	4	6	0	0	4	8	6		
Group Decision Making	18	0	0	1	0	1	1	1	3	0	0	2	3	4	2	1	6	5	6		
Content Analysis	17	0	0	0	2	1	0	0	1	5	1	4	1	1	1	2	2	11	2		
Electronic Mail Systems	17	0	0	1	1	1	3	1	0	1	0	3	4	1	1	2	5	8	2		
Information Systems	17	0	0	0	1	0	0	1	1	1	0	1	5	7	0	1	2	7	7		
Problems	17	0	0	0	0	0	0	0	0	0	2	2	6	6	1	0	0	10	7		X
Sex Differences	17	0	0	0	1	0	0	0	0	1	1	3	6	4	1	1	0	11	5		
Examples	16	0	0	0	0	0	0	0	0	3	2	2	4	5	0	0	0	11	5		X
Instructional Design	16	0	0	0	0	0	0	2	0	2	0	3	6	3	0	0	2	11	3		
Research Needs	16	0	0	0	0	2	0	0	2	6	1	3	1	0	1	0	4	11	1		
Secondary Education	16	0	0	0	1	0	0	1	1	3	0	1	5	4	0	1	2	9	4		
Communications	15	0	0	1	0	0	0	1	0	3	0	0	7	1	2	1	1	10	3		

Problematisations	Total	84	85	86	87	88	89	90	91	92	93	94	95	96	97	84 87	88 91	92 95	96 97	EARLY	LATER
Hypermedia	15	0	0	0	0	0	0	1	0	3	1	0	4	4	2	0	1	8	6		
Professional Development	15	0	0	0	0	0	0	2	0	2	1	0	5	5	0	0	2	8	5		
Questionnaires	15	0	0	0	0	1	1	3	1	2	0	0	4	3	0	0	6	6	3		
Software & Systems	15	0	0	0	0	0	2	2	0	0	0	2	4	4	1	0	4	6	5		
Student Participation	15	0	0	0	0	1	0	0	0	1	1	0	2	8	2	0	1	4	10		
Discourse Analysis	14	0	0	0	0	1	0	1	0	2	0	2	3	5	0	0	2	7	5		
Graduate Students	14	0	0	1	0	0	0	1	1	0	0	5	4	2	0	1	2	9	2		
Information Dissemination	14	0	0	0	0	0	0	0	0	0	0	0	6	7	1	0	0	6	8		X
Information Sources	14	0	0	0	0	0	0	0	0	0	1	1	6	5	1	0	0	8	6		X
Instructional Effectiveness	14	0	0	0	0	0	0	1	2	0	0	1	3	4	3	0	3	4	7		
Listservs	14	0	0	0	0	0	0	0	0	0	0	2	2	7	3	0	0	4	10		X
Online Searching	14	0	0	0	0	1	0	0	0	1	0	2	2	6	2	0	1	5	8		
Social Interaction	14	0	0	0	1	1	0	0	0	0	0	2	4	3	3	1	1	6	6		
Surveys	14	0	0	1	0	1	0	1	0	1	1	2	5	1	1	1	2	9	2		
Teacher Student Relationship	14	0	0	0	0	0	0	0	0	1	0	4	3	3	3	0	0	8	6		X
Computer Attitudes	13	0	0	0	0	1	0	1	1	1	0	1	2	6	0	0	3	4	6		
Cooperation	13	0	0	0	0	0	0	0	0	0	1	1	5	5	1	0	0	7	6		X
Electronic Publishing	13	0	0	0	0	0	0	1	1	1	0	1	6	2	1	0	2	8	3		
International Programs	13	0	0	0	0	0	1	2	1	0	2	0	5	1	1	0	4	7	2		
Learning Environments	13	0	0	0	0	0	0	0	0	4	3	0	2	3	1	0	0	9	4		X
Microcomputers	13	0	0	0	2	1	0	2	1	3	0	2	0	2	0	2	4	5	2		
Social Studies	13	0	0	0	0	0	0	0	0	0	0	2	1	7	3	0	0	3	10		X
Undergraduate Students	13	0	0	0	0	0	0	0	0	2	0	2	5	4	0	0	0	9	4		X

Problematisations	Total	84	85	86	87	88	89	90	91	92	93	94	95	96	97	84 87	88 91	92 95	96 97	EARLY	LATER
College Students	12	0	0	1	0	0	0	0	0	1	1	1	2	5	1	1	0	5	6		
Databases	12	0	0	0	0	0	0	1	0	3	1	0	3	4	0	0	1	7	4		
Educational Resources	12	0	0	0	0	0	0	0	0	0	1	0	3	5	3	0	0	4	8		X
Interactive Video	12	0	0	0	0	0	0	0	0	0	1	1	5	4	1	0	0	7	5		X
Multimedia Instruction	12	0	0	0	0	0	0	0	0	1	0	1	5	3	2	0	0	7	5		X
Multimedia Materials	12	0	0	0	0	0	0	0	0	0	0	0	6	3	3	0	0	6	6		X
Nontraditional Education	12	0	0	0	0	0	0	0	0	0	0	1	5	5	1	0	0	6	6		X
Postsecondary Education	12	0	0	0	0	0	0	1	2	1	2	1	0	4	1	0	3	4	5		
Privacy	12	0	0	0	0	0	1	0	0	0	0	6	0	5	0	0	1	6	5		
Research Methodology	12	0	0	1	0	1	0	1	1	3	1	1	1	2	0	1	3	6	2		
Computer Literacy	11	0	0	0	0	0	0	0	0	0	0	3	6	2	0	0	0	9	2		X
Computer Oriented Programs	11	0	0	0	2	0	0	0	0	0	0	1	2	6	0	2	0	3	6		
Electronic Text	11	0	0	0	0	0	0	0	1	0	1	0	5	3	1	0	1	6	4		
Elementary Education	11	0	0	0	0	1	0	0	0	0	0	0	6	3	1	0	1	6	4		
Graduate Study	11	0	0	0	0	1	0	1	0	0	2	1	2	4	0	0	2	5	4		
Guidelines	11	0	0	0	0	0	0	0	0	0	2	0	4	5	0	0	0	6	5		X
Learner Controlled Instruction	11	0	0	0	0	0	0	1	0	3	3	1	1	2	0	0	1	8	2		
Literature Reviews	11	0	0	0	0	0	0	1	1	1	2	1	4	0	1	0	2	8	1		
Teacher Attitudes	11	0	0	0	0	0	0	2	0	2	2	1	1	3	0	0	2	6	3		
Teacher Education	11	0	0	0	0	0	0	0	2	1	3	1	2	2	0	0	2	7	2		
Academic Achievement	10	0	0	0	0	1	0	1	2	1	1	0	3	1	0	0	4	5	1		
Academic Libraries	10	0	0	0	0	0	0	1	0	0	1	2	1	4	1	0	1	4	5		
Communication Social Aspects	10	1	0	0	0	0	0	0	0	1	0	1	1	5	1	1	0	3	6		

Problematisations	Total	84	85	86	87	88	89	90	91	92	93	94	95	96	97	84 87	88 91	92 95	96 97	EARLY	LATER
Communications Systems	10	0	0	0	0	1	3	1	0	0	0	4	0	1	0	0	5	4	1		
Cost Effectiveness	10	0	0	0	0	0	0	0	2	0	0	2	4	2	0	0	2	6	2		
Curriculum Development	10	0	0	0	0	0	0	0	0	1	2	2	2	3	0	0	0	7	3		X
Educational Change	10	0	0	0	0	0	0	0	0	0	0	2	6	2	0	0	0	8	2		X
Feedback	10	0	0	1	1	0	0	0	0	0	0	1	2	5	0	2	0	3	5		
Learning Activities	10	0	0	0	0	0	0	1	0	0	1	0	1	7	0	0	1	2	7		
Man Machine Systems	10	0	0	0	0	0	0	0	2	3	1	1	1	2	0	0	2	6	2		
Organizational Communication	10	0	0	0	2	1	0	0	0	0	0	2	2	3	0	2	1	4	3		
Writing Instruction	10	0	0	0	0	0	0	4	0	3	0	1	0	0	2	0	4	4	2		

Bottom Keyword Frequency Listing

Class Activities 9
Community 9
Computer Users 9
Costs 9
Decision Support Systems 9
Discussion Groups 9
High Schools 9
Information Exchange . . . 9
Information Retrieval 9
Information Services 9
Instructional Materials . . . 9
Interpersonal Relationship 9
Learning Processes 9
Learning Strategies 9
Pilot Projects 9
User Needs Information . . 9
Classroom Environment . . 8
Cognitive Processes 8
Communication Behavior . 8
Local Area Networks 8
Managerial Skills 8
Problem Solving 8
Qualitative Research 8
Reference Services 8
Scholarly Communication . 8
Scientific And Technical Information 8
Social Influences 8
Statistical Analysis 8
Student Projects 8
Telecommunications Media 8
Writing Composition 8
Writing Research 8
Business Communication . 7
Collaborative Writing 7
Communications & Information Management . 7
Conferences 7
Connectivity 7
Courseware 7
Democracy 7
Electronic Libraries 7
Environmental Education . 7
Ethics 7
Evaluation Methods 7
Experiential Learning 7
Face To Face Communication 7
Global Approach 7
Groups 7
Information Seeking 7
Interviews 7
Language Usage 7
Library Services 7
Masters Programs 7
Organizational Change . . . 7
Program Descriptions 7
Prototypes 7
Second Language Learning 7
Technical Writing 7
United Kingdom 7
Usenet 7
Verbal Communication . . . 7
Virtual Reality 7
Collaborative Learning . . . 6
Communication Patterns . 6
Computer System Design 6
Conventional Instruction . . 6
Copyrights 6
Course Content 6
Cyberspace 6
Discussion Teaching Technique 6
Educational Development . 6
Electronic Technology . . . 6
Females 6
Groupware 6
Independent Study 6
Information Management . 6
Information Utilization 6
Inservice Teacher Education 6
Instructional Development 6
Intercultural Communication 6
Intermode Differences . . . 6
International Communication 6
Librarians 6
Longitudinal Studies 6
Psychology 6
Second Language Instruction 6
Seminars 6
Skill Development 6
Social Networks 6
Student Motivation 6
Students 6
Technology 6
Technology Integration . . . 6
Technology Utilization . . . 6
Australia 5
Canada 5
Change 5
College Faculty 5
Communications Networks 5
Computer Graphics 5
Computer Software Evaluation 5
Course Development 5
Course Evaluation 5
Curriculum Enrichment . . . 5
Design Requirements 5
Educational Research . . . 5
Discussion 5
Electronic Media 5
English Second Language 5
Freshman Composition . . 5
Gender Issues 5
Government Role 5
Group Participation 5
Group Problem Solving . . 5
Historical Background . . . 5
Hypotheses 5
Hypothesis Testing 5
Information Technology Social Aspects 5
Instructional Improvement 5
Integrated Learning Systems 5
Intermediate Grades 5
International 5
Interpersonal Relations . . 5
Library Automation 5
Mass Media 5
Multicultural Education . . . 5
Open University Great Britain 5
Participation 5
Personal Narratives 5
Preservice Teacher Education 5
Program Evaluation 5
Public Libraries 5
Publishing Industry 5
Research 5
Research Tools 5
Satisfaction 5
Social Change 5
Standards 5
Student Reaction 5

Student Role 5
Teachers 5
Adult Education 4
Authors 4
Bitnet 4
Chemistry 4
Classroom Communication 4
Communication In Organizations 4
Computer Assisted Research 4
Computer Communication 4
Computer Simulation 4
Computer Software Development 4
Conceptual Frameworks . 4
Consortia 4
Critical Thinking 4
Cultural Differences 4
Cultural Pluralism 4
Discourse Communities . . 4
Educational Counseling . . 4
Electronic Classrooms . . . 4
Electronic Equipment 4
Ethnography 4
Global Education 4
Group Activities 4
Group Composition 4
Group Performance 4
Group Structure 4
High School Students 4
History 4
Influence 4
Information Industry 4
Information Science 4
Integrated Services Digital Networks 4
Intellectual Property 4
Interdisciplinary Approach 4
Interpersonal Interaction . . 4
Language Styles 4
Legal Responsibility 4
Library Role 4
Multimedia Technology . . . 4
Newsgroups 4
Online Information Services 4
Organization Theory 4
Paradigm Shifts 4
Peer Relationship 4
Policy Formation 4
Political Science 4
Predictor Variables 4
Program Development . . . 4
Program Implementation . 4
Scholarly Journals 4
School Counseling 4
School Counselors 4
School Guidance 4
Schools & Educational Services 4
Science And Society 4
Science Education 4
Scientific Research 4
Shared Resources And Services 4
Social Identity 4
Socialization 4
Speech Communication . . 4
State Programs 4
Student Needs 4
Teamwork 4
Technological Change . . . 4
Telephone Communications Systems 4
Training Needs 4
Universities 4
Video Teleconferencing . . 4
Voice Messaging Systems 4
Web Sites 4
Writing Processes 4
Academic Community . . . 3
Activities 3
Administrator Attitudes . . . 3
Adolescence 3
Adolescents 3
Adult Students 3
Adults 3
Analysis Of Variance 3
Barriers To Participation . . 3
Behavior Patterns 3
Biology 3
Browsing 3
Business 3
Business And Industrial Personnel 3
Cataloging 3
College School Cooperation 3
Communication Problems 3
Communication Skills 3
Communication Styles . . . 3
Computer Anxiety 3
Computer Architecture . . . 3
Computer Games 3
Computer Interfaces 3
Computer Science Education3
Computers Social Aspects 3
Context Effect 3
Cooperative Programs . . . 3
Correlation 3
Cultural Context 3
Dial Access Information Systems 3
Educational Strategies . . . 3
Educational Trends 3
Effects 3
Electronic Journals 3
Employee Attitudes 3
Engineering Education . . . 3
Environment 3
Evaluation 3
Evaluation Criteria 3
Expectation 3
Experimentation 3
Experiments 3
Federal Government 3
Flaming Computer Mediated Communication 3
Florida 3
Freedom Of Speech 3
Geographic Isolation 3
Gopher 3
Grade 5 3
Grade 6 3
Group Instruction 3
Health Education 3
Html 3
Human Sex Differences . . 3
Humanities 3
Impacts 3
Impression Formation 3
Information Scientists 3
Information Superhighway 3
Information Transfer 3
Integrated Activities 3
Intellectual Disciplines . . . 3
Interactive Systems 3
International Counselor Network 3
Japan 3
Knowledge Representation 3
Legislation 3
Libraries 3
Library Cooperation 3
Library Networks 3
Males 3

Management Information Systems . . . 3
Mass Media Use . . . 3
Mathematics . . . 3
Mathematics Education . . 3
Measurement Techniques 3
Mentors . . . 3
Middle Schools . . . 3
Minority Groups . . . 3
Modems . . . 3
Moos . . . 3
Navigation Information Systems . . . 3
Netherlands . . . 3
Networks . . . 3
Newspapers . . . 3
Nonverbal Communication 3
Online . . . 3
Ontario Institute For Studies In Education . . . 3
Open Education . . . 3
Organizational Climate . . . 3
Organizational Structure . . 3
Partnerships In Education 3
Peer Evaluation . . . 3
Planning . . . 3
Political Issues . . . 3
Politics . . . 3
Printed Materials . . . 3
Prior Learning . . . 3
Professional Training 3
Program Effectiveness . . . 3
Public Affairs Education . . 3
Public Policy . . . 3
Public Relations . . . 3
Remote Access . . . 3
Role Of Technology . . . 3
School Libraries . . . 3
Science Instruction . . . 3
Scientists . . . 3
Search Engines . . . 3
Self Help Groups . . . 3
Self Perception . . . 3
Sex Role . . . 3
Situated Learning . . . 3
Small Group Instruction . . 3
Social Action . . . 3
Social Impact . . . 3
Social Perception . . . 3
Sociology . . . 3
Software & Computer Services Industry . . . 3
State University Of New York Empire State Coll . . . 3
Status . . . 3
Student Characteristics . . 3
Student Teachers . . . 3
Success . . . 3
Synchronous Learning . . . 3
Synchronous Writing 3
Systems Development . . . 3
Task Oriented Groups . . . 3
Teacher Student Interaction 3
Telecommunication In Politics . . . 3
Training . . . 3
User Characteristics 3
User Satisfaction Information 3
Work Groups . . . 3
Writing Improvement 3
Writing Skills . . . 3
Written Communication . . 3
Academic Discourse 2
Active Learning . . . 2
Administration . . . 2
Administrator Education . . 2
Administrators . . . 2
Adult Learning . . . 2
Advantages . . . 2
Affective Behavior 2
Aged . . . 2
American Indians . . . 2
Annotated Bibliographies . 2
Applications . . . 2
Archives . . . 2
Asian Americans . . . 2
Associations . . . 2
Audience Analysis 2
Audience Awareness 2
Audiotape Recordings . . . 2
Audiovisual Aids . . . 2
Audiovisual Communications 2
Australian Open Learning Information Network 2
Beginning Teachers 2
Behavior Modification 2
Behavior Standards 2
Bibliographic Databases . . 2
Blacks . . . 2
Broadcasting & Telecommunications Industry . . . 2
Bulletin Boards . . . 2
Business Administration Education . . . 2
Business Correspondence 2
Business Education 2
California State University Los Angeles . . . 2
Censorship . . . 2
Change Agents . . . 2
Change Strategies 2
Chaos Theory . . . 2
Chat Rooms . . . 2
Chemical Industry . . . 2
Childhood . . . 2
Citations References 2
Citizen Participation 2
Citizenship Education 2
Classification . . . 2
College Libraries . . . 2
Colleges & Universities . . 2
Communication Channels 2
Communication Psychological Aspects . . . 2
Communication Strategies 2
Community Colleges 2
Community Programs 2
Computational Linguistics . 2
Computer Centers 2
Computer Managed Instruction . . . 2
Computer Peripherals . . . 2
Computer Resources 2
Conceptual Models 2
Confidentiality . . . 2
Conflict . . . 2
Consensus . . . 2
Constructivism Learning . . 2
Cooperative Planning 2
Corporations . . . 2
Courses . . . 2
Criticism . . . 2
Cues . . . 2
Curriculum . . . 2
Curriculum Design 2
Data Collection . . . 2
Data Transmission 2
Deafness . . . 2
Debate . . . 2
Delphi Technique . . . 2
Demography . . . 2
Design . . . 2
Developmental Programs . 2
Digital Data . . . 2

Digital Technology 2
Directions 2
Discourse Modes 2
Distance Learning 2
Distributed Computing ... 2
Economics Education 2
Educational Benefits 2
Educational Environment . 2
Educational Media 2
Educational Needs 2
Educational Objectives ... 2
Electronic Networks For Interaction Enfi 2
Elementary School Teachers 2
Emotional Disturbances .. 2
Empirical Research 2
Employee Interaction 2
Employment Opportunities 2
Empowerment 2
End Users 2
English Instruction 2
Ethnic Groups 2
Etiquette 2
European Community 2
Experience Level 2
External Degree Programs 2
Extraversion 2
Fair Use Copyrights 2
Field Studies 2
File Transfer Protocol 2
Financial Support 2
Foreign Students 2
Forums 2
Foucault Michel 2
Functions 2
Gallaudet University Dc .. 2
Gateway Systems 2
Government Business Relationship 2
Grammar 2
Group Identity 2
Health Communication ... 2
Hearing Impairments 2
History Instruction 2
Humor 2
Identification Psychology . 2
Immersion Programs 2
Individual Development .. 2
Individual Instruction 2
Individuality 2
Information 2
Information Highways 2
Information Infrastructure . 2
Information Literacy 2
Information Processing ... 2
Information Science Education 2
Information Storage 2
Information Technology Political Aspects 2
Instructional Systems 2
Intention 2
Interlibrary Loans 2
International Educational Exchange 2
Internet Relay Chat 2
Internet Social Aspects ... 2
Interoperability 2
Interorganizational Networks 2
Interprofessional Relationship 2
Japanese 2
Journal Writing 2
Journalism 2
Journalism Education 2
Knowledge Acquisition ... 2
Knowledge Utilization 2
Language Teachers 2
Law 2
Laws 2
Layout Publications 2
Learning Environment ... 2
Lecture Method 2
Library Acquisition 2
Library Facilities 2
Library Personnel 2
Literacy 2
Mailing Lists 2
Man Machine Interaction . 2
Management Development 2
Management Science Operations Research 2
Managers 2
Market Research 2
Marketing 2
Mass Media Social Aspects 2
Masters Of Business Administration 2
Mathematical Formulas .. 2
Mathematics Instruction .. 2
Media 2
Media Selection 2
Mediation 2
Meetings 2
Menu Driven Software ... 2
Messages 2
Methodological Problems . 2
Methodology 2
Motivation 2
Multinational Corporations 2
Music Education 2
Native Speakers 2
Needs Assessment 2
Negotiation 2
Negotiation Processes ... 2
Network Protocols 2
Networks Persons 2
Norway 2
Observation 2
Oclc 2
Online Search Skills 2
Online Vendors 2
Open Universities 2
Optical Data Disks 2
Orality 2
Organizations 2
Organizations Social 2
Outreach Programs 2
Perception 2
Performance Evaluation .. 2
Performance Factors 2
Personality Traits 2
Personnel 2
Persuasive Communication 2
Policy Issues 2
Political Campaigns 2
Political Candidates 2
Political Parties 2
Postmodernism 2
Primary Education 2
Productivity 2
Professional Concerns ... 2
Professional Continuing Education 2
Professional Ethics 2
Public Access 2
Reading Comprehension . 2
Reading Skills 2
Research & Development 2
Research Opportunities .. 2
Research Problems 2
Researchers 2
Roles 2
Rural Areas 2
Rural Schools 2

Santa Monica Municipal Services 2
Scholarly Writing 2
Scholarship 2
Searches 2
Secondary School Students 2
Secondary School Teachers 2
Self Concept 2
Sex 2
Sex Roles 2
Small Group Communication 2
Small Groups 2
Social Behavior 2
Social Environment 2
Social Environments 2
Social Factors 2
Social Policy 2
Social Psychology 2
Social Responsibility 2
Social Support 2
Software 2
Spelling 2
Staff Development 2
State Government 2
Strategic Planning 2
Student Behavior 2
Student Development 2
Student Support Services . 2
Student Surveys 2
Sustainable Development . 2
Sweden 2
Systems Analysis 2
Task Analysis 2
Task Performance 2
Teacher Collaboration . . . 2
Teacher Student Conferences 2
Technological Innovations 2
Technological Literacy . . . 2
Technology Plans 2
Telecommunication Social Aspects 2
Telecommunications Policy 2
Telecomputing 2
Telematics 2
Telephone Communications Industry 2
Telephones 2
Telnet 2
Theater Arts 2
Thinking Skills 2
Trend Analysis 2
Tutoring 2
Tutors 2
Undergraduate Study 2
University Of Lancaster England 2
User Preferences 2
Users 2
Value Judgment 2
Videotex 2
Virtual Classrooms 2
Virtual Libraries 2
Voice Mail 2
Volunteers 2
Voting 2
Windows Software 2
Work 2
Work Environment 2
Workshops 2
Workstations 2
Writing Contexts 2
Writing Functions 2
Writing Laboratories 2

Alphanumeric Keyword Listing

Academic Achievement 10
Academic Community . . 3
Academic Discourse 2
Academic Libraries 10
Access To Information . 24
Active Learning 2
Activities 3
Administration 2
Administrator Attitudes . . 3
Administrator Education . 2
Administrators 2
Adolescence 3
Adolescents 3
Adult Education 4
Adult Learning 2
Adult Students 3
Adulthood 53
Adults 3
Advantages 2
Affective Behavior 2
Aged 2
American Indians 2
Analysis Of Variance . . . 3
Annotated Bibliographies 2
Applications 2
Archives 2
Asian Americans 2
Associations 2
Audience Analysis 2
Audience Awareness . . . 2
Audiotape Recordings . . 2
Audiovisual Aids 2
Audiovisual Communications 2
Australia 5
Australian Open Learning Information Network 2
Authors 4
Barriers To Participation . 3
Beginning Teachers 2
Behavior Modification . . . 2
Behavior Patterns 3
Behavior Standards 2
Bibliographic Databases . 2
Biology 3
Bitnet 4
Blacks 2
Broadcasting & Telecommunications Industry 2
Browsing 3
Bulletin Boards 2
Business 3
Business Administration Education 2
Business And Industrial Personnel 3
Business Communication 7
Business Correspondence 2
Business Education 2
California State University Los Angeles 2
Canada 5
Case Studies 29
Cataloging 3
Censorship 2
Change 5
Change Agents 2
Change Strategies 2
Chaos Theory 2
Chat Rooms 2
Chemical Industry 2
Chemistry 4
Childhood 2
Citations References . . . 2
Citizen Participation 2
Citizenship Education . . . 2
Class Activities 9
Classification 2
Classroom Communication 4
Classroom Environment . 8
Cognitive Processes 8
Collaborative Learning . . 6
Collaborative Writing . . . 7
College Faculty 5
College Libraries 2
College School Cooperation 3
College Students 12
Colleges & Universities . 2
Communication 26
Communication Behavior 8
Communication Channels 2
Communication In Organizations 4
Communication Patterns 6
Communication Problems 3
Communication Psychological Aspects . . 2
Communication Research 38
Communication Skills . . . 3
Communication Social Aspects 10
Communication Strategies 2
Communication Styles . . 3
Communication Systems 21
Communication Thought Transfer 31
Communications 15
Communications & Information Management 7
Communications Networks 5
Communications Systems 10
Community 9
Community Colleges . . . 2
Community Programs . . . 2
Comparative Analysis . . 21
Computational Linguistics 2
Computer Anxiety 3
Computer Applications . 57
Computer Architecture . . 3
Computer Assisted Instruction 107
Computer Assisted Research 4
Computer Attitudes 13
Computer Centers 2
Computer Communication 4
Computer Games 3
Computer Graphics 5
Computer Interfaces 3
Computer Literacy 11
Computer Managed Instruction 2
Computer Mediated Communication 457
Computer Mediated Communication Systems 20
Computer Networks . . 136
Computer Oriented Programs 11
Computer Peripherals . . 2
Computer Resources . . . 2
Computer Science Education 3
Computer Simulation . . . 4
Computer Software . . . 21
Computer Software Development 4
Computer Software Evaluation 5

Computer System Design 6
Computer Users 9
Computer Uses In Education 69
Computers 53
Computers Social Aspects 3
Conceptual Frameworks 4
Conceptual Models 2
Conferences 7
Confidentiality 2
Conflict 2
Connectivity 7
Consensus 2
Consortia 4
Constructivism Learning . 2
Content Analysis 17
Context Effect 3
Conventional Instruction . 6
Cooperation 13
Cooperative Learning .. 25
Cooperative Planning ... 2
Cooperative Programs .. 3
Copyrights 6
Corporations 2
Correlation 3
Cost Effectiveness 10
Costs 9
Course Content 6
Course Development ... 5
Course Evaluation 5
Courses 2
Courseware 7
Critical Thinking 4
Criticism 2
Cues 2
Cultural Context 3
Cultural Differences 4
Cultural Pluralism 4
Curriculum 2
Curriculum Design 2
Curriculum Development 10
Curriculum Enrichment .. 5
Cyberspace 6
Data Collection 2
Data Transmission 2
Databases 12
Debate 2
Deafness 2
Decision Making 18
Decision Support Systems 9
Delphi Technique 2
Democracy 7
Demography 2
Design 2
Design Requirements ... 5
Developmental Programs 2
Dial Access Information Systems 3
Digital Data 2
Digital Technology 2
Directions 2
Discourse Analysis 14
Discourse Communities . 4
Discourse Modes 2
Discussion 5
Discussion Groups 9
Discussion Teaching Technique 6
Distance Education ... 76
Distance Learning 2
Distributed Computing .. 2
Economics Education ... 2
Educational Benefits 2
Educational Change ... 10
Educational Counseling . 4
Educational Development 6
Educational Environment 2
Educational Media 2
Educational Needs 2
Educational Objectives .. 2
Educational Research .. 5
Educational Resources 12
Educational Strategies .. 3
Educational Technology 48
Educational Trends 3
Effects 3
Electronic Classrooms .. 4
Electronic Equipment ... 4
Electronic Journals 3
Electronic Libraries 7
Electronic Mail 137
Electronic Mail Systems 17
Electronic Media 5
Electronic Networks For Interaction Enfi 2
Electronic Publishing .. 13
Electronic Technology .. 6
Electronic Text 11
Elementary Education . 11
Elementary School Teachers 2
Elementary Secondary Education 39
Emotional Disturbances . 2
Empirical Research 2
Employee Attitudes 3
Employee Interaction ... 2
Employment Opportunities 2
Empowerment 2
End Users 2
Engineering Education .. 3
English Instruction 2
English Second Language 5
Environment 3
Environmental Education 7
Ethics 7
Ethnic Groups 2
Ethnography 4
Etiquette 2
European Community ... 2
Evaluation 3
Evaluation Criteria 3
Evaluation Methods 7
Examples 16
Expectation 3
Experience Level 2
Experiential Learning ... 7
Experimental Theoretical 42
Experimentation 3
Experiments 3
External Degree Programs 2
Extraversion 2
Face To Face Communication 7
Fair Use Copyrights 2
Federal Government ... 3
Feedback 10
Females 6
Field Studies 2
File Transfer Protocol ... 2
Financial Support 2
Flaming Computer Mediated Communication 3
Florida 3
Foreign Countries 57
Foreign Students 2
Forums 2
Foucault Michel 2
Freedom Of Speech 3
Freshman Composition . 5
Functions 2
Futures Of Society 32
Gallaudet University Dc . 2
Gateway Systems 2
Gender Issues 5
Geographic Isolation ... 3

Global Approach 7
Global Education 4
Gopher 3
Government Business Relationship 2
Government Role 5
Grade 5 3
Grade 6 3
Graduate Students 14
Graduate Study 11
Grammar 2
Group Activities 4
Group Composition 4
Group Decision Making 18
Group Discussion 23
Group Dynamics 43
Group Identity 2
Group Instruction 3
Group Participation 5
Group Performance 4
Group Problem Solving . 5
Group Structure 4
Groups 7
Groupware 6
Guidelines 11
Health Communication .. 2
Health Education 3
Hearing Impairments ... 2
High School Students ... 4
High Schools 9
Higher Education 204
Historical Background .. 5
History 4
History Instruction 2
Html 3
Human Sex Differences . 3
Humanities 3
Humor 2
Hypermedia 15
Hypotheses 5
Hypothesis Testing 5
Identification Psychology 2
Immersion Programs ... 2
Impacts 3
Impression Formation ... 3
Independent Study 6
Individual Development . 2
Individual Instruction 2
Individuality 2
Influence 4
Information 2
Information Dissemination 14
Information Exchange .. 9
Information Highways ... 2
Information Industry 4
Information Infrastructure 2
Information Literacy 2
Information Management 6
Information Networks .. 72
Information Processing .. 2
Information Retrieval ... 9
Information Science 4
Information Science Education 2
Information Scientists ... 3
Information Seeking 7
Information Services 9
Information Sources ... 14
Information Storage 2
Information Superhighway 3
Information Systems ... 17
Information Technology 51
Information Technology Political Aspects 2
Information Technoiogy Social Aspects 5
Information Transfer 3
Information Utilization ... 6
Inservice Teacher Education 6
Instructional Design ... 16
Instructional Development 6
Instructional Effectiveness 14
Instructional Improvement 5
Instructional Innovation 20
Instructional Materials .. 9
Instructional Systems ... 2
Integrated Activities 3
Integrated Learning Systems 5
Integrated Services Digital Networks 4
Intellectual Disciplines .. 3
Intellectual Property 4
Intention 2
Interaction 20
Interactive Systems 3
Interactive Video 12
Intercultural Communication6
Interdisciplinary Approach 4
Interlibrary Loans 2
Intermediate Grades 5
Intermode Differences .. 6
International 5
International Communication 6
International Counselor Network 3
International Educational Exchange 2
International Programs . 13
Internet 139
Internet Relay Chat 2
Internet Social Aspects .. 2
Interoperability 2
Interorganizational Networks 2
Interpersonal Communication 67
Interpersonal Interaction . 4
Interpersonal Relations . 5
Interpersonal Relationship 9
Interprofessional Relationship 2
Interviews 7
Japan 3
Japanese 2
Journal Writing 2
Journalism 2
Journalism Education ... 2
Knowledge Acquisition .. 2
Knowledge Representation 3
Knowledge Utilization ... 2
Language Styles 4
Language Teachers 2
Language Usage 7
Law 2
Laws 2
Layout Publications 2
Learner Controlled Instruction 11
Learning Activities 10
Learning Environment .. 2
Learning Environments 13
Learning Processes 9
Learning Strategies 9
Lecture Method 2
Legal Responsibility 4
Legislation 3
Librarians 6
Libraries 3
Library Acquisition 2
Library Automation 5
Library Cooperation 3
Library Facilities 2
Library Networks 3

Library Personnel 2
Library Role 4
Library Services 7
Listservs 14
Literacy 2
Literature Reviews 11
Local Area Networks ... 8
Longitudinal Studies 6
Mailing Lists 2
Males 3
Man Machine Interaction 2
Man Machine Systems . 10
Management Development 2
Management Information Systems 3
Management Science Operations Research ... 2
Managerial Skills 8
Managers 2
Market Research 2
Marketing 2
Mass Media 5
Mass Media Social Aspects 2
Mass Media Use 3
Masters Of Business Administration 2
Masters Programs 7
Mathematical Formulas . 2
Mathematics 3
Mathematics Education . 3
Mathematics Instruction . 2
Measurement Techniques 3
Media 2
Media Selection 2
Mediation 2
Meetings 2
Mentors 3
Menu Driven Software .. 2
Messages 2
Methodological Problems 2
Methodology 2
Microcomputers 13
Middle Schools 3
Minority Groups 3
Models 28
Modems 3
Moos 3
Motivation 2
Multicultural Education .. 5
Multimedia Instruction .. 12
Multimedia Materials ... 12
Multimedia Technology .. 4
Multinational Corporations 2
Music Education 2
Native Speakers 2
Navigation Information Systems 3
Needs Assessment 2
Negotiation 2
Negotiation Processes .. 2
Netherlands 3
Network Protocols 2
Networks 3
Networks Persons 2
Newsgroups 4
Newspapers 3
Nontraditional Education 12
Nonverbal Communication 3
Norway 2
Observation 2
Oclc 2
Online 3
Online Information Services 4
Online Search Skills 2
Online Searching 14
Online Systems 44
Online Vendors 2
Ontario Institute For Studies In Education 3
Open Education 3
Open Universities 2
Open University Great Britain 5
Optical Data Disks 2
Orality 2
Organization Theory 4
Organizational Behavior 26
Organizational Change .. 7
Organizational Climate .. 3
Organizational Communication 10
Organizational Structure . 3
Organizations 2
Organizations Social ... 2
Outreach Programs 2
Paradigm Shifts 4
Participation 5
Partnerships In Education 3
Peer Evaluation 3
Peer Relationship 4
Perception 2
Performance Evaluation . 2
Performance Factors ... 2
Personal Narratives 5
Personality Traits 2
Personnel 2
Persuasive Communication 2
Pilot Projects 9
Planning 3
Policy Formation 4
Policy Issues 2
Political Campaigns 2
Political Candidates 2
Political Issues 3
Political Parties 2
Political Science 4
Politics 3
Postmodernism 2
Postsecondary Education 12
Predictor Variables 4
Preservice Teacher Education 5
Primary Education 2
Printed Materials 3
Prior Learning 3
Privacy 12
Problem Solving 8
Problems 17
Productivity 2
Professional Concerns .. 2
Professional Continuing Education 2
Professional Development 15
Professional Ethics 2
Professional Training ... 3
Program Descriptions ... 7
Program Development .. 4
Program Effectiveness .. 3
Program Evaluation 5
Program Implementation 4
Prototypes 7
Psychology 6
Public Access 2
Public Affairs Education . 3
Public Libraries 5
Public Policy 3
Public Relations 3
Publishing Industry 5
Qualitative Research ... 8
Questionnaires 15
Reading Comprehension 2
Reading Skills 2
Reference Services 8
Remote Access 3
Research 5
Research & Development 2

Research Methodology 12
Research Needs 16
Research Opportunities . 2
Research Problems 2
Research Tools 5
Researchers 2
Role Of Technology 3
Roles 2
Rural Areas 2
Rural Schools 2
Santa Monica Municipal Services 2
Satisfaction 5
Scholarly Communication 8
Scholarly Journals 4
Scholarly Writing 2
Scholarship 2
School Counseling 4
School Counselors 4
School Guidance 4
School Libraries 3
Schools & Educational Services 4
Science And Society ... 4
Science Education 4
Science Instruction 3
Scientific And Technical Information 8
Scientific Research 4
Scientists 3
Search Engines 3
Searches 2
Second Language Instruction 6
Second Language Learning 7
Secondary Education .. 16
Secondary School Students 2
Secondary School Teachers 2
Self Concept 2
Self Help Groups 3
Self Perception 3
Seminars 6
Sex 2
Sex Differences 17
Sex Role 3
Sex Roles 2
Shared Resources And Services 4
Situated Learning 3
Skill Development 6
Small Group Communication 2
Small Group Instruction . 3
Small Groups 2
Social Action 3
Social Behavior 2
Social Change 5
Social Environment 2
Social Environments 2
Social Factors 2
Social Identity 4
Social Impact 3
Social Influences 8
Social Interaction 14
Social Networks 6
Social Perception 3
Social Policy 2
Social Psychology 2
Social Responsibility 2
Social Studies 13
Social Support 2
Socialization 4
Sociology 3
Software 2
Software & Computer Services Industry 3
Software & Systems ... 15
Speech Communication . 4
Spelling 2
Staff Development 2
Standards 5
State Government 2
State Programs 4
State University Of New York Empire State Coll 3
Statistical Analysis 8
Status 3
Strategic Planning 2
Student Attitudes 25
Student Behavior 2
Student Characteristics . 3
Student Development ... 2
Student Motivation 6
Student Needs 4
Student Participation .. 15
Student Projects 8
Student Reaction 5
Student Role 5
Student Support Services 2
Student Surveys 2
Student Teachers 3
Students 6
Studies 38
Success 3
Surveys 14
Sustainable Development 2
Sweden 2
Synchronous Learning .. 3
Synchronous Writing ... 3
Systems Analysis 2
Systems Development .. 3
Tables Data 22
Task Analysis 2
Task Oriented Groups .. 3
Task Performance 2
Teacher Attitudes 11
Teacher Collaboration .. 2
Teacher Education 11
Teacher Role 21
Teacher Student Conferences 2
Teacher Student Interaction 3
Teacher Student Relationship 14
Teachers 5
Teaching Methods 39
Teamwork 4
Technical Writing 7
Technological Advancement 30
Technological Change .. 4
Technological Innovations 2
Technological Literacy .. 2
Technology 6
Technology Integration .. 6
Technology Plans 2
Technology Utilization .. 6
Telecommunication In Politics 3
Telecommunication Social Aspects 2
Telecommunications . 101
Telecommunications Media 8
Telecommunications Policy 2
Telecommunications Systems 29
Telecomputing 2
Teleconferencing 62
Telematics 2
Telephone Communications Industry 2
Telephone Communications Systems 4
Telephones 2

Telnet 2
Theater Arts 2
Thinking Skills 2
Training 3
Training Needs 4
Trend Analysis 2
Tutoring 2
Tutors 2
Undergraduate Students 13
Undergraduate Study . . . 2
United Kingdom 7
United States 25
Universities 4
University Of Lancaster England 2
Use Studies 21
Usenet 7
User Characteristics 3
User Needs Information . 9
User Preferences 2
User Satisfaction Information 3
Users 2
Users Information 20
Value Judgment 2
Verbal Communication . . 7
Video Teleconferencing . 4
Videotex 2
Virtual Classrooms 2
Virtual Libraries 2
Virtual Reality 7
Voice Mail 2
Voice Messaging Systems 4
Volunteers 2
Voting 2
Web Sites 4
Windows Software 2
Work 2
Work Environment 2
Work Groups 3
Workshops 2
Workstations 2
World Wide Web 29
Writing Composition 8
Writing Contexts 2
Writing Functions 2
Writing Improvement . . . 3
Writing Instruction 10
Writing Laboratories 2
Writing Processes 4
Writing Research 8
Writing Skills 3
Written Communication . 3

Appendix H: Top Keyword Database Proximity

Below is a database analysis of the top 116 keywords analyzed. Indicated are the problematisations and the frequency of problematisations appearing in the selected databases. Number (#) of Databases (DBs) is the number of different databases a term was affiliated. Total is the overall frequency of the term in the master dataset. Mode DB is the database a term occurred most often. Mode is the keyword count in the Mode DB. Next is the next most frequent keyword count after the mode. Next DB is the Database counted in Next. The following columns are the frequency breakdown of the keywords by database. The last 38 terms all resided in ERIC.

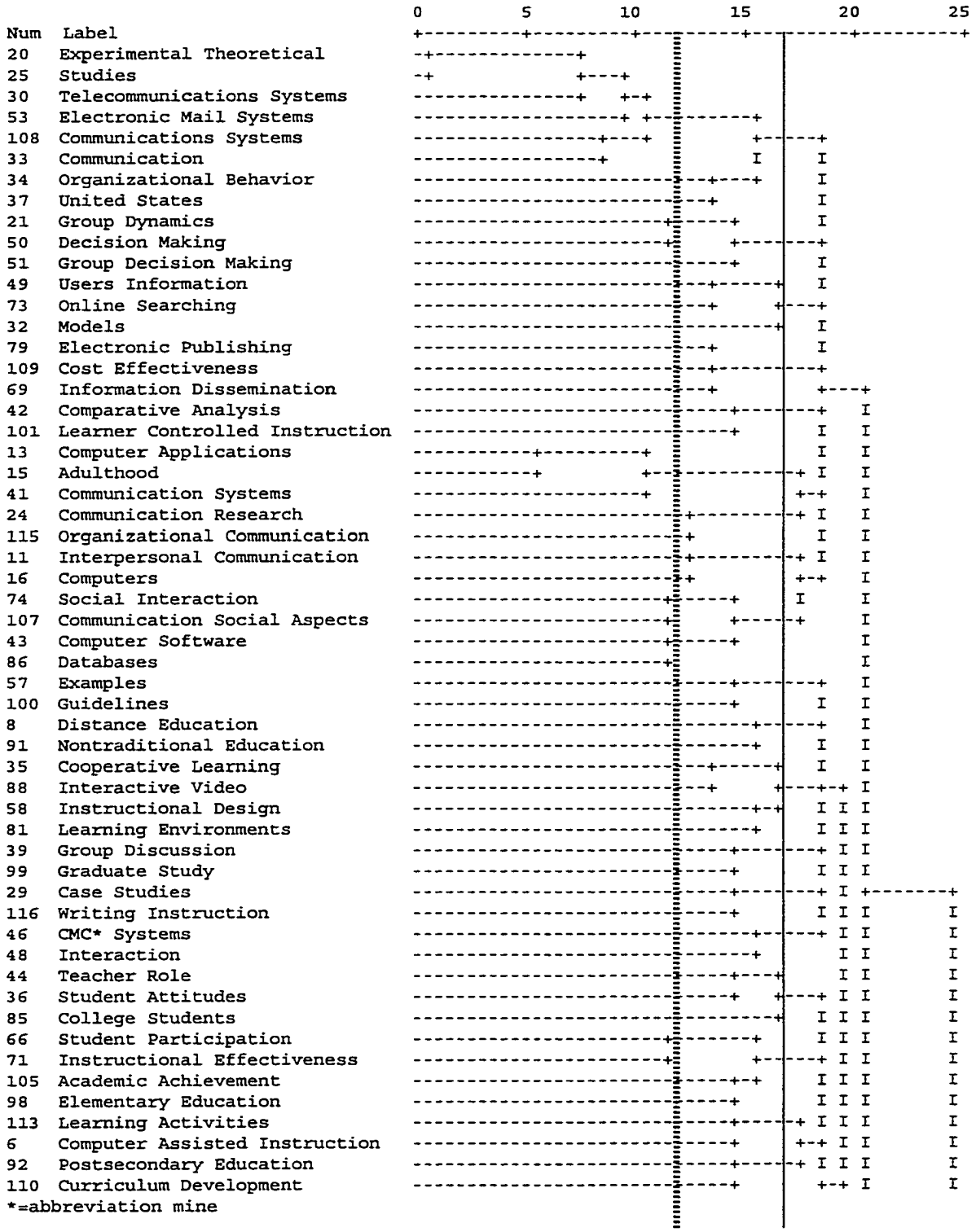
Term	# of DBs	Total	Mode DB	Mode	Next	Next DB	ABI	Eric	Psych	SSI	Soc
Computer Mediated Communication	5	457	Eric	427	41	SSI	4	427	39	41	15
Higher Education	5	204	Eric	204	18	Psych	1	204	18	7	11
Internet	5	139	Eric	126	9	ABI	9	126	1	6	1
Computer Networks	5	136	Eric	127	9	Psych	8	127	9	8	5
Telecommunications	5	101	Eric	81	29	Soc	5	81	10	6	29
Interpersonal Communication	5	67	Eric	40	32	Psych	5	40	32	11	21
Teleconferencing	5	62	Eric	60	4	Psych	3	60	4	1	1
Computer Applications	5	57	Psych	57	15	Eric	5	15	57	9	14
Adulthood	5	53	Psych	53	14	Eric	6	14	53	4	8
Computers	5	53	Soc	32	25	Eric	5	25	20	8	32
Information Technology	5	51	Eric	41	9	Soc	5	41	4	3	9
Group Dynamics	5	43	Eric	20	15	Psych	10	20	15	2	14
Communication Research	5	38	Eric	36	11	Soc	1	36	10	10	11
Models	5	28	Eric	23	3	Soc/Psych/ABI	3	23	3	1	3
Communication	5	26	ABI	18	10	Psych	18	8	10	4	8
Organizational Behavior	5	26	ABI	22	10	Psych	22	2	10	1	6
United States	5	25	ABI	17	8	Eric	17	8	5	1	2
Communication Systems	5	21	Psych	21	4	Soc/Eric	2	4	21	3	4
Computer Mediated Communication Systems	5	20	Eric	20	3	Psych	1	20	3	2	1
Decision Making	5	18	Eric	13	5	Soc/Psych/ABI	5	13	5	1	5
Group Decision Making	5	18	SSI	9	7	Psych	3	5	7	9	5
Electronic Mail Systems	5	17	ABI	16	4	Psych	16	2	4	2	1
Sex Differences	5	17	Eric	15	4	Soc/Psych	1	15	4	1	4
Feedback	5	10	Eric	7	2	SSI/Psych	1	7	2	2	1
Organizational Communication	5	10	Eric	10	4	SSI	1	10	3	4	2
Electronic Mail	4	137	Eric	137	5	ABI	5	137	3	0	2
Experimental Theoretical	4	42	ABI	42	6	Psych/Eric	42	6	6	0	3
Studies	4	38	ABI	38	6	Psych/Eric	38	6	6	0	3
Telecommunications Systems	4	29	ABI	29	3	Psych/Eric	29	3	3	0	2
Student Attitudes	4	25	Eric	23	4	Psych	1	23	4	0	1
Group Discussion	4	23	Eric	21	7	Psych	1	21	7	0	2
Tables Data	4	22	Eric	22	3	Psych	1	22	3	0	1
Comparative Analysis	4	21	Eric	18	3	Psych/ABI	3	18	3	0	1
Use Studies	4	21	Eric	21	1	Soc/Psych/ABI	1	21	1	0	1
Interaction	4	20	Eric	20	3	Psych	0	20	3	1	2
Content Analysis	4	17	Eric	16	4	Psych	1	16	4	2	0
Information Systems	4	17	Eric	14	3	Psych/ABI	3	14	3	1	0
Communications	4	15	Eric	13	2	Psych/ABI	2	13	2	1	0
Software & Systems	4	15	ABI	15	1	Soc/Psych/Eric	15	1	1	0	1
Discourse Analysis	4	14	Eric	13	3	Soc/Psych	0	13	3	2	3
Information Dissemination	4	14	Eric	13	1	Soc/Psych/ABI	1	13	1	0	1
Social Interaction	4	14	Soc/SSI	7	6	Psych	0	4	6	7	7
Microcomputers	4	13	Eric	11	3	Soc/Psych	0	11	3	2	3
Undergraduate Students	4	13	Eric	12	5	Soc	1	12	4	0	5
Literature Reviews	4	11	Eric	11	1	Soc/SSI/Psych	0	11	1	1	1
Communication Social Aspects	4	10	SSI	10	7	Eric	0	7	4	10	6
Computer Assisted Instruction	3	107	Eric	103	6	Psych	0	103	6	0	4
Information Networks	3	72	Eric	72	1	SSI/ABI	1	72	0	1	0

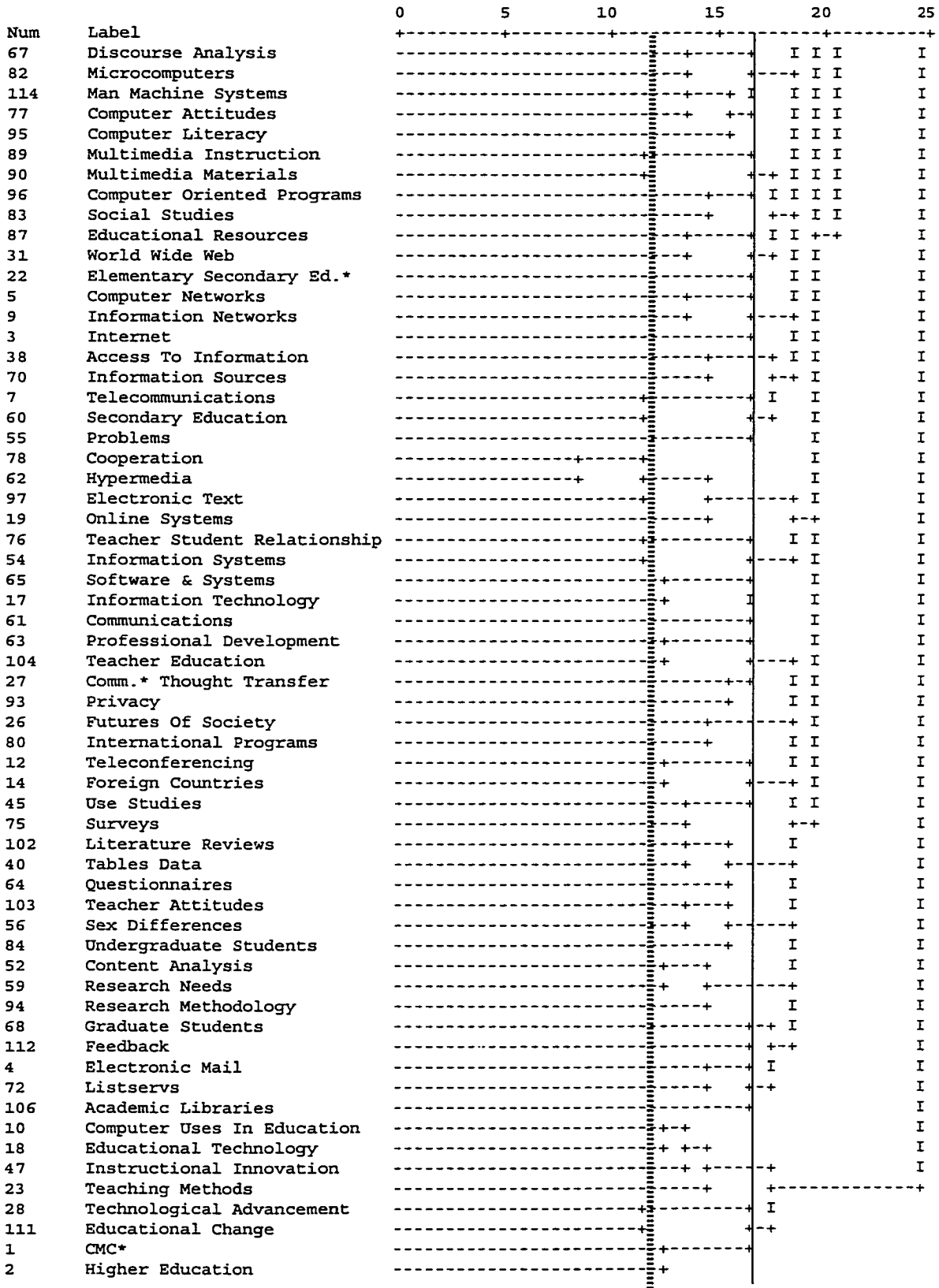
Term	# of DBs	Total	Mode DB	Mode	Next	Next DB	ABI	Eric	Psych	SSI	Soc
Foreign Countries	3	57	Eric	57	2	Psych	1	57	2	0	0
Teaching Methods	3	39	Eric	37	2	Soc	0	37	1	0	2
Communication Thought Transfer	3	31	Eric	31	1	Psych/ABI	1	31	1	0	0
Case Studies	3	29	Eric	28	1	Psych/ABI	1	28	1	0	0
Computer Software	3	21	Eric	18	3	Psych	0	18	3	0	1
Questionnaires	3	15	Eric	14	2	ABI	2	14	1	0	0
Graduate Students	3	14	Eric	12	3	Psych	0	12	3	0	2
Surveys	3	14	Eric	12	2	Soc	0	12	1	0	2
Computer Attitudes	3	13	Eric	10	3	Psych	1	10	3	0	0
Cooperation	3	13	Eric	13	1	Soc/Psych	0	13	1	0	1
College Students	3	12	Eric	9	4	Psych	0	9	4	0	1
Privacy	3	12	Eric	10	1	Soc/Psych	0	10	1	0	1
Research Methodology	3	12	Eric	11	3	Psych	0	11	3	0	1
Computer Oriented Programs	3	11	Eric	11	2	Psych	0	11	2	1	0
Communications Systems	3	10	ABI	10	2	Eric	10	2	1	0	0
Man Machine Systems	3	10	Eric	8	2	SSI/Psych	0	8	2	2	0
Distance Education	2	76	Eric	76	2	Psych	0	76	2	0	0
Computer Uses In Education	2	69	Eric	69	1	Psych	0	69	1	0	0
Educational Technology	2	48	Eric	48	1	Psych	0	48	1	0	0
Online Systems	2	44	Eric	44	1	Soc	0	44	0	0	1
Elementary Secondary Education	2	39	Eric	39	1	Psych	0	39	1	0	0
Futures Of Society	2	32	Eric	32	1	Psych	0	32	1	0	0
Technological Advancement	2	30	Eric	30	1	ABI	1	30	0	0	0
Users Information	2	20	Eric	20	1	ABI	1	20	0	0	0
Examples	2	16	Eric	16	2	Psych	0	16	2	0	0
Research Needs	2	16	Eric	16	2	Psych	0	16	2	0	0
Listservs	2	14	Eric	14	1	ABI	1	14	0	0	0
Teacher Student Relationship	2	14	Eric	14	1	Psych	0	14	1	0	0
Guidelines	2	11	Eric	7	4	ABI	4	7	0	0	0
Learner Controlled Instruction	2	11	Eric	11	1	Psych	0	11	1	0	0

World Wide Web 29
Cooperative Learning 25
Access To Information 24
Teacher Role 21
Instructional Innovation 20
Problems 17
Instructional Design 16
Secondary Education 16
Hypermedia 15
Professional Development 15
Student Participation 15
Information Sources 14
Instructional Effectiveness 14
Online Searching 14
Electronic Publishing 13
International Programs 13
Learning Environments 13
Social Studies 13
Databases 12
Educational Resources 12
Interactive Video 12
Multimedia Instruction 12
Multimedia Materials 12
Nontraditional Education 12
Postsecondary Education 12
Computer Literacy 11
Electronic Text 11
Elementary Education 11
Graduate Study 11
Teacher Attitudes 11
Teacher Education 11
Academic Achievement 10
Academic Libraries 10
Cost Effectiveness 10
Curriculum Development 10
Educational Change 10
Learning Activities 10
Writing Instruction 10

Appendix I: Keyword Cluster Dendrogram and Agglomerative Schedule

Below is a hierarchical cluster analysis done on the top116 items. The following is the SPSS 7.5 Dendrogram using complete linkage method. Num is an identifier linked to the agglomerative schedule and proximity index. The dotted vertical line indicates the ten cluster solution and the vertical solid line indicates the 32 cluster complete solution.




0 5 10 15 20 25
Num Label
67 Discourse Analysis
82 Microcomputers
114 Man Machine Systems
77 Computer Attitudes
95 Computer Literacy
89 Multimedia Instruction
90 Multimedia Materials
96 Computer Oriented Programs
83 Social Studies
87 Educational Resources
31 World Wide Web
22 Elementary Secondary Ed.*
5 Computer Networks
9 Information Networks
3 Internet
38 Access To Information
70 Information Sources
7 Telecommunications
60 Secondary Education
55 Problems
78 Cooperation
62 Hypermedia
97 Electronic Text
19 Online Systems
76 Teacher Student Relationship
54 Information Systems
65 Software & Systems
17 Information Technology
61 Communications
63 Professional Development
104 Teacher Education
27 Comm.* Thought Transfer
93 Privacy
26 Futures Of Society
80 International Programs
12 Teleconferencing
14 Foreign Countries
45 Use Studies
75 Surveys
102 Literature Reviews
40 Tables Data
64 Questionnaires
103 Teacher Attitudes
56 Sex Differences
84 Undergraduate Students
52 Content Analysis
59 Research Needs
94 Research Methodology
68 Graduate Students
112 Feedback
4 Electronic Mail
72 Listservs
106 Academic Libraries
10 Computer Uses In Education
18 Educational Technology
47 Instructional Innovation
23 Teaching Methods
28 Technological Advancement
111 Educational Change
1 CMC*
2 Higher Education

Agglomerative Schedule

Conceptually, the complete linkage method ensures that all items within a cluster are separated by some maximum distance from the next cluster. Johnson and Wichern (1988) describe the function as $d_{(UV)W} = \max (d_{UW}, d_{VW})$. Corresponding objects are merged (to make cluster (UV)) and then compared to any other cluster W. In the previous formula d_{UW} and d_{VW} are the distances between the most distant member of cluster U and W and clusters V and W. These distances, in the current analysis, were generated using the proximity matrix in Appendix K.

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	20	25	0.9602	0	0	3
2	13	15	0.6409	0	0	7
3	20	30	0.5481	1	0	5
4	83	87	0.4695	0	0	9
5	20	53	0.4509	3	0	6
6	20	108	0.4475	5	0	65
7	13	41	0.3719	2	0	107
8	33	34	0.3417	0	0	44
9	31	83	0.3405	0	4	49
10	8	91	0.3398	0	0	59
11	11	16	0.3385	0	0	38
12	21	50	0.3305	0	0	56
13	28	111	0.3289	0	0	72
14	74	107	0.3251	0	0	38
15	71	105	0.3251	0	0	74
16	89	90	0.3200	0	0	68
17	5	9	0.3170	0	0	75
18	10	18	0.2994	0	0	27
19	24	115	0.2873	0	0	83
20	52	59	0.2838	0	0	60
21	1	2	0.2751	0	0	72
22	26	80	0.2708	0	0	73
23	36	85	0.2685	0	0	41
24	3	38	0.2520	0	0	66
25	56	84	0.2509	0	0	79
26	79	109	0.2491	0	0	36
27	10	47	0.2250	18	0	50
28	46	48	0.2246	0	0	61
29	49	73	0.2177	0	0	67
30	62	97	0.2171	0	0	78
31	6	92	0.2141	0	0	77
32	29	116	0.2139	0	0	76
33	45	75	0.2113	0	0	63
34	12	14	0.2090	0	0	73

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
35	67	82	0.2048	0	0	69
36	69	79	0.2048	0	26	87
37	40	64	0.1964	0	0	64
38	11	74	0.1894	11	14	83
39	58	81	0.1889	0	0	80
40	27	93	0.1823	0	0	88
41	36	66	0.1808	23	0	102
42	42	101	0.1772	0	0	87
43	98	113	0.1766	0	0	74
44	33	37	0.1762	8	0	65
45	7	60	0.1753	0	0	97
46	43	86	0.1675	0	0	81
47	39	99	0.1672	0	0	80
48	54	65	0.1661	0	0	98
49	22	31	0.1621	0	9	103
50	10	23	0.1607	27	0	82
51	4	72	0.1537	0	0	71
52	77	95	0.1506	0	0	84
53	57	100	0.1501	0	0	81
54	35	88	0.1494	0	0	59
55	17	61	0.1433	0	0	89
56	21	51	0.1414	12	0	92
57	63	104	0.1376	0	0	89
58	19	76	0.1266	0	0	78
59	8	35	0.1254	10	54	94
60	52	94	0.1195	20	0	79
61	44	46	0.1168	0	28	76
62	55	78	0.1130	0	0	93
63	45	102	0.1096	33	0	90
64	40	103	0.1060	37	0	90
65	20	33	0.1036	6	44	92
66	3	70	0.0817	24	0	75
67	32	49	0.0711	0	29	100
68	89	96	0.0695	16	0	84
69	67	114	0.0665	35	0	91
70	68	112	0.0665	0	0	86
71	4	106	0.0665	51	0	86
72	1	28	0.0640	21	13	82
73	12	26	0.0631	34	22	88
74	71	98	0.0615	15	43	85
75	3	5	0.0495	66	17	103
76	29	44	0.0424	32	61	104
77	6	110	0.0424	31	0	85
78	19	62	0.0376	58	30	93
79	52	56	0.0319	60	25	96
80	39	58	0.0304	47	39	94

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
81	43	57	0.0253	46	53	99
82	1	10	0.0128	72	50	115
83	11	24	-0.0166	38	19	107
84	77	89	-0.0183	52	68	91
85	6	71	-0.0198	77	74	95
86	4	68	-0.0198	71	70	96
87	42	69	-0.0207	42	36	100
88	12	27	-0.0209	73	40	108
89	17	63	-0.0215	55	57	98
90	40	45	-0.0215	64	63	101
91	67	77	-0.0217	69	84	95
92	20	21	-0.0225	65	56	105
93	19	55	-0.0226	78	62	97
94	8	39	-0.0232	59	80	99
95	6	67	-0.0235	85	91	102
96	4	52	-0.0259	86	79	101
97	7	19	-0.0260	45	93	106
98	17	54	-0.0268	89	48	106
99	8	43	-0.0280	94	81	109
100	32	42	-0.0289	67	87	105
101	4	40	-0.0296	96	90	108
102	6	36	-0.0305	95	41	104
103	3	22	-0.0338	75	49	112
104	6	29	-0.0342	102	76	109
105	20	32	-0.0421	92	100	110
106	7	17	-0.0485	97	98	111
107	11	13	-0.0486	83	7	110
108	4	12	-0.0515	101	88	111
109	6	8	-0.0563	104	99	113
110	11	20	-0.0646	107	105	114
111	4	7	-0.0853	108	106	112
112	3	4	-0.0919	103	111	113
113	3	6	-0.1110	112	109	114
114	3	11	-0.1741	113	110	115
115	1	3	-0.4017	82	114	0

Appendix J: Conceptual Loose Clustering Solution

Below is the 32 cluster solution with descriptive titles capitalized. Ordering of Appendix I was used to facilitate comparison. Number (#) of Databases (DBs) is the number of different databases a term was affiliated. Total is the overall frequency of the term in the master dataset. Mode DB is the database a term occurred most often. Mode is the keyword count in the Mode DB. Next is the next most frequent keyword count after the mode. Next DB is the Database counted in Next. The following columns are the frequency breakdown of the keywords by database.

Term	# of DBs	Total	Mode DB	Mode	Next	Next Mode DB	ABI	Eric	Psych	SSI	Soc
BUSINESS COMMUNICATIONS AND BEHAVIOR											
Experimental Theoretical	4	42	ABI	42	6	Psych/Eric	42	6	6	0	3
Studies	4	38	Eric	38	38	Psych/Eric	38	6	6	0	3
Telecommunications Systems	4	29	ABI	29	3	Psych/Eric	29	3	3	0	2
Electronic Mail Systems	5	17	ABI	16	4	Psych	16	2	4	2	1
Communications Systems	3	10	ABI	10	2	Eric	10	2	1	0	0
Communication	5	26	ABI	18	10	Psych	18	8	10	4	8
Organizational Behavior	5	26	ABI	22	10	Psych	22	2	10	1	6
United States	5	25	ABI	17	8	Eric	17	8	5	1	2
GROUP DYNAMICS AND DECISION MAKING											
Group Dynamics	5	43	Eric	20	15	Psych	10	20	15	2	14
Decision Making	5	18	Eric	13	5	Soc/Psyc/ABI	5	13	5	1	5
Group Decision Making	5	18	SSI	9	7	Psych	3	5	7	9	5
ONLINE USERS											
Users Information	2	20	Eric	20	1	ABI	1	20	0	0	0
Online Searching	1	14	Eric	14			0	14	0	0	0
Models	5	28	Eric	23	3	Soc/Psyc/ABI	3	23	3	1	3
ELECTRONIC INFORMATION DISSEMINATION											
Electronic Publishing	1	13	Eric	13			0	13	0	0	0
Cost Effectiveness	1	10	Eric	10			0	10	0	0	0
Information Dissemination	4	14	Eric	13	1	Soc/Psyc/ABI	1	13	1	0	1
LEARNER CONTROLLED INSTRUCTION											
Comparative Analysis	4	21	Eric	18	3	Psych/ABI	3	18	3	0	1
Learner Controlled Instruction	2	11	Eric	11	1	Psych	0	11	1	0	0
ADULT COMPUTER USE											
Computer Applications	5	57	Psych	57	15	Eric	5	15	57	9	14
Adulthood	5	53	Psych	53	14	Eric	6	14	53	4	8
Communication Systems	5	21	Psych	21	4	Soc/Eric	2	4	21	3	4
ORGANIZATIONAL AND INTERPERSONAL RESEARCH											
Communication Research	5	38	Eric	36	11	Soc	1	36	10	10	11
Organizational Communication	5	10	Eric	10	4	SSI	1	10	3	4	2
Interpersonal Communication	5	67	Eric	40	32	Psych	5	40	32	11	21
Computers	5	53	Soc	32	25	Eric	5	25	20	8	32

Term	# of DBs	Total	Mode DB	Mode	Next	Next Mode DB	ABI	Eric	Psych	SSI	Soc
SOCIAL ASPECTS											
Social Interaction	4	14	Soc/SSI	7	6	Psych	0	4	6	7	7
Communication Social Aspects	4	10	SSI	10	7	Eric	0	7	4	10	6
Computer Software	3	21	Eric	18	3	Psych	0	18	3	0	1
Databases	1	12	Eric	12			0	12	0	0	0
EXEMPLARS											
Examples	2	16	Eric	16	2	Psych	0	16	2	0	0
Guidelines	2	11	Eric	7	4	ABI	4	7	0	0	0
NONTRADITIONAL EDUCATION											
Distance Education	2	76	Eric	76	2	Psych	0	76	2	0	0
Nontraditional Education	1	12	Eric	12			0	12	0	0	0
COOPERATIVE LEARNING AND INSTRUCTIONAL DESIGN											
Cooperative Learning	1	25	Eric	25			0	25	0	0	0
Interactive Video	1	12	Eric	12			0	12	0	0	0
Instructional Design	1	16	Eric	16			0	16	0	0	0
Learning Environments	1	13	Eric	13			0	13	0	0	0
GROUP DISCUSSION											
Group Discussion	4	23	Eric	21	7	Psych	1	21	7	0	2
Graduate Study	1	11	Eric	11			0	11	0	0	0
Case Studies	3	29	Eric	28	1	Psych/ABI	1	28	1	0	0
Writing Instruction	1	10	Eric	10			0	10	0	0	0
INTERACTION AND CMC* SYSTEMS											
CMC* Systems	5	20	Eric	20	3	Psych	1	20	3	2	1
Interaction	4	20	Eric	20	3	Psych	0	20	3	1	2
TEACHER STUDENT INTERACTIONS											
Teacher Role	1	21	Eric	21			0	21	0	0	0
Student Attitudes	4	25	Eric	23	4	Psych	1	23	4	0	1
College Students	3	12	Eric	9	4	Psych	0	9	4	0	1
INSTRUCTIONAL TECHNIQUES AND EFFECTIVENESS											
Student Participation	1	15	Eric	15			0	15	0	0	0
Instructional Effectiveness	1	14	Eric	14			0	14	0	0	0
Academic Achievement	1	10	Eric	10			0	10	0	0	0
Elementary Education	1	11	Eric	11			0	11	0	0	0
Learning Activities	1	10	Eric	10			0	10	0	0	0
Computer Assisted Instruction	3	107	Eric	103	6	Psych	0	103	6	0	4
Postsecondary Education	1	12	Eric	12			0	12	0	0	0
Curriculum Development	1	10	Eric	10			0	10	0	0	0
MAN MACHINE INTERACTION AND ANALYSIS											
Discourse Analysis	4	14	Eric	13	3	Soc/Psych	0	13	3	2	3
Microcomputers	4	13	Eric	11	3	Soc/Psych	0	11	3	2	3
Man Machine Systems	3	10	Eric	8	2	SSI/Psych	0	8	2	2	0
Computer Attitudes	3	13	Eric	10	3	Psych	1	10	3	0	0
Computer Literacy	1	11	Eric	11			0	11	0	0	0

Term	# of DBs	Total	Mode DB	Mode	Next	Next Mode DB	ABI	Eric	Psych	SSI	Soc
MULTIMEDIA AND COMPUTER ORIENTED PROGRAMS											
Multimedia Instruction	1	12	Eric	12			0	12	0	0	0
Multimedia Materials	1	12	Eric	12			0	12	0	0	0
Computer Oriented Programs	3	11	Eric	11	2	Psych	0	11	2	1	0
Social Studies	1	13	Eric	13			0	13	0	0	0
EDUCATION AND THE WORLD WIDE WEB											
Educational Resources	1	12	Eric	12			0	12	0	0	0
World Wide Web	1	29	Eric	29			0	29	0	0	0
Elementary Secondary Education	2	39	Eric	39	1	Psych	0	39	1	0	0
COMPUTER NETWORKS AND THE INTERNET											
Computer Networks	5	136	Eric	127	9	Psych	8	127	9	8	5
Information Networks	3	72	Eric	72	1	SSI/ABI	1	72	0	1	0
Internet	5	139	Eric	126	9	ABI	9	126	1	6	1
INFORMATION ACCESS											
Access To Information	1	24	Eric	24			0	24	0	0	0
Information Sources	1	14	Eric	14			0	14	0	0	0
TELECOMMUNICATIONS AND PROBLEMS											
Telecommunications	5	109	Eric	81	29	Soc	5	81	10	6	29
Secondary Education	1	16	Eric	16			0	16	0	0	0
Problems	1	17	Eric	17			0	17	0	0	0
COOPERATION AND ONLINE SYSTEMS											
Cooperation	3	13	Eric	13	1	Soc/Psych	0	13	1	0	1
Hypermedia	1	15	Eric	15			0	15	0	0	0
Electronic Text	1	11	Eric	11			0	11	0	0	0
Online Systems	2	44	Eric	44	1	Soc	0	44	0	0	1
SOFTWARE, INFORMATION SYSTEMS AND TECHNOLOGY											
Teacher Student Relationship	2	14	Eric	14	1	Psych	0	14	1	0	0
Information Systems	4	17	Eric	14	3	Psych/ABI	3	14	3	1	0
Software & Systems	4	15	ABI	15	1	Soc/Psyc/Eric	15	1	1	0	1
Information Technology	5	51	Eric	41	9	Soc	5	41	4	3	9
Communications	4	15	Eric	13	2	Psych/ABI	2	13	2	1	0
PROFESSIONAL DEVELOPMENT AND COMMUNICATION THOUGHT TRANSFER											
Professional Development	1	15	Eric	15			0	15	0	0	0
Teacher Education	1	11	Eric	11			0	11	0	0	0
Communication Thought Transfer	3	31	Eric	31	1	Psych/ABI	1	31	1	0	0
Privacy	3	12	Eric	10	1	Soc/Psych	0	10	1	0	1
FUTURES OF SOCIETY											
Futures Of Society	2	32	Eric	32	1	Psych	0	32	1	0	0
International Programs	1	13	Eric	13			0	13	0	0	0
TELECONFERENCING AND USE STUDIES											
Teleconferencing	5	62	Eric	60	4	Psych	3	60	4	1	1
Foreign Countries	3	57	Eric	57	2	Psych	1	57	2	0	0
Use Studies	4	21	Eric	21	1	Soc/Psyc/ABI	1	21	1	0	1
Surveys	3	14	Eric	12	2	Soc	0	12	1	0	2

Term	# of DBs	Total	Mode DB	Mode	Next	Next Mode DB	ABI	Eric	Psych	SSI	Soc
LITERATURE REVIEWS AND QUESTIONNAIRES											
Literature Reviews	4	11	Eric	11	1	Soc/SS/IPsyc	0	11	1	1	1
Tables Data	4	22	Eric	22	3	Psych	1	22	3	0	1
Questionnaires	3	15	Eric	14	2	ABI	2	14	1	0	0
TEACHER ATTITUDES AND UNDERGRADUATE STUDENTS											
Teacher Attitudes	1	11	Eric	11			0	11	0	0	0
Sex Differences	5	17	Eric	15	4	Soc/Psych	1	15	4	1	4
Undergraduate Students	4	13	Eric	12	5	Soc	1	12	4	0	5
CONTENT ANALYSIS AND RESEARCH METHODOLOGY											
Content Analysis	4	17	Eric	16	4	Psych	1	16	4	2	0
Research Needs	2	16	Eric	16	2	Psych	0	16	2	0	0
Research Methodology	3	12	Eric	11	3	Psych	0	11	3	0	1
GRADUATE STUDENTS AND ELECTRONIC MAIL											
Graduate Students	3	14	Eric	12	3	Psych	0	12	3	0	2
Feedback	5	10	Eric	7	2	SSI/Psych	1	7	2	2	1
Electronic Mail	4	137	Eric	137	5	ABI	5	137	3	0	2
Listservs	2	14	Eric	14	1	ABI	1	14	0	0	0
Academic Libraries	1	10	Eric	10			0	10	0	0	0
Computer Uses In Education	2	69	Eric	69	1	Psych	0	69	1	0	0
COMPUTER USES AND TEACHING											
Educational Technology	2	48	Eric	48	1	Psych	0	48	1	0	0
Instructional Innovation	1	20	Eric	20			0	20	0	0	0
Teaching Methods	3	39	Eric	37	2	Soc	0	37	1	0	2
TECHNOLOGICAL ADVANCEMENT AND COMPUTER MEDIATED COMMUNICATION											
Technological Advancement	2	30	Eric	30	1	ABI	1	30	0	0	0
Educational Change	1	10	Eric	10			0	10	0	0	0
CMC*	5	457	Eric	427	41	SSI	4	427	39	41	15
Higher Education	5	204	Eric	204	18	Psych	1	204	18	7	11

*=computer mediated communication

Appendix K: Conceptual Proximity Matrix

Below is the variable key and proximity matrix that gives the distances between variables based on correlations. Whole numbers are variable identifiers that can be coordinated with the dendrogram and agglomerate schedule in appendix I. Variables are listed in the same order as appendices I and J for comparative purposes.

20	Experimental Theoretical
25	Studies
30	Telecommunications Systems
53	Electronic Mail Systems
108	Communications Systems
33	Communication
34	Organizational Behavior
37	United States
21	Group Dynamics
50	Decision Making
51	Group Decision Making
49	Users Information
73	Online Searching
32	Models
79	Electronic Publishing
109	Cost Effectiveness
69	Information Dissemination
42	Comparative Analysis
101	Learner Controlled Instruction
13	Computer Applications
15	Adulthood
41	Communication Systems
24	Communication Research
115	Organizational Communication
11	Interpersonal Communication
16	Computers
74	Social Interaction
107	Communication Social Aspects
43	Computer Software
86	Databases
57	Examples
100	Guidelines
8	Distance Education
91	Nontraditional Education
35	Cooperative Learning
88	Interactive Video
58	Instructional Design
81	Learning Environments
39	Group Discussion
99	Graduate Study
29	Case Studies
116	Writing Instruction
46	CMC* Systems
48	Interaction
44	Teacher Role
36	Student Attitudes
85	College Students
66	Student Participation
71	Instructional Effectiveness
105	Academic Achievement
98	Elementary Education
113	Learning Activities
6	Computer Assisted Instruction
92	Postsecondary Education
110	Curriculum Development
67	Discourse Analysis
82	Microcomputers
114	Man Machine Systems
77	Computer Attitudes
95	Computer Literacy
89	Multimedia Instruction
90	Multimedia Materials
96	Computer Oriented Programs
83	Social Studies
87	Educational Resources
31	World Wide Web
22	Elementary Secondary Ed.*
5	Computer Networks
9	Information Networks
3	Internet
38	Access To Information
70	Information Sources
7	Telecommunications
60	Secondary Education
55	Problems
78	Cooperation
62	Hypermedia
97	Electronic Text
19	Online Systems
76	Teacher Student Relationship
54	Information Systems
65	Software & Systems
17	Information Technology
61	Communications
63	Professional Development
104	Teacher Education
27	Comm.* Thought Transfer
93	Privacy
26	Futures Of Society
80	International Programs
12	Teleconferencing
14	Foreign Countries
45	Use Studies
75	Surveys
102	Literature Reviews
40	Tables Data
64	Questionnaires
103	Teacher Attitudes
56	Sex Differences
84	Undergraduate Students
52	Content Analysis
59	Research Needs
94	Research Methodology
68	Graduate Students
112	Feedback
4	Electronic Mail
72	Listservs
106	Academic Libraries
10	Computer Uses In Education
18	Educational Technology
47	Instructional Innovation
23	Teaching Methods
28	Technological Advancement
111	Educational Change
1	CMC*
2	Higher Education

*=abreviation mine

Variables 1-53

	1	2	3	4	5	6	7	8	9	10	11	12
2	0.2751											
3	0.2161	-0.0199										
4	0.1946	0.0854	0.1201									
5	0.1747	0.0717	0.1789	0.1368								
6	0.1088	0.2125	-0.0651	-0.0515	-0.0602							
7	0.0046	-0.0254	0.0108	0.0037	0.1432	-0.0080						
8	0.1617	0.2064	-0.0981	-0.0362	-0.0109	0.2961	-0.0075					
9	0.1186	-0.0220	0.1770	0.1808	0.3170	-0.0482	0.0833	-0.0455				
10	0.1952	0.0325	0.1764	0.1429	0.0577	0.0533	-0.0196	-0.0405	0.0781			
11	-0.1823	0.0847	-0.1280	-0.0505	-0.1122	-0.0928	0.0553	-0.1164	-0.0470	-0.0425		
12	0.0578	0.1414	-0.0919	0.0793	0.0287	0.1019	-0.0474	0.2675	0.0285	-0.1199	-0.0312	
13	-0.3970	-0.0958	-0.1741	-0.1590	-0.0769	-0.1330	0.0088	-0.1209	-0.1172	-0.1144	0.3377	-0.0705
14	0.0825	0.2144	-0.0801	0.0569	0.0448	0.1187	0.0088	0.2372	0.0049	-0.0078	-0.0405	0.2090
15	-0.3970	-0.0826	-0.1672	-0.1239	-0.1230	-0.0808	-0.0589	-0.0809	-0.1126	-0.0916	0.3013	-0.0265
16	-0.2095	-0.0456	-0.1118	-0.0681	-0.0251	-0.0808	0.1603	-0.1162	-0.0405	0.0186	0.3385	-0.0458
17	-0.0156	-0.0380	0.0056	-0.0204	0.0092	-0.0456	0.0569	0.0118	0.0365	-0.0142	-0.0491	-0.0230
18	0.1135	0.0384	0.1172	0.0472	0.0192	0.1215	0.0174	0.1664	0.0442	0.2994	-0.0051	0.0630
19	0.1325	0.0310	0.1358	0.0628	-0.0273	0.0049	-0.0217	0.0293	0.0946	0.0606	-0.0572	0.0322
20	-0.4017	-0.1760	-0.0519	-0.0658	-0.0649	-0.1236	-0.0665	-0.1011	-0.0777	-0.0957	0.0106	-0.0468
21	-0.2087	-0.0048	-0.1493	-0.1019	-0.0857	-0.0763	0.0843	-0.0649	-0.1006	-0.0982	0.2106	0.0347
22	0.1516	-0.0997	0.1458	0.1004	0.1017	0.0735	0.0460	-0.0173	-0.0124	0.2241	-0.0702	-0.0656
23	0.0128	0.1559	-0.0139	-0.0441	-0.0592	0.1792	-0.0621	0.0436	-0.0331	0.1607	-0.0488	0.0231
24	0.0715	0.1482	-0.0428	-0.0572	0.0577	-0.0473	0.0314	-0.0971	-0.0731	-0.0491	0.2566	-0.0641
25	-0.3812	-0.1679	-0.0428	-0.0572	-0.0563	-0.1187	-0.0599	-0.0971	-0.0731	-0.0919	0.0181	-0.0417
26	0.1195	0.0049	0.0301	0.0674	0.1038	0.0270	0.0536	0.0895	-0.0176	-0.0839	-0.0590	0.0670
27	0.1170	0.0261	-0.0187	0.1260	0.1094	-0.0084	-0.0427	-0.0419	0.1005	0.0118	-0.0334	0.0705
28	0.0796	0.0640	0.1116	-0.0132	0.0423	0.0149	0.0416	0.0062	0.0579	0.0386	-0.0555	0.0491
29	0.0764	0.1847	-0.0110	0.0092	0.0101	0.0389	-0.0786	0.0325	-0.0100	-0.0067	-0.0291	0.0015
30	-0.3668	-0.1580	-0.0110	-0.0646	-0.0454	-0.1029	-0.0579	-0.0841	-0.0577	-0.0796	-0.0291	0.0015
31	0.1119	-0.0438	0.2277	0.0461	0.0101	-0.0016	-0.0579	-0.0608	-0.0338	0.1879	-0.0783	-0.0750
32	0.0191	0.0274	-0.0816	-0.0052	0.0144	0.0226	0.0289	0.0360	0.0170	-0.0782	-0.0519	0.0819
33	-0.2324	-0.0289	-0.0370	-0.0550	0.0236	-0.0758	0.0590	-0.0795	-0.0771	-0.0752	0.0298	-0.0708
34	-0.3407	-0.1218	-0.0458	-0.0857	-0.0645	-0.0911	0.0277	-0.0745	-0.0723	-0.0706	0.0682	-0.0665
35	0.1009	0.0990	-0.0333	-0.1110	0.0285	0.1657	0.0193	0.1475	0.0014	0.0307	-0.0725	-0.0420
36	0.0057	0.1866	-0.0530	0.0078	-0.0509	0.1874	-0.0919	0.1475	-0.0499	-0.0476	0.0068	0.0674
37	-0.2416	-0.0586	0.0062	-0.0516	-0.0509	-0.0734	0.0193	-0.0278	-0.0755	-0.0737	0.0068	-0.0147
38	0.0980	-0.0538	0.2520	0.0731	0.1348	-0.0488	0.0007	0.0004	0.0568	0.1142	-0.0710	-0.0680
39	0.0356	0.1700	0.0157	-0.0445	-0.0025	0.0899	-0.0186	0.1339	-0.0189	0.0109	0.0407	0.0190
40	0.0515	0.0308	0.0209	0.1067	0.1078	0.0034	-0.0387	-0.0462	0.1201	-0.0134	-0.0116	0.0805
41	-0.2422	-0.0574	-0.1024	-0.0583	-0.0578	-0.0397	-0.0356	-0.0439	-0.0690	-0.0673	0.0488	-0.0634
42	0.0268	0.0379	-0.0381	-0.0153	0.0286	0.0549	-0.0114	0.0922	-0.0132	-0.0673	-0.0087	0.0854
43	0.0268	-0.0764	-0.0167	0.0063	0.0070	0.0076	-0.0598	-0.0167	-0.0411	-0.0105	-0.0087	0.0556
44	0.0268	0.1141	-0.0381	0.0278	-0.0578	0.1731	-0.0114	0.0922	-0.0411	-0.0105	-0.0375	0.1151
45	0.0474	-0.0193	0.0262	0.0924	-0.0146	-0.0869	0.0128	-0.0711	-0.0132	-0.0389	-0.0375	0.0259
46	-0.2110	0.1038	-0.0998	0.0114	0.0121	0.1572	-0.0571	0.0421	0.0754	-0.0366	-0.0057	0.1209
47	0.1068	0.0648	0.1196	0.0114	0.0563	0.1572	-0.0323	0.0143	0.0183	0.2250	-0.0646	-0.0009
48	0.0221	0.0843	-0.0340	-0.0548	-0.0763	0.1088	-0.0571	0.0979	-0.0672	0.0506	-0.0057	0.1209
49	0.0856	-0.0327	0.0099	0.0996	0.0785	-0.0848	-0.0076	-0.0693	0.1325	-0.0075	-0.0646	-0.0314

Variables 1-53

	1	2	3	4	5	6	7	8	9	10	11	12
50	-0.0326	0.0819	-0.0945	-0.0240	-0.0700	-0.0293	0.0267	-0.0363	-0.0337	-0.0316	0.0628	-0.0585
51	-0.0772	-0.0412	-0.0945	-0.0937	-0.0467	-0.0548	0.0006	-0.0657	-0.0637	-0.0316	0.0937	-0.0585
52	0.0294	-0.0143	-0.0443	0.0761	-0.0188	0.0006	-0.0753	-0.0638	-0.0310	-0.0289	0.0680	0.0091
53	-0.2914	-0.1198	-0.0206	-0.0432	-0.0427	-0.0779	-0.0485	-0.0638	-0.0618	-0.0604	0.0043	-0.0239

	13	14	15	16	17	18	19	20	21	22	23	24
14	-0.1029											
15	0.6409	-0.0589										
16	0.1411	-0.0589	0.1529									
17	-0.0154	-0.0358	-0.0510	0.0752								
18	-0.0727	0.0318	-0.0900	-0.0252	-0.0441							
19	-0.0894	-0.0023	-0.0859	-0.0184	-0.0383	0.0834						
20	0.0039	-0.0635	0.0568	-0.0129	-0.0100	-0.0783	-0.0747					
21	0.1538	-0.0883	0.2562	0.1880	-0.0136	-0.0803	-0.0766	0.1564				
22	-0.0607	-0.0377	-0.0805	0.0147	-0.0062	0.1975	0.0050	-0.0700	-0.0718			
23	-0.0838	0.0774	-0.0567	-0.0567	-0.0788	0.1726	-0.0209	-0.0700	-0.0718	0.0140		
24	0.0805	-0.0826	0.0169	0.1133	-0.0042	-0.0500	-0.0193	-0.0420	0.0881	-0.0395	-0.0118	
25	0.0106	-0.0593	0.0651	-0.0071	-0.0287	-0.0752	-0.0717	0.9602	0.1411	-0.0672	-0.0672	-0.0383
26	-0.0754	0.0762	-0.0464	-0.0725	0.0353	0.0406	0.0198	-0.0631	-0.0360	0.0889	-0.0614	-0.0605
27	-0.0742	0.0028	-0.0448	-0.0183	-0.0158	-0.0398	0.0221	-0.0322	-0.0053	-0.0604	-0.0604	-0.0287
28	-0.0729	-0.0208	-0.0700	-0.0700	0.1505	0.1026	0.0246	-0.0307	-0.0625	0.0336	0.0956	-0.0272
29	-0.0716	0.0607	-0.0414	-0.0414	-0.0395	0.0206	-0.0324	-0.0599	-0.0614	-0.0583	0.0992	0.0381
30	-0.0451	-0.0451	0.0132	0.0132	-0.0674	-0.0652	-0.0622	0.5554	0.1191	-0.0583	-0.0583	-0.0256
31	-0.0716	-0.0451	-0.0688	-0.0141	-0.0117	0.1637	0.0271	-0.0599	-0.0614	0.1621	0.0047	-0.0575
32	0.0104	0.0643	-0.0397	-0.0397	-0.0095	0.0524	-0.0610	0.0351	0.0315	0.0068	-0.0252	0.0084
33	0.1275	-0.0676	0.0503	0.1367	0.0536	-0.0616	-0.0587	0.4296	0.1956	-0.0550	-0.0550	0.1472
34	0.1435	-0.0634	0.1835	0.0307	0.0025	-0.0577	-0.0551	0.4969	0.2482	-0.0516	-0.0516	-0.0153
35	-0.0663	-0.0094	-0.0637	-0.0637	-0.0325	0.0011	-0.0575	-0.0554	0.0078	0.0137	0.0137	-0.0532
36	-0.0378	0.0474	0.0244	-0.0049	-0.0325	0.0011	0.0064	-0.0224	-0.0245	-0.0539	-0.0539	-0.0532
37	0.0474	0.1326	0.0538	-0.0343	-0.0026	-0.0296	-0.0575	0.2418	0.0401	0.0137	-0.0201	-0.0532
38	-0.0649	0.0220	-0.0623	-0.0623	0.0304	0.0349	0.1066	-0.0542	-0.0556	0.0851	0.0161	-0.0521
39	0.1140	-0.0634	0.1224	0.0002	0.0336	-0.0258	0.0114	-0.0187	0.1809	0.0187	0.0187	0.0203
40	-0.0318	0.0286	0.0341	-0.0596	-0.0266	-0.0238	-0.0199	-0.0167	-0.0188	-0.0505	-0.0505	-0.0134
41	0.3719	-0.0296	0.3887	0.0057	-0.0569	-0.0551	-0.0526	-0.0147	-0.0168	-0.0493	-0.0493	-0.0486
42	0.0013	0.0322	0.0376	-0.0262	-0.0569	0.0451	0.0169	0.0571	0.0183	0.0242	-0.0493	-0.0114
43	0.0013	-0.0296	-0.0262	0.0057	-0.0245	0.0117	-0.0178	-0.0506	-0.0168	-0.0493	-0.0125	-0.0486
44	-0.0605	0.0322	-0.0581	-0.0581	-0.0569	0.1119	0.0169	-0.0506	-0.0168	0.0242	-0.0125	-0.0486
45	-0.0605	0.0322	-0.0262	-0.0262	0.0405	-0.0217	0.1560	-0.0147	-0.0519	-0.0493	-0.0493	0.0630
46	0.0042	0.1307	0.0413	-0.0240	0.0442	-0.0195	-0.0157	-0.0126	-0.0147	-0.0480	0.1401	0.1050
47	-0.0590	0.0991	-0.0567	0.0087	-0.0555	0.2540	-0.0157	-0.0493	-0.0506	0.1401	0.2154	-0.0474
48	0.0042	0.0042	0.0087	-0.0240	-0.0223	-0.0195	-0.0157	-0.0493	0.0573	-0.0104	0.1401	0.0288
49	-0.0590	0.0991	-0.0567	-0.0567	0.0775	0.0488	-0.0512	-0.0126	-0.0147	0.0648	-0.0480	0.0288
50	0.0772	-0.0559	0.0839	0.0839	0.0174	-0.0149	-0.0485	0.1467	0.3305	-0.0455	-0.0059	0.1154
51	0.1105	-0.0559	0.0839	0.0839	-0.0526	-0.0509	-0.0485	0.0306	0.1791	-0.0455	-0.0059	0.1555
52	0.0142	-0.0200	0.0539	-0.0168	-0.0511	-0.0494	-0.0086	-0.0056	-0.0465	-0.0442	-0.0442	0.1213
53	-0.0200	-0.0200	0.0539	-0.0168	-0.0151	-0.0494	-0.0471	0.5115	0.1091	-0.0442	-0.0442	-0.0024

	25	26	27	28	29	30	31	32	33	34	35	36
26	-0.0605											
27	-0.0287	0.0461										

Variables 1-53

	25	26	27	28	29	30	31	32	33	34	35	36
28	-0.0272	0.1846	-0.0180									
29	-0.0575	0.0166	-0.0165	-0.0507								
30	0.5481	-0.0525	-0.0516	-0.0507	-0.0136							
31	-0.0575	-0.0525	-0.0516	0.0918	-0.0498	-0.0498						
32	0.0408	-0.0164	0.0563	-0.0136	-0.0121	-0.0121	-0.0121					
33	0.4158	-0.0496	-0.0487	-0.0104	-0.0471	0.2580	-0.0471	0.0314				
34	0.4832	-0.0465	-0.0457	-0.0449	-0.0037	0.4007	-0.0441	0.0389	0.3417			
35	-0.0532	0.0256	0.0275	-0.0087	0.0316	-0.0461	-0.0461	0.0733	-0.0435	-0.0409		
36	-0.0190	-0.0115	-0.0478	-0.0087	0.1093	-0.0461	-0.0461	-0.0453	-0.0026	-0.0409	-0.0010	
37	0.2547	-0.0115	-0.0101	-0.0087	-0.0072	0.2647	-0.0072	-0.0058	0.2020	0.1762	-0.0427	-0.0427
38	-0.0521	-0.0097	-0.0467	0.1490	-0.0055	-0.0451	0.1530	-0.0443	-0.0426	-0.0400	-0.0418	0.0008
39	-0.0153	-0.0465	-0.0457	-0.0051	0.0367	-0.0037	-0.0441	-0.0433	-0.0417	0.0512	0.0026	0.0894
40	-0.0134	0.0334	0.1555	-0.0439	0.0808	-0.0018	-0.0431	-0.0003	-0.0407	-0.0382	-0.0399	0.0488
41	-0.0114	-0.0040	-0.0436	-0.0429	0.0001	0.0001	-0.0421	0.0016	0.0047	0.1987	-0.0390	0.0517
42	0.0630	0.1976	0.0383	-0.0013	0.0001	0.0846	-0.0421	0.0446	-0.0398	0.0099	0.0064	0.0517
43	-0.0486	0.0766	0.0792	-0.0013	-0.0421	-0.0421	0.0424	0.0016	-0.0398	0.0099	0.0517	0.0517
44	-0.0486	-0.0040	0.0792	-0.0429	0.0424	-0.0421	0.0001	0.0875	-0.0398	-0.0373	0.0971	0.1424
45	-0.0114	-0.0040	0.1201	0.0403	-0.0421	0.0001	-0.0421	-0.0413	-0.0398	-0.0373	0.0064	0.0064
46	-0.0093	-0.0020	-0.0425	0.0433	0.0455	0.0022	-0.0411	-0.0403	-0.0388	-0.0364	-0.0380	0.1477
47	-0.0474	-0.0020	0.0413	0.0433	-0.0411	-0.0411	0.1320	-0.0403	-0.0388	-0.0364	0.1477	-0.0380
48	-0.0474	-0.0432	-0.0425	-0.0418	0.0455	-0.0411	-0.0411	-0.0403	-0.0388	-0.0364	0.0549	0.0549
49	-0.0093	0.0393	0.0413	0.0008	-0.0411	0.0022	0.0455	0.1356	-0.0388	-0.0364	0.0084	-0.0380
50	0.1154	0.0025	0.0038	-0.0396	-0.0389	0.0066	-0.0389	-0.0382	0.2030	0.1181	-0.0360	-0.0360
51	0.0353	-0.0410	-0.0403	-0.0396	-0.0389	0.0522	-0.0389	0.0081	0.1551	0.1181	-0.0360	-0.0360
52	-0.0024	0.0049	0.0969	-0.0384	0.0558	0.0090	-0.0378	0.0581	0.0629	0.0188	-0.0349	-0.0349
53	0.4509	-0.0398	-0.0391	-0.0384	-0.0378	0.5239	-0.0378	-0.0371	0.3587	0.4371	-0.0349	-0.0349

	37	38	39	40	41	42	43	44	45	46	47	48
38	0.0008											
39	-0.0409	0.0043										
40	0.0044	0.0514	0.0541									
41	0.0517	-0.0381	-0.0373	0.0600								
42	0.0064	0.0081	0.1043	0.0600	-0.0356							
43	-0.0390	0.0081	0.0099	-0.0365	0.0137	-0.0356						
44	-0.0390	-0.0381	-0.0373	-0.0365	-0.0356	0.0137	0.0630					
45	0.0064	0.0543	-0.0373	0.2046	0.0137	-0.0356	-0.0356	-0.0356				
46	0.0084	-0.0372	0.0603	0.0138	-0.0347	0.0663	-0.0347	0.1168	0.0663			
47	0.0084	0.0102	0.0119	-0.0356	-0.0347	-0.0347	-0.0347	0.0663	-0.0347	-0.0338		
48	-0.0380	-0.0372	0.0603	0.0138	-0.0347	0.0158	-0.0347	0.1672	-0.0347	0.2246	0.0179	
49	0.0084	0.0575	-0.0364	0.0632	-0.0347	0.0158	-0.0347	-0.0347	0.1168	0.0179	-0.0338	0.0179
50	0.0617	-0.0352	0.1181	-0.0337	0.0203	0.0203	-0.0329	-0.0329	-0.0329	0.0223	-0.0321	-0.0321
51	0.0129	-0.0352	0.0673	-0.0337	-0.0329	-0.0329	-0.0329	-0.0329	-0.0329	0.0223	-0.0321	-0.0321
52	-0.0349	-0.0342	0.0188	0.2344	0.0227	0.0227	-0.0319	-0.0319	0.1320	0.0248	-0.0311	-0.0311
53	0.2665	-0.0342	-0.0335	0.0207	0.1320	-0.0319	-0.0319	-0.0319	0.0227	0.0248	-0.0311	-0.0311

	49	50	51	52	53	54	55	56	57	58	59	60
50	-0.0321											
51	-0.0321	0.1414										
52	-0.0311	-0.0295	-0.0295									
53	-0.0311	0.0294	0.0294	0.0319								

Variables 54 -107

	1	2	3	4	5	6	7	8	9	10	11	12
54	0.0294	0.0068	0.0031	0.0045	0.0291	-0.0256	-0.0485	-0.0336	0.0308	0.0340	-0.0275	-0.0569
55	0.0982	0.0490	0.0506	0.0522	0.0530	0.0006	0.0051	0.0569	0.0616	0.0025	-0.0594	0.0420
56	-0.0164	0.0490	-0.0443	-0.0194	-0.0427	0.0006	0.0319	-0.0336	-0.0310	-0.0289	0.1317	-0.0239
57	0.0952	0.0143	0.0088	0.0347	0.0847	-0.0216	-0.0454	0.0624	0.0036	-0.0261	-0.0247	0.0807
58	0.0952	0.0360	-0.0156	-0.0636	-0.0631	0.1402	-0.0730	0.2798	-0.0599	-0.0261	-0.0575	0.1146
59	0.0480	0.0795	-0.0645	0.0347	-0.0385	0.0862	-0.0730	0.0624	0.0036	-0.0261	0.0081	0.1485
60	0.0244	-0.0074	0.0333	0.0347	0.0108	0.0323	0.1753	-0.0618	0.0990	0.0386	0.0081	-0.0551
61	-0.0053	-0.0226	0.0905	-0.0092	-0.0340	0.0382	-0.0421	-0.0598	0.0732	0.1105	-0.0218	-0.0183
62	0.0921	0.0222	-0.0356	-0.0346	-0.0595	0.1217	-0.0137	0.1004	-0.0252	0.0102	-0.0557	0.1218
63	0.0921	-0.0002	0.0401	0.0415	0.0422	0.0382	0.1287	0.0043	0.0732	0.0771	-0.0218	0.0518
64	-0.0053	0.1119	-0.0356	0.0669	-0.0595	0.0382	-0.0421	0.0363	-0.0580	-0.0566	0.0120	0.0518
65	-0.2489	-0.1123	-0.0861	-0.0853	-0.0086	-0.0731	-0.0421	-0.0598	-0.0580	-0.0566	0.0120	-0.0533
66	0.0921	0.1119	-0.0356	0.0415	-0.0086	0.0382	-0.0421	0.0043	-0.0580	0.1105	-0.0557	0.0518
67	0.0133	0.0771	-0.0831	-0.0561	0.0232	0.0446	-0.0093	-0.0246	-0.0220	-0.0201	0.0863	0.0210
68	0.0133	0.1699	0.0213	0.0750	-0.0556	0.1309	0.0202	0.0417	-0.0560	-0.0546	-0.0187	0.0934
69	0.0637	0.0307	0.1517	-0.0036	0.0758	-0.0418	-0.0681	-0.0577	0.0797	0.1527	-0.0187	-0.0515
70	0.0637	-0.0388	0.1256	0.1275	0.0495	-0.0706	-0.0387	-0.0577	0.1137	0.0490	-0.0537	-0.0152
71	0.0637	0.0539	-0.0309	-0.0036	0.0495	0.1309	0.0202	0.1411	-0.0560	0.0836	-0.0537	-0.0152
72	0.0889	0.0307	0.1256	0.1537	-0.0031	-0.0130	-0.0387	-0.0246	-0.0220	-0.0546	-0.0187	-0.0515
73	0.0889	-0.0388	0.0995	-0.0036	0.0758	-0.0418	0.0791	-0.0577	0.0119	0.0145	-0.0537	-0.0152
74	-0.1126	-0.0388	-0.0831	-0.0823	-0.0031	-0.0706	0.1085	-0.0577	-0.0560	-0.0546	0.1913	-0.0152
75	0.0133	0.0771	0.0995	0.0488	0.0495	0.0158	-0.0093	-0.0246	0.0797	-0.0201	-0.0187	0.0934
76	0.0889	0.1467	-0.0048	0.0226	-0.0031	0.0158	0.0202	0.0417	-0.0560	0.1527	0.0163	-0.0152
77	-0.0189	0.0640	-0.0530	0.0295	-0.0244	-0.0083	-0.0656	-0.0556	-0.0187	0.0549	0.0209	0.0256
78	0.0856	0.0159	0.0282	-0.0521	0.0847	-0.0679	0.0260	-0.0212	0.0165	-0.0526	-0.0517	0.0256
79	0.0595	-0.0563	0.0012	0.0567	-0.0244	-0.0381	-0.0351	-0.0556	0.0868	0.0191	-0.0517	-0.0120
80	0.0595	0.0159	-0.0259	0.0839	0.0847	0.0514	-0.0045	0.1850	-0.0187	-0.0526	-0.0517	0.0631
81	0.0595	0.0880	-0.0530	-0.0793	0.0029	0.2006	0.0260	0.1850	-0.0539	-0.0168	-0.0517	0.0631
82	0.0072	0.0159	-0.0530	0.0567	0.0847	0.0813	0.1176	0.0819	0.0516	-0.0526	0.0571	0.1007
83	0.0856	-0.0563	0.1635	0.0023	0.0847	0.0514	-0.0045	-0.0556	0.0165	0.3057	-0.0517	-0.0495
84	0.0595	0.1842	-0.0259	0.0839	0.0029	-0.0083	0.0565	-0.0212	-0.0187	-0.0526	0.1297	0.0256
85	-0.0537	0.0499	-0.0487	-0.0195	-0.0190	0.0279	-0.0312	-0.0533	-0.0517	-0.0132	-0.0119	-0.0085
86	0.0550	-0.0252	0.0639	0.0370	0.0660	0.0900	0.0640	-0.0176	0.1312	-0.0132	-0.0119	-0.0085
87	0.0822	-0.0252	0.1483	-0.0195	0.0377	0.0900	-0.0312	0.0181	0.0580	0.1731	-0.0497	-0.0476
88	0.0550	0.0499	0.0076	-0.0761	-0.0474	0.0589	0.0005	0.1254	-0.0517	0.0613	-0.0119	0.0696
89	0.0822	-0.0502	0.0639	0.0370	-0.0190	0.0589	0.0323	0.0539	0.0214	0.2104	-0.0119	-0.0085
90	0.0822	-0.0502	0.0920	0.0087	0.0093	0.0279	-0.0630	0.0539	0.0214	0.0986	-0.0497	-0.0085
91	0.0822	0.0499	-0.0205	0.0087	0.0093	0.0900	-0.0312	0.3398	-0.0517	-0.0132	-0.0497	0.0696
92	0.0550	-0.1002	-0.0487	-0.0478	0.0660	0.2141	0.0323	0.1254	0.0580	-0.0132	-0.0497	0.0696
93	0.0278	0.0499	0.0076	0.0936	0.0093	-0.0652	-0.0312	-0.0533	-0.0151	0.0240	-0.0497	-0.0085
94	0.0278	0.0499	-0.0205	0.0653	0.0944	-0.0031	-0.0312	-0.0533	0.0214	-0.0505	0.0258	-0.0085
95	0.0786	0.0346	0.0440	0.0453	0.0163	0.0672	-0.0271	-0.0510	0.0650	0.1850	-0.0081	0.0360
96	-0.0064	0.0085	0.0146	0.0157	-0.0133	0.0348	0.0392	-0.0137	-0.0113	0.1850	0.1101	-0.0047
97	0.0786	0.0085	0.0440	-0.0138	0.0163	0.0024	0.0060	-0.0137	0.1032	0.0684	-0.0475	-0.0047
98	0.0786	-0.0959	0.1027	0.1338	0.0163	0.1319	0.0392	-0.0510	0.0269	0.1850	-0.0475	-0.0455
99	0.0503	0.1651	0.0440	0.0157	-0.0133	0.1319	0.0392	0.1728	-0.0113	-0.0483	-0.0081	0.1583
100	0.0084	-0.0289	0.0309	0.0646	-0.0001	-0.0563	0.0187	0.0362	-0.0447	-0.0007	-0.0429	0.0039
101	0.0786	0.1129	-0.0441	-0.0433	-0.0429	0.1967	-0.0271	0.1355	-0.0113	0.0684	-0.0081	0.1176

Variables 54 -107

	1	2	3	4	5	6	7	8	9	10	11	12
102	0.0786	0.0607	-0.0441	0.0453	0.0459	0.0024	0.0392	0.0982	0.0269	-0.0483	0.0313	0.1176
103	-0.0064	0.0868	-0.0441	-0.0138	0.0459	0.0995	0.0392	0.0609	-0.0495	-0.0094	-0.0475	0.0768
104	0.0503	0.0607	-0.0441	-0.0138	0.1051	0.1319	0.1054	0.1355	0.0269	-0.0094	-0.0475	-0.0047
105	0.0155	0.1001	-0.0392	-0.0075	0.0240	0.1781	0.0120	0.2641	-0.0071	-0.0053	-0.0453	-0.0006
106	0.0452	0.1548	0.0223	0.1162	0.0550	-0.0255	-0.0227	0.0296	0.1529	-0.0460	-0.0453	0.0421
107	0.0452	0.0454	-0.0085	-0.0693	0.0240	-0.0594	0.0468	-0.0486	-0.0471	-0.0460	0.2437	-0.0433
	13	14	15	16	17	18	19	20	21	22	23	24
54	-0.0200	0.0142	0.0186	-0.0521	0.0209	-0.0494	-0.0086	0.0739	0.0702	-0.0442	-0.0442	0.0801
55	-0.0543	0.0484	-0.0521	-0.0521	-0.0151	-0.0124	0.0299	-0.0454	-0.0076	-0.0442	-0.0035	-0.0436
56	0.0826	-0.0200	0.0893	0.0893	0.0209	-0.0494	0.0299	-0.0056	0.1091	-0.0035	-0.0442	-0.0024
57	-0.0526	0.0531	0.0223	-0.0505	0.0246	-0.0098	-0.0060	-0.0440	0.0350	-0.0009	-0.0009	-0.0422
58	-0.0526	0.0179	-0.0505	-0.0505	-0.0124	0.1426	0.0733	-0.0440	-0.0451	-0.0428	-0.0009	-0.0422
59	-0.0174	0.1236	0.0223	-0.0505	-0.0495	0.0283	-0.0060	-0.0440	-0.0050	-0.0428	-0.0428	-0.0422
60	-0.0526	0.1588	-0.0505	-0.0141	-0.0124	0.0664	0.0336	-0.0440	-0.0050	-0.0428	0.0410	-0.0422
61	-0.0145	0.0218	-0.0113	0.0638	0.1433	-0.0070	0.0376	-0.0425	-0.0436	0.0884	0.0451	-0.0409
62	-0.0509	0.0218	-0.0489	-0.0489	0.0286	0.0323	0.0376	-0.0425	-0.0436	0.0018	0.0018	-0.0409
63	-0.0509	-0.0145	-0.0489	-0.0113	-0.0096	-0.0463	0.0785	-0.0425	-0.0436	0.1316	0.0018	-0.0409
64	-0.0509	0.0218	-0.0113	-0.0489	-0.0479	-0.0463	-0.0033	0.0420	-0.0023	-0.0414	-0.0414	-0.0409
65	-0.0145	-0.0509	-0.0113	-0.0113	0.0668	-0.0463	-0.0442	0.5492	0.1217	-0.0414	-0.0414	-0.0409
66	-0.0509	0.0218	-0.0489	-0.0489	-0.0479	-0.0070	-0.0033	-0.0425	-0.0023	0.0018	0.0018	-0.0409
67	0.0261	-0.0115	-0.0083	0.0694	-0.0067	-0.0041	-0.0003	-0.0411	-0.0421	-0.0400	0.0048	0.1870
68	-0.0491	0.0261	0.0694	0.0305	-0.0462	-0.0041	0.0843	-0.0411	-0.0421	-0.0400	0.0495	0.0059
69	-0.0115	-0.0115	-0.0083	0.0305	-0.0067	0.0366	-0.0003	0.0026	0.0006	0.0048	-0.0400	0.0059
70	-0.0491	-0.0491	-0.0472	-0.0083	-0.0067	0.0366	0.0420	-0.0411	-0.0421	0.0943	-0.0400	0.0059
71	-0.0491	-0.0115	-0.0472	-0.0472	-0.0462	0.0773	-0.0003	-0.0411	-0.0421	0.0048	0.0943	0.0059
72	-0.0491	0.0261	-0.0472	-0.0472	0.0329	-0.0447	-0.0003	0.0026	-0.0421	-0.0400	-0.0400	0.0059
73	-0.0491	0.0261	-0.0472	-0.0472	0.0329	-0.0041	0.0843	-0.0411	-0.0421	0.0048	-0.0400	-0.0394
74	0.1013	-0.0491	0.1083	0.2637	-0.0067	-0.0447	-0.0427	-0.0411	0.2145	-0.0400	-0.0400	0.1417
75	-0.0115	-0.0491	-0.0083	-0.0083	0.0329	-0.0447	-0.0003	-0.0411	-0.0421	-0.0400	-0.0400	-0.0394
76	-0.0115	0.0261	-0.0472	-0.0472	-0.0462	0.1586	0.1266	-0.0411	-0.0421	-0.0400	0.0943	-0.0394
77	0.0697	0.0307	0.0754	-0.0454	-0.0035	-0.0009	-0.0411	0.0058	-0.0406	-0.0385	0.0079	-0.0380
78	-0.0083	-0.0473	-0.0454	-0.0051	-0.0035	-0.0431	0.0905	-0.0395	-0.0406	-0.0385	-0.0385	0.0090
79	-0.0473	0.0697	-0.0454	-0.0454	-0.0035	-0.0431	0.0467	-0.0395	-0.0406	-0.0385	0.0079	-0.0380
80	-0.0473	0.2257	-0.0454	-0.0454	-0.0445	-0.0431	0.0028	-0.0395	-0.0406	0.0543	0.0079	-0.0380
81	-0.0473	0.1867	-0.0454	-0.0454	0.0375	-0.0431	-0.0411	-0.0395	-0.0406	0.0079	0.0543	-0.0380
82	0.0307	-0.0083	-0.0454	0.0754	-0.0035	0.0413	-0.0411	-0.0395	-0.0406	0.0079	-0.0385	0.0560
83	-0.0473	-0.0083	-0.0454	0.0352	-0.0445	0.2099	-0.0411	-0.0395	-0.0406	0.3327	-0.0385	0.0090
84	0.0697	0.0307	0.1157	0.1157	0.0375	-0.0009	-0.0411	0.0058	0.2255	-0.0385	0.0079	0.0560
85	0.0763	-0.0048	0.0821	0.0402	-0.0001	-0.0413	-0.0394	-0.0380	0.0072	-0.0370	-0.0370	-0.0364
86	-0.0454	-0.0048	-0.0436	-0.0436	-0.0427	0.0025	0.0062	-0.0380	-0.0389	0.0113	-0.0370	-0.0364
87	-0.0454	-0.0454	-0.0436	0.0402	-0.0427	0.2217	0.0062	-0.0380	-0.0389	0.2043	-0.0370	-0.0364
88	-0.0454	-0.0048	-0.0436	-0.0436	-0.0427	0.0025	-0.0394	-0.0380	-0.0389	-0.0370	0.1078	-0.0364
89	-0.0454	0.0357	-0.0436	-0.0436	-0.0001	0.1779	0.0518	-0.0380	-0.0389	0.0595	0.1078	-0.0364
90	-0.0454	-0.0454	-0.0436	-0.0436	-0.0001	0.1779	0.0975	-0.0380	-0.0389	0.0113	0.0595	-0.0364
91	-0.0454	-0.0048	-0.0436	-0.0436	0.0426	0.0464	0.0518	-0.0380	-0.0389	0.0113	-0.0370	-0.0364
92	-0.0454	0.0357	-0.0436	-0.0436	-0.0001	0.0025	0.0062	-0.0380	0.0072	-0.0370	0.0595	-0.0364
93	-0.0048	-0.0048	-0.0017	-0.0017	-0.0427	0.0025	0.1431	-0.0380	-0.0389	0.0113	-0.0370	-0.0364
94	-0.0454	0.0357	-0.0017	-0.0436	-0.0427	0.0025	-0.0394	-0.0380	-0.0389	0.0595	-0.0370	0.0612

Variables 54 -107

	13	14	15	16	17	18	19	20	21	22	23	24
95	-0.0434	-0.0434	-0.0417	-0.0417	0.0036	-0.0395	0.0575	-0.0363	0.0590	0.0150	-0.0354	-0.0349
96	0.0412	-0.0434	0.0457	0.0020	-0.0409	0.1435	-0.0377	-0.0363	0.0109	-0.0354	0.0654	0.0161
97	-0.0434	-0.0011	-0.0417	-0.0417	0.0036	0.0062	0.1051	-0.0363	-0.0373	0.0150	0.0654	-0.0349
98	-0.0434	-0.0011	-0.0417	-0.0417	-0.0409	0.0520	0.0575	-0.0363	-0.0373	-0.0354	0.0150	0.0161
99	-0.0434	0.0835	-0.0417	-0.0417	-0.0409	-0.0395	0.0099	-0.0363	0.0109	-0.0354	0.0654	-0.0349
100	-0.0392	-0.0392	-0.0377	-0.0377	0.0613	0.0653	-0.0341	-0.0328	0.0195	-0.0319	-0.0319	-0.0315
101	-0.0011	0.0835	-0.0417	0.0020	0.0036	0.0520	-0.0377	-0.0363	-0.0373	0.0654	0.0654	-0.0349
102	-0.0011	-0.0434	-0.0417	0.0020	0.0481	0.0062	0.0099	-0.0363	-0.0373	-0.0354	-0.0354	0.0161
103	-0.0434	0.0835	-0.0417	-0.0417	-0.0409	0.0977	0.0575	-0.0363	-0.0373	0.0150	0.0150	0.0671
104	-0.0434	0.0412	-0.0417	-0.0417	0.0036	0.0520	0.0099	-0.0363	-0.0373	0.0654	0.0150	-0.0349
105	-0.0414	0.1360	-0.0398	-0.0398	-0.0389	-0.0377	0.0140	-0.0346	-0.0355	-0.0337	0.0191	-0.0332
106	-0.0414	0.0917	-0.0398	-0.0398	0.0543	-0.0377	0.0140	-0.0346	-0.0355	0.0191	-0.0337	-0.0332
107	0.1360	-0.0414	-0.0398	0.1894	0.0077	-0.0377	-0.0359	-0.0346	0.0654	-0.0337	-0.0337	0.2873
	25	26	27	28	29	30	31	32	33	34	35	36
54	0.0801	0.0496	0.0516	0.0997	0.0090	0.0090	0.0090	0.0105	0.0629	-0.0335	-0.0349	0.0153
55	-0.0436	0.0496	0.0062	-0.0384	-0.0378	-0.0378	0.0090	-0.0371	-0.0357	-0.0335	0.0655	0.0153
56	-0.0024	0.0049	0.0062	-0.0384	0.0558	-0.0378	-0.0378	-0.0371	0.0136	-0.0335	0.0655	0.0153
57	-0.0422	0.0535	0.1489	0.0102	0.0116	-0.0366	0.0116	0.0621	-0.0346	-0.0324	0.0179	0.0696
58	-0.0422	0.0075	-0.0379	-0.0373	-0.0366	-0.0366	0.0116	-0.0359	-0.0346	-0.0324	0.1213	-0.0339
59	-0.0422	0.0535	0.0088	0.0102	0.0116	-0.0366	-0.0366	0.0621	-0.0346	-0.0324	0.0179	0.1213
60	-0.0422	-0.0386	-0.0379	-0.0373	0.0116	-0.0366	-0.0366	-0.0359	-0.0346	-0.0324	-0.0339	0.0179
61	-0.0409	0.0102	-0.0367	0.0129	0.0143	0.0641	-0.0354	-0.0348	-0.0334	-0.0314	0.0206	0.0206
62	-0.0409	0.0577	-0.0367	0.0618	-0.0354	-0.0354	0.0641	-0.0348	-0.0334	-0.0314	0.0206	-0.0328
63	-0.0409	0.0102	0.0597	-0.0360	-0.0354	-0.0354	-0.0354	-0.0348	-0.0334	-0.0314	0.0206	-0.0328
64	0.0467	0.0102	0.0115	-0.0360	0.0143	0.0641	-0.0354	-0.0348	-0.0334	-0.0314	-0.0328	0.2342
65	0.4847	-0.0373	0.0115	-0.0360	-0.0354	0.0641	-0.0354	-0.0348	0.1761	0.1909	-0.0328	-0.0328
66	-0.0409	-0.0373	0.0115	0.0129	0.0143	-0.0354	0.0143	-0.0348	-0.0334	-0.0314	0.0206	0.1808
67	-0.0394	-0.0360	0.0144	-0.0348	-0.0342	-0.0342	-0.0342	0.0187	0.0761	-0.0303	-0.0316	0.0236
68	-0.0394	0.0131	-0.0354	0.0158	0.0173	-0.0342	-0.0342	-0.0336	-0.0323	-0.0303	-0.0316	0.2445
69	0.0059	-0.0360	0.0643	0.0664	-0.0342	-0.0342	0.1716	0.0187	-0.0323	-0.0303	-0.0316	-0.0316
70	-0.0394	0.0131	0.0144	-0.0348	0.0173	-0.0342	0.0687	0.0187	-0.0323	-0.0303	0.0236	-0.0316
71	-0.0394	0.0131	-0.0354	0.0664	-0.0342	-0.0342	-0.0342	-0.0336	-0.0323	-0.0303	0.1340	0.0788
72	0.0059	0.0131	0.0144	-0.0348	0.0173	-0.0342	0.0173	-0.0336	-0.0323	-0.0303	-0.0316	0.0236
73	-0.0394	-0.0360	-0.0354	0.0664	-0.0342	-0.0342	0.0687	0.0711	-0.0323	-0.0303	-0.0316	-0.0316
74	-0.0394	-0.0360	-0.0354	-0.0348	-0.0342	-0.0342	-0.0342	-0.0336	0.0219	-0.0303	-0.0316	-0.0316
75	-0.0394	-0.0360	0.1141	0.0158	0.0173	-0.0342	-0.0342	-0.0336	-0.0323	-0.0303	-0.0316	0.1340
76	-0.0394	-0.0360	0.0144	0.1171	0.0687	-0.0342	-0.0342	-0.0336	-0.0323	-0.0303	0.0236	-0.0316
77	0.0090	-0.0347	-0.0341	0.1240	-0.0329	-0.0329	-0.0329	-0.0323	0.0251	-0.0292	-0.0305	0.0268
78	-0.0380	-0.0347	0.0176	-0.0335	0.0204	-0.0329	0.0738	0.0219	-0.0311	-0.0292	-0.0305	-0.0305
79	-0.0380	0.1181	-0.0341	0.0190	-0.0329	-0.0329	0.0204	0.0219	-0.0311	-0.0292	-0.0305	-0.0305
80	-0.0380	0.2708	0.0176	-0.0335	-0.0329	-0.0329	-0.0329	0.0219	-0.0311	-0.0292	-0.0305	-0.0305
81	-0.0380	0.0162	-0.0341	-0.0335	0.0204	-0.0329	-0.0329	0.0762	-0.0311	-0.0292	0.1413	-0.0305
82	-0.0380	0.0672	0.0693	0.0190	-0.0329	-0.0329	-0.0329	0.0762	0.0813	-0.0292	-0.0305	-0.0305
83	-0.0380	-0.0347	0.0176	0.0715	-0.0329	-0.0329	0.3405	-0.0323	-0.0311	-0.0292	-0.0305	-0.0305
84	0.0090	-0.0347	-0.0341	0.0190	0.0738	-0.0329	-0.0329	-0.0323	0.0813	-0.0292	0.0841	0.0268
85	-0.0364	-0.0333	-0.0327	-0.0322	-0.0316	-0.0316	-0.0316	0.0254	-0.0298	-0.0280	-0.0292	0.2685
86	-0.0364	-0.0333	0.0748	-0.0322	-0.0316	-0.0316	0.1348	-0.0310	-0.0298	-0.0280	0.0303	-0.0292
87	-0.0364	0.0197	0.0210	0.0224	-0.0316	-0.0316	0.3567	-0.0310	-0.0298	-0.0280	0.0303	-0.0292

Variables 54 -107

	25	26	27	28	29	30	31	32	33	34	35	36
88	-0.0364	0.0726	-0.0327	0.0224	0.1348	-0.0316	0.0793	-0.0310	-0.0298	-0.0280	0.1494	-0.0292
89	-0.0364	0.0726	-0.0327	0.0770	-0.0316	-0.0316	0.0239	-0.0310	-0.0298	-0.0280	0.0303	-0.0292
90	-0.0364	0.0197	-0.0327	-0.0322	-0.0316	-0.0316	0.1903	-0.0310	-0.0298	-0.0280	0.0303	-0.0292
91	-0.0364	-0.0333	-0.0327	0.0224	0.0239	-0.0316	0.0239	-0.0310	-0.0298	-0.0280	0.2089	0.0303
92	-0.0364	-0.0333	-0.0327	-0.0322	-0.0316	-0.0316	-0.0316	0.0254	-0.0298	-0.0280	-0.0292	-0.0292
93	-0.0364	0.0197	0.1823	-0.0322	0.0239	-0.0316	-0.0316	-0.0310	-0.0298	-0.0280	-0.0292	-0.0292
94	-0.0364	0.0197	0.0748	-0.0322	0.0239	-0.0316	-0.0316	0.0254	0.0870	-0.0280	-0.0292	-0.0292
95	-0.0349	-0.0318	-0.0313	0.0262	-0.0302	-0.0302	-0.0302	0.0881	-0.0285	-0.0268	-0.0280	0.0342
96	-0.0349	-0.0318	0.0248	-0.0308	-0.0302	-0.0302	0.0277	-0.0297	-0.0285	-0.0268	0.0342	-0.0280
97	-0.0349	0.0234	0.0248	0.0262	-0.0302	-0.0302	0.0856	-0.0297	-0.0285	-0.0268	0.0342	-0.0280
98	-0.0349	-0.0318	-0.0313	-0.0308	-0.0302	-0.0302	-0.0302	-0.0297	-0.0285	-0.0268	-0.0280	-0.0280
99	-0.0349	-0.0318	-0.0313	-0.0308	0.0856	-0.0302	-0.0302	-0.0297	-0.0285	-0.0268	0.0963	0.0342
100	-0.0315	0.0322	-0.0283	-0.0278	-0.0273	0.0366	0.0366	-0.0268	0.0415	-0.0242	0.0433	-0.0253
101	-0.0349	-0.0318	-0.0313	0.0262	0.0277	-0.0302	-0.0302	0.0881	-0.0285	-0.0268	0.0342	0.0963
102	-0.0349	0.0234	0.0809	-0.0308	-0.0302	-0.0302	-0.0302	0.0292	0.0324	-0.0268	0.0342	-0.0280
103	-0.0349	0.0787	-0.0313	-0.0308	0.0277	-0.0302	-0.0302	0.0292	-0.0285	-0.0268	0.0342	0.1584
104	-0.0349	0.0234	-0.0313	-0.0308	0.0277	-0.0302	-0.0302	-0.0297	-0.0285	-0.0268	0.0342	0.0342
105	-0.0332	0.0276	-0.0298	-0.0293	0.0319	-0.0288	-0.0288	-0.0283	-0.0272	-0.0255	0.0385	0.1687
106	-0.0332	0.0276	0.0290	-0.0293	-0.0288	-0.0288	0.1532	-0.0283	-0.0272	-0.0255	-0.0266	-0.0266
107	-0.0332	-0.0303	-0.0298	-0.0293	-0.0288	-0.0288	-0.0288	-0.0283	0.1006	-0.0255	-0.0266	-0.0266

	37	38	39	40	41	42	43	44	45	46	47	48
54	0.0153	0.0170	-0.0335	0.0207	0.0227	0.0227	-0.0319	-0.0319	0.0227	0.0248	-0.0311	-0.0311
55	-0.0349	0.0170	-0.0335	0.0741	-0.0319	0.0227	-0.0319	-0.0319	0.0773	-0.0311	-0.0311	0.0807
56	-0.0349	-0.0342	0.0711	0.0207	0.0227	-0.0319	-0.0319	0.0227	0.0227	0.0248	-0.0311	0.0248
57	-0.0339	0.0196	0.0753	0.1333	0.0816	0.0253	0.0253	-0.0309	0.0253	-0.0302	-0.0302	0.0274
58	-0.0339	0.0196	0.0753	0.0233	-0.0309	-0.0309	0.0253	0.0816	0.0253	0.0274	0.0274	0.0850
59	-0.0339	-0.0332	-0.0324	0.1884	0.0253	0.0816	-0.0309	0.1378	0.0816	0.1426	-0.0302	0.0274
60	0.0179	-0.0332	0.0214	0.0233	-0.0309	-0.0309	-0.0309	-0.0309	0.0253	-0.0302	0.0850	-0.0302
61	0.0740	-0.0321	-0.0314	0.0261	-0.0299	-0.0299	-0.0299	-0.0299	-0.0299	-0.0292	-0.0292	-0.0292
62	-0.0328	0.0224	0.0242	0.0261	-0.0299	0.0281	-0.0299	-0.0299	-0.0299	0.0303	-0.0292	0.0303
63	-0.0328	0.0224	0.0242	0.0261	-0.0299	-0.0299	-0.0299	0.0281	0.0862	-0.0292	-0.0292	-0.0292
64	0.0740	-0.0321	0.0242	0.1964	0.0281	0.0281	0.0281	-0.0299	0.0862	0.1491	-0.0292	-0.0292
65	0.1274	-0.0321	-0.0314	-0.0307	-0.0299	-0.0299	-0.0299	-0.0299	-0.0299	-0.0292	-0.0292	-0.0292
66	-0.0328	-0.0321	0.1353	0.0261	-0.0299	-0.0299	0.0862	0.0862	-0.0299	0.0303	0.0303	0.1491
67	-0.0316	-0.0310	-0.0303	0.1465	-0.0289	0.0912	-0.0289	-0.0289	-0.0289	0.0333	-0.0282	0.1562
68	-0.0316	-0.0310	0.0847	0.0291	0.0912	-0.0289	-0.0289	0.0312	0.0912	-0.0282	-0.0282	-0.0282
69	0.0236	0.1380	0.0272	-0.0296	-0.0289	0.0312	-0.0289	-0.0289	-0.0289	0.0333	0.0333	-0.0282
70	-0.0316	0.0817	-0.0303	0.0878	-0.0289	-0.0289	0.0312	-0.0289	0.0312	-0.0282	0.0333	-0.0282
71	0.0236	0.1380	-0.0303	-0.0296	-0.0289	0.1512	-0.0289	0.0312	0.0312	0.0333	0.0948	-0.0282
72	0.0788	0.0253	-0.0303	-0.0296	-0.0289	-0.0289	0.0312	-0.0289	0.0312	-0.0282	-0.0282	-0.0282
73	-0.0316	0.1943	-0.0303	-0.0296	-0.0289	-0.0289	-0.0289	-0.0289	0.0312	-0.0282	0.0333	0.0333
74	-0.0316	-0.0310	-0.0303	-0.0296	-0.0289	-0.0289	-0.0289	-0.0289	-0.0289	0.0333	-0.0282	-0.0282
75	-0.0316	0.0253	0.0272	0.1465	0.0312	0.0312	-0.0289	-0.0289	0.2113	0.0333	-0.0282	0.0333
76	0.0236	0.0253	-0.0303	0.0291	0.0312	-0.0289	-0.0289	0.0312	-0.0289	-0.0282	-0.0282	0.0948
77	-0.0305	-0.0298	-0.0292	0.0933	0.0967	-0.0278	-0.0278	-0.0278	0.0344	0.0366	-0.0271	-0.0271
78	-0.0305	-0.0298	-0.0292	-0.0285	0.0344	-0.0278	0.0967	-0.0278	0.0344	-0.0271	-0.0271	-0.0271
79	-0.0305	0.0870	-0.0292	0.0324	-0.0278	0.0344	-0.0278	-0.0278	-0.0278	-0.0271	-0.0271	-0.0271
80	0.0841	-0.0298	-0.0292	0.0324	-0.0278	0.0344	-0.0278	-0.0278	-0.0278	0.1004	0.1004	-0.0271

Variables 54 -107

	37	38	39	40	41	42	43	44	45	46	47	48
81	-0.0305	-0.0298	0.0304	0.0324	-0.0278	-0.0278	-0.0278	-0.0278	-0.0278	0.0366	0.1004	0.1641
82	-0.0305	-0.0298	0.0304	0.0324	-0.0278	-0.0278	0.0967	0.0344	-0.0278	-0.0271	-0.0271	-0.0271
83	0.0268	-0.0298	-0.0292	-0.0285	-0.0278	-0.0278	-0.0278	-0.0278	-0.0278	-0.0271	0.1004	-0.0271
84	-0.0305	-0.0298	0.0900	0.1541	0.0344	0.0344	-0.0278	-0.0278	0.0344	0.0366	0.0366	0.1004
85	-0.0292	-0.0286	0.0340	-0.0274	0.1028	-0.0267	0.1675	-0.0267	0.0380	-0.0260	-0.0260	0.0402
86	-0.0292	0.0321	-0.0280	0.0993	-0.0267	0.0380	0.1675	0.1028	-0.0267	-0.0260	0.0402	-0.0260
87	-0.0292	0.0321	-0.0280	0.0360	-0.0267	-0.0267	-0.0267	0.0380	-0.0267	-0.0260	0.1065	-0.0260
88	-0.0292	-0.0286	0.0340	-0.0274	-0.0267	0.0380	0.1028	0.1028	-0.0267	0.0402	-0.0260	0.0402
89	-0.0292	-0.0286	-0.0280	-0.0274	-0.0267	-0.0267	-0.0267	-0.0267	-0.0267	-0.0260	-0.0260	0.0402
90	-0.0292	0.0928	-0.0280	-0.0274	-0.0267	-0.0267	0.0380	-0.0267	0.0380	-0.0260	-0.0260	-0.0260
91	-0.0292	0.0321	0.0959	-0.0274	-0.0267	-0.0267	-0.0267	-0.0267	-0.0267	-0.0260	0.0402	0.0402
92	-0.0292	-0.0286	-0.0280	-0.0274	-0.0267	0.0380	0.0380	0.0380	-0.0267	0.0402	0.1065	0.1065
93	-0.0292	-0.0286	-0.0280	-0.0274	-0.0267	-0.0267	-0.0267	0.0380	-0.0267	-0.0260	-0.0260	0.0402
94	-0.0292	-0.0286	-0.0280	0.0993	0.0380	0.0380	-0.0267	0.0380	0.1028	0.0402	0.0402	-0.0260
95	-0.0280	-0.0274	-0.0268	0.0399	-0.0255	-0.0255	-0.0255	0.0420	-0.0255	-0.0249	-0.0249	0.0443
96	-0.0280	-0.0274	0.0379	-0.0262	-0.0255	-0.0255	-0.0255	0.0420	-0.0255	0.0443	0.1826	-0.0249
97	-0.0280	0.0360	0.0379	0.0399	-0.0255	0.0420	-0.0255	0.0420	-0.0255	-0.0249	0.1134	0.0443
98	-0.0280	-0.0274	-0.0268	-0.0262	-0.0255	-0.0255	0.0420	-0.0255	-0.0255	-0.0249	0.0443	-0.0249
99	-0.0280	-0.0274	0.1672	-0.0262	-0.0255	-0.0255	-0.0255	0.1096	-0.0255	0.1134	0.0443	0.0443
100	0.0433	-0.0247	-0.0242	-0.0236	-0.0231	-0.0231	0.0515	-0.0231	-0.0231	-0.0225	-0.0225	0.0539
101	-0.0280	0.0360	0.0379	0.0399	-0.0255	0.1772	-0.0255	0.1096	-0.0255	-0.0249	0.0443	-0.0249
102	-0.0280	-0.0274	-0.0268	0.1060	-0.0255	0.0420	0.0420	0.0420	0.1096	-0.0249	-0.0249	0.0443
103	-0.0280	-0.0274	0.0379	0.1060	-0.0255	-0.0255	-0.0255	0.1096	0.0420	0.1134	-0.0249	0.0443
104	-0.0280	-0.0274	0.0379	-0.0262	-0.0255	0.0420	-0.0255	0.0420	-0.0255	0.0443	-0.0249	-0.0249
105	0.0385	-0.0261	0.0423	-0.0249	-0.0243	0.1173	-0.0243	0.0465	-0.0243	0.1937	-0.0237	0.0488
106	0.0385	0.1067	-0.0255	-0.0249	-0.0243	-0.0243	-0.0243	-0.0243	0.0465	0.0488	-0.0237	-0.0237
107	-0.0266	-0.0261	-0.0255	-0.0249	-0.0243	-0.0243	-0.0243	-0.0243	-0.0243	-0.0237	-0.0237	0.0488

	49	50	51	52	53	54	55	56	57	58	59	60
54	0.0807	-0.0295	0.0294	0.0319	0.0319							
55	-0.0311	-0.0295	-0.0295	-0.0286	-0.0286	-0.0286						
56	0.0248	0.0294	-0.0295	0.0319	-0.0286	0.0319	-0.0286					
57	-0.0302	-0.0286	-0.0286	0.0346	-0.0277	0.0346	0.0346	-0.0277				
58	-0.0302	-0.0286	-0.0286	-0.0277	-0.0277	0.0346	0.0346	-0.0277	-0.0269			
59	0.0850	-0.0286	-0.0286	0.2838	-0.0277	-0.0277	-0.0277	0.0969	0.0373	0.0373		
60	0.0274	-0.0286	-0.0286	-0.0277	-0.0277	-0.0277	0.0346	0.0346	0.1015	-0.0269	-0.0269	
61	-0.0292	-0.0276	-0.0276	-0.0268	-0.0268	-0.0268	-0.0268	0.0375	-0.0260	-0.0260	-0.0260	0.1064
62	-0.0292	-0.0276	-0.0276	-0.0268	-0.0268	-0.0268	0.0375	-0.0268	-0.0260	0.1064	0.1064	-0.0260
63	-0.0292	-0.0276	-0.0276	-0.0268	-0.0268	-0.0268	0.0375	-0.0268	0.0402	-0.0260	-0.0260	-0.0260
64	-0.0292	-0.0276	-0.0276	0.1018	0.1018	0.0375	0.0375	-0.0268	0.1064	-0.0260	0.1064	0.0402
65	-0.0292	0.1600	0.0349	-0.0268	0.2947	0.1661	-0.0268	0.0375	-0.0260	-0.0260	-0.0260	-0.0260
66	-0.0292	-0.0276	-0.0276	-0.0268	-0.0268	-0.0268	0.0375	-0.0268	-0.0260	0.0402	0.1064	0.0402
67	-0.0282	-0.0267	-0.0267	-0.0259	-0.0259	-0.0259	-0.0259	-0.0259	0.0434	0.0434	0.0434	-0.0251
68	0.0333	-0.0267	-0.0267	-0.0259	-0.0259	0.0406	0.1071	-0.0259	0.0434	0.0434	0.1119	-0.0251
69	0.0333	-0.0267	-0.0267	-0.0259	-0.0259	0.1736	-0.0259	-0.0259	-0.0251	-0.0251	-0.0251	-0.0251
70	0.0948	-0.0267	-0.0267	-0.0259	-0.0259	-0.0259	-0.0259	-0.0259	-0.0251	-0.0251	-0.0251	-0.0251
71	-0.0282	-0.0267	-0.0267	-0.0259	-0.0259	-0.0259	-0.0259	-0.0259	-0.0251	-0.0251	0.0434	-0.0251
72	0.0333	-0.0267	-0.0267	0.0406	-0.0259	-0.0259	-0.0259	-0.0259	-0.0251	-0.0251	0.0434	0.0434
73	0.2177	-0.0267	-0.0267	0.0406	-0.0259	0.0406	-0.0259	-0.0259	-0.0251	-0.0251	0.0434	0.0434

Variables 54 -107

	49	50	51	52	53	54	55	56	57	58	59	60
74	-0.0282	-0.0267	0.0380	0.0406	-0.0259	-0.0259	-0.0259	0.0406	-0.0251	-0.0251	-0.0251	-0.0251
75	-0.0282	-0.0267	-0.0267	0.0406	-0.0259	-0.0259	0.0406	0.0406	-0.0251	-0.0251	0.0434	-0.0251
76	-0.0282	-0.0267	-0.0267	-0.0259	-0.0259	-0.0259	0.0406	-0.0259	-0.0251	0.1119	0.0434	-0.0251
77	-0.0271	-0.0257	0.0414	-0.0249	-0.0249	0.0440	-0.0249	0.0440	-0.0242	-0.0242	-0.0242	0.0468
78	-0.0271	0.0414	-0.0257	-0.0249	-0.0249	-0.0249	0.1130	-0.0249	0.0468	-0.0242	-0.0242	-0.0242
79	-0.0271	-0.0257	-0.0257	0.0440	-0.0249	-0.0249	0.0440	-0.0249	-0.0242	-0.0242	0.0468	-0.0242
80	0.0366	-0.0257	-0.0257	-0.0249	-0.0249	-0.0249	0.0440	0.0440	0.1179	0.0468	0.0468	-0.0242
81	-0.0271	-0.0257	-0.0257	-0.0249	-0.0249	-0.0249	0.0440	-0.0249	-0.0242	0.1889	0.0468	-0.0242
82	0.0366	-0.0257	-0.0257	-0.0249	-0.0249	-0.0249	-0.0249	-0.0249	-0.0242	0.0468	0.1179	-0.0242
83	-0.0271	-0.0257	-0.0257	-0.0249	-0.0249	0.1130	-0.0249	-0.0249	-0.0242	-0.0242	-0.0242	-0.0242
84	-0.0271	0.1085	-0.0257	0.0440	-0.0249	-0.0249	0.0440	0.2509	0.1179	0.0468	0.1179	-0.0242
85	0.0402	-0.0247	-0.0247	-0.0239	-0.0239	-0.0239	-0.0239	-0.0239	-0.0232	-0.0232	-0.0232	-0.0232
86	-0.0260	-0.0247	-0.0247	-0.0239	-0.0239	-0.0239	-0.0239	-0.0239	0.1245	-0.0232	-0.0232	0.0507
87	-0.0260	-0.0247	-0.0247	-0.0239	-0.0239	0.0478	0.0478	-0.0239	-0.0232	0.1245	-0.0232	-0.0232
88	-0.0260	-0.0247	-0.0247	-0.0239	-0.0239	-0.0239	-0.0239	-0.0239	-0.0232	-0.0232	-0.0232	-0.0232
89	-0.0260	-0.0247	-0.0247	-0.0239	-0.0239	-0.0239	-0.0239	0.0478	-0.0232	-0.0232	0.0507	-0.0232
90	-0.0260	-0.0247	-0.0247	-0.0239	-0.0239	-0.0239	0.0478	-0.0239	-0.0232	0.1245	-0.0232	-0.0232
91	-0.0260	-0.0247	-0.0247	-0.0239	-0.0239	-0.0239	0.0478	-0.0239	0.0507	0.1245	-0.0232	-0.0232
92	0.0402	-0.0247	-0.0247	-0.0239	-0.0239	-0.0239	-0.0239	-0.0239	-0.0232	-0.0232	-0.0232	0.0507
93	0.0402	0.0451	-0.0247	-0.0239	-0.0239	-0.0239	-0.0239	-0.0239	-0.0232	-0.0232	-0.0232	-0.0232
94	0.1728	-0.0247	-0.0247	0.1195	-0.0239	0.0478	-0.0239	0.0478	0.1245	-0.0232	0.1984	-0.0232
95	-0.0249	-0.0236	-0.0236	-0.0229	-0.0229	-0.0229	0.0519	-0.0229	-0.0222	-0.0222	-0.0222	-0.0222
96	-0.0249	-0.0236	-0.0236	0.1268	-0.0229	-0.0229	-0.0229	0.1268	-0.0222	-0.0222	-0.0222	0.1320
97	0.0443	-0.0236	-0.0236	-0.0229	-0.0229	-0.0229	0.2016	-0.0229	-0.0222	-0.0222	-0.0222	-0.0222
98	-0.0249	-0.0236	-0.0236	-0.0229	-0.0229	-0.0229	-0.0229	-0.0229	-0.0222	-0.0222	-0.0222	-0.0222
99	-0.0249	0.0492	-0.0236	-0.0229	-0.0229	-0.0229	-0.0229	-0.0229	-0.0222	0.1320	0.0549	-0.0222
100	0.0539	-0.0213	-0.0213	-0.0207	-0.0207	-0.0207	-0.0207	-0.0207	0.1501	-0.0201	-0.0201	-0.0201
101	-0.0249	-0.0236	-0.0236	-0.0229	-0.0229	-0.0229	-0.0229	-0.0229	-0.0222	0.0549	0.0549	-0.0222
102	0.0443	-0.0236	-0.0236	-0.0229	-0.0229	-0.0229	-0.0229	-0.0229	0.0549	0.0549	-0.0222	-0.0222
103	-0.0249	-0.0236	-0.0236	-0.0229	-0.0229	-0.0229	0.0519	-0.0229	-0.0222	0.0549	-0.0222	0.0549
104	-0.0249	-0.0236	-0.0236	0.0519	-0.0229	-0.0229	0.0519	-0.0229	-0.0222	-0.0222	0.0549	0.0549
105	0.0488	-0.0225	-0.0225	-0.0218	-0.0218	-0.0218	-0.0218	0.1350	-0.0212	-0.0212	0.3020	-0.0212
106	-0.0237	-0.0225	-0.0225	-0.0218	-0.0218	-0.0218	-0.0218	-0.0218	-0.0212	-0.0212	-0.0212	-0.0212
107	-0.0237	0.0538	0.2064	-0.0218	-0.0218	-0.0218	-0.0218	-0.0218	-0.0212	-0.0212	-0.0212	-0.0212

	61	62	63	64	65	66	67	68	69	70	71	72
62	-0.0252											
63	0.1115	0.0432										
64	-0.0252	-0.0252	0.1799									
65	-0.0252	-0.0252	-0.0252	0.0432								
66	-0.0252	0.1115	-0.0252	0.0432	-0.0252							
67	-0.0243	0.1171	0.0464	0.0464	-0.0243	0.1171						
68	0.0464	-0.0243	0.0464	0.1171	-0.0243	-0.0243	-0.0235					
69	-0.0243	0.0464	-0.0243	-0.0243	-0.0243	-0.0243	-0.0235	-0.0235				
70	-0.0243	-0.0243	-0.0243	-0.0243	-0.0243	0.0464	-0.0235	-0.0235	0.0497			
71	-0.0243	0.0464	0.0464	0.0464	-0.0243	-0.0243	-0.0235	-0.0235	-0.0235	-0.0235		
72	-0.0243	-0.0243	-0.0243	0.0464	-0.0243	-0.0243	-0.0235	0.0497	0.0497	0.0497	-0.0235	
73	-0.0243	-0.0243	-0.0243	-0.0243	-0.0243	-0.0243	-0.0235	-0.0235	0.0497	-0.0235	-0.0235	-0.0235
74	-0.0243	-0.0243	-0.0243	-0.0243	-0.0243	-0.0243	0.0497	-0.0235	-0.0235	-0.0235	-0.0235	-0.0235

Variables 54 -107

	61	62	63	64	65	66	67	68	69	70	71	72
75	0.0464	-0.0243	0.1878	0.0464	-0.0243	0.0464	0.0497	0.0497	-0.0235	0.0497	-0.0235	0.1228
76	-0.0243	0.1171	-0.0243	-0.0243	-0.0243	0.1171	0.0497	0.0497	0.0497	-0.0235	0.1228	0.0497
77	-0.0234	-0.0234	0.0499	0.1232	-0.0234	-0.0234	0.0532	-0.0226	0.0532	-0.0226	-0.0226	-0.0226
78	-0.0234	0.1232	-0.0234	-0.0234	-0.0234	-0.0234	-0.0226	-0.0226	0.0532	-0.0226	-0.0226	-0.0226
79	-0.0234	0.0499	-0.0234	-0.0234	-0.0234	0.0499	-0.0226	-0.0226	0.2048	0.0532	-0.0226	0.0532
80	-0.0234	0.0499	-0.0234	-0.0234	-0.0234	-0.0234	-0.0226	-0.0226	-0.0226	-0.0226	0.0532	-0.0226
81	-0.0234	0.1965	0.0499	-0.0234	-0.0234	0.0499	0.0532	-0.0226	-0.0226	-0.0226	-0.0226	-0.0226
82	-0.0234	0.1232	-0.0234	-0.0234	-0.0234	0.0499	0.2048	-0.0226	-0.0226	-0.0226	-0.0226	-0.0226
83	-0.0234	-0.0234	-0.0234	-0.0234	-0.0234	0.0499	-0.0226	-0.0226	0.2048	0.0532	0.0532	-0.0226
84	-0.0234	0.0499	-0.0234	0.0499	-0.0234	0.0499	0.0532	-0.0226	0.0532	-0.0226	-0.0226	-0.0226
85	0.0538	-0.0225	-0.0225	0.0538	-0.0225	0.2062	0.0572	0.0572	-0.0217	-0.0217	-0.0217	-0.0217
86	-0.0225	0.0538	0.1300	-0.0225	-0.0225	-0.0225	0.0572	-0.0217	-0.0217	-0.0217	-0.0217	-0.0217
87	-0.0225	-0.0225	0.0538	-0.0225	-0.0225	-0.0225	-0.0217	-0.0217	0.1360	0.0572	-0.0217	-0.0217
88	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	-0.0217	-0.0217	-0.0217	-0.0217	0.2148	-0.0217
89	0.0538	0.1300	-0.0225	-0.0225	-0.0225	0.1300	-0.0217	0.0572	-0.0217	-0.0217	-0.0217	-0.0217
90	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	-0.0217	-0.0217	0.0572	-0.0217	-0.0217	-0.0217
91	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	0.0538	0.0572	-0.0217	-0.0217	-0.0217	-0.0217	-0.0217
92	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	0.0572	-0.0217	-0.0217	-0.0217	0.0572	-0.0217
93	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	-0.0225	-0.0217	-0.0217	0.0572	-0.0217	-0.0217	-0.0217
94	-0.0225	-0.0225	-0.0225	0.0538	-0.0225	-0.0225	0.0572	0.0572	-0.0217	-0.0217	-0.0217	-0.0217
95	0.0581	-0.0215	-0.0215	-0.0215	-0.0215	0.0581	-0.0207	-0.0207	-0.0207	-0.0207	-0.0207	-0.0207
96	-0.0215	-0.0215	-0.0215	-0.0215	-0.0215	0.1376	-0.0207	-0.0207	-0.0207	-0.0207	-0.0207	-0.0207
97	-0.0215	0.2171	-0.0215	-0.0215	-0.0215	0.0581	-0.0207	-0.0207	-0.0207	0.1438	0.0615	-0.0207
98	0.0581	-0.0215	0.0581	-0.0215	-0.0215	0.1376	-0.0207	-0.0207	-0.0207	-0.0207	0.0615	0.0615
99	-0.0215	0.0581	-0.0215	-0.0215	-0.0215	0.0581	-0.0207	0.0615	-0.0207	-0.0207	-0.0207	-0.0207
100	-0.0194	-0.0194	-0.0194	-0.0194	-0.0194	-0.0194	-0.0187	-0.0187	-0.0187	-0.0187	-0.0187	-0.0187
101	0.0581	-0.0215	0.0581	-0.0215	-0.0215	-0.0215	-0.0207	-0.0207	-0.0207	-0.0207	0.0615	-0.0207
102	-0.0215	-0.0215	0.0581	-0.0215	-0.0215	-0.0215	0.0615	0.0615	-0.0207	0.0615	0.0615	-0.0207
103	-0.0215	-0.0215	0.0581	0.1376	-0.0215	-0.0215	0.0615	0.0615	-0.0207	-0.0207	0.0615	-0.0207
104	-0.0215	-0.0215	0.1376	0.1376	-0.0215	-0.0215	-0.0207	-0.0207	-0.0207	-0.0207	0.1438	-0.0207
105	-0.0205	-0.0205	-0.0205	0.0629	-0.0205	0.0629	-0.0198	-0.0198	-0.0198	-0.0198	0.3251	-0.0198
106	-0.0205	-0.0205	-0.0205	-0.0205	-0.0205	-0.0205	-0.0198	-0.0198	-0.0198	-0.0198	-0.0198	0.0665
107	0.0629	-0.0205	-0.0205	-0.0205	-0.0205	-0.0205	0.0665	-0.0198	-0.0198	-0.0198	-0.0198	-0.0198

	73	74	75	76	77	78	79	80	81	82	83	84
74	-0.0235											
75	-0.0235	-0.0235										
76	-0.0235	-0.0235	-0.0235									
77	-0.0226	-0.0226	-0.0226	0.0532								
78	-0.0226	-0.0226	-0.0226	-0.0226	-0.0217							
79	0.0532	-0.0226	-0.0226	-0.0226	-0.0217	-0.0217						
80	-0.0226	-0.0226	-0.0226	-0.0226	-0.0217	-0.0217	-0.0217					
81	-0.0226	-0.0226	-0.0226	0.1290	-0.0217	-0.0217	-0.0217	-0.0217				
82	0.0532	0.0532	-0.0226	0.0532	-0.0217	0.0569	-0.0217	-0.0217	0.0569			
83	-0.0226	-0.0226	-0.0226	-0.0226	-0.0217	-0.0217	-0.0217	-0.0217	-0.0217	-0.0217		
84	-0.0226	0.0532	-0.0226	0.0532	0.0569	-0.0217	-0.0217	-0.0217	0.0569	0.0569	-0.0217	
85	0.0572	-0.0217	0.0572	0.0572	0.0609	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209
86	0.0572	-0.0217	-0.0217	-0.0217	-0.0209	0.0609	0.0609	-0.0209	0.0609	0.0609	-0.0209	-0.0209
87	0.0572	-0.0217	-0.0217	-0.0217	-0.0209	-0.0209	-0.0209	0.0609	-0.0209	-0.0209	0.4695	-0.0209

Variables 54 -107

	73	74	75	76	77	78	79	80	81	82	83	84
88	-0.0217	-0.0217	-0.0217	0.0572	-0.0209	-0.0209	-0.0209	-0.0209	0.0609	-0.0209	-0.0209	0.0609
89	-0.0217	-0.0217	-0.0217	0.1360	0.0609	-0.0209	-0.0209	0.0609	-0.0209	0.0609	0.1426	-0.0209
90	-0.0217	-0.0217	-0.0217	-0.0217	0.0609	0.1426	0.0609	0.0609	-0.0209	-0.0209	0.0609	-0.0209
91	-0.0217	-0.0217	0.0572	-0.0217	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209	0.0609
92	0.1360	-0.0217	-0.0217	-0.0217	-0.0209	0.0609	-0.0209	0.0609	-0.0209	-0.0209	-0.0209	-0.0209
93	0.0572	-0.0217	-0.0217	0.0572	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209	-0.0209
94	0.0572	-0.0217	0.0572	-0.0217	-0.0209	0.0609	-0.0209	0.0609	-0.0209	0.0609	-0.0209	0.0609
95	0.0615	-0.0207	0.0615	0.0615	0.1506	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200
96	-0.0207	0.0615	-0.0207	-0.0207	0.0653	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200
97	-0.0207	-0.0207	-0.0207	0.0615	-0.0200	0.0653	0.2359	-0.0200	0.0653	-0.0200	-0.0200	-0.0200
98	-0.0207	-0.0207	-0.0207	0.0615	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	0.2359	-0.0200
99	-0.0207	-0.0207	-0.0207	-0.0207	-0.0200	-0.0200	-0.0200	0.0653	0.0653	-0.0200	-0.0200	-0.0200
100	-0.0187	-0.0187	-0.0187	-0.0187	-0.0180	-0.0180	-0.0180	-0.0180	-0.0180	-0.0180	-0.0180	0.0761
101	-0.0207	-0.0207	0.0615	-0.0207	0.0653	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200
102	-0.0207	-0.0207	0.1438	-0.0207	-0.0200	0.0653	-0.0200	-0.0200	-0.0200	0.0653	-0.0200	-0.0200
103	-0.0207	-0.0207	-0.0207	-0.0207	0.0653	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	0.0653	-0.0200
104	-0.0207	-0.0207	-0.0207	-0.0207	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	0.0653
105	-0.0198	-0.0198	-0.0198	-0.0198	-0.0190	-0.0190	-0.0190	0.1598	-0.0190	0.0704	0.0704	-0.0190
106	0.1527	-0.0198	-0.0198	-0.0198	0.0704	0.0704	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190
107	-0.0198	0.3251	-0.0198	-0.0198	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	0.0704	-0.0190	-0.0190

	85	86	87	88	89	90	91	92	93	94	95	96
86	-0.0200											
87	-0.0200	0.0650										
88	-0.0200	0.0650	-0.0200									
89	-0.0200	-0.0200	0.0650	-0.0200								
90	-0.0200	0.0650	0.2350	-0.0200	0.3200							
91	0.0650	-0.0200	0.1500	0.1500	-0.0200	0.1500						
92	0.0650	0.0650	-0.0200	-0.0200	0.0650	-0.0200	-0.0200					
93	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200				
94	-0.0200	0.0650	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200	-0.0200			
95	0.0695	-0.0192	-0.0192	-0.0192	0.0695	0.0695	-0.0192	0.0695	0.0695	-0.0192		
96	-0.0192	-0.0192	-0.0192	-0.0192	0.0695	0.0695	0.0695	-0.0192	-0.0192	-0.0192	-0.0183	
97	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0183	0.0742
98	-0.0192	-0.0192	-0.0192	-0.0192	0.2470	0.0695	-0.0192	-0.0192	-0.0192	-0.0192	0.1668	-0.0183
99	-0.0192	-0.0192	-0.0192	0.0695	-0.0192	-0.0192	0.1583	-0.0192	-0.0192	-0.0192	-0.0183	0.0742
100	-0.0173	0.0806	-0.0173	-0.0173	-0.0173	-0.0173	-0.0173	-0.0173	-0.0173	-0.0173	-0.0166	-0.0166
101	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	0.0742	-0.0183
102	-0.0192	0.0695	-0.0192	0.0695	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0183	-0.0183
103	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0192	-0.0183	-0.0183
104	-0.0192	-0.0192	-0.0192	0.0695	-0.0192	-0.0192	0.0695	0.1583	-0.0192	-0.0192	-0.0183	-0.0183
105	-0.0183	-0.0183	-0.0183	0.0747	-0.0183	-0.0183	-0.0183	0.0747	-0.0183	0.0747	-0.0175	-0.0175
106	-0.0183	0.0747	0.0747	-0.0183	-0.0183	0.0747	-0.0183	-0.0183	-0.0183	-0.0183	-0.0175	-0.0175
107	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0175	-0.0175

	97	98	99	100	101	102	103	104	105	106	107	108
98	-0.0183											
99	-0.0183	-0.0183										
100	0.0856	-0.0166	-0.0166									
101	-0.0183	-0.0183	-0.0183	-0.0166								

Variables 54 -107

	97	98	99	100	101	102	103	104	105	106	107	108
102	-0.0183	-0.0183	-0.0183	-0.0166	0.0742							
103	-0.0183	0.0742	0.0742	-0.0166	0.0742	-0.0183						
104	-0.0183	-0.0183	-0.0183	0.0856	-0.0183	-0.0183	-0.0183					
105	-0.0175	0.0795	0.0795	-0.0158	-0.0175	-0.0175	-0.0175	0.0795				
106	-0.0175	-0.0175	-0.0175	-0.0158	-0.0175	-0.0175	-0.0175	-0.0175	0.0850			
107	-0.0175	-0.0175	-0.0175	-0.0158	-0.0175	-0.0175	-0.0175	-0.0175	-0.0166	-0.0166		

Variables 108 -116

	1	2	3	4	5	6	7	8	9	10	11	12
108	-0.2222	-0.0913	-0.0700	-0.0075	-0.0690	-0.0594	-0.0574	-0.0486	-0.0471	-0.0460	-0.0453	-0.0006
109	0.0749	-0.0093	-0.0392	-0.0384	-0.0380	0.0084	-0.0227	0.1468	-0.0071	-0.0053	-0.0453	-0.0006
110	0.0452	-0.0093	0.0223	0.0544	0.0240	0.0424	-0.0227	0.0296	0.0729	-0.0053	-0.0453	-0.0433
111	0.0749	0.0728	0.0838	0.0234	0.0550	0.0424	0.0120	0.0296	-0.0471	0.1170	-0.0453	-0.0433
112	0.0155	-0.0093	-0.0392	0.0234	-0.0690	0.0084	0.0468	-0.0486	-0.0071	-0.0460	-0.0040	-0.0006
113	0.0749	-0.0093	0.1146	0.0853	0.0860	0.0763	0.0468	-0.0486	-0.0471	0.0762	-0.0453	-0.0006
114	0.0155	-0.0366	-0.0085	0.0234	0.0860	0.0424	0.0468	0.0296	-0.0071	-0.0460	-0.0040	-0.0006
115	0.0155	-0.0093	-0.0392	-0.0384	0.0550	-0.0594	0.0120	-0.0486	0.0329	-0.0460	0.0373	-0.0433
116	-0.0440	0.1275	-0.0700	0.0234	0.0240	0.0424	-0.0227	0.0296	-0.0071	-0.0053	-0.0453	0.0421

	13	14	15	16	17	18	19	20	21	22	23	24
108	0.0030	0.0030	0.0061	-0.0398	0.0077	-0.0377	-0.0359	0.4810	0.1158	-0.0337	-0.0337	0.0202
109	-0.0414	0.0030	-0.0398	-0.0398	0.0077	0.0582	-0.0359	-0.0346	-0.0355	-0.0337	0.0191	-0.0332
110	-0.0414	0.0473	-0.0398	-0.0398	0.0077	-0.0377	-0.0359	-0.0346	-0.0355	0.1246	0.0719	0.0202
111	-0.0414	0.0030	-0.0398	-0.0398	0.0077	0.2500	-0.0359	-0.0346	-0.0355	0.0719	0.1246	0.0202
112	0.0473	0.0030	0.0061	0.0061	-0.0389	-0.0377	-0.0359	0.0170	-0.0355	-0.0337	0.0191	0.0202
113	-0.0414	0.0030	-0.0398	-0.0398	0.0077	0.0103	-0.0359	-0.0346	0.0149	0.0719	0.0191	-0.0332
114	0.0030	0.0473	0.0519	-0.0398	0.0077	0.0103	0.0140	-0.0346	-0.0355	-0.0337	-0.0337	-0.0332
115	0.0917	-0.0414	0.0061	0.0519	0.0543	-0.0377	-0.0359	0.0170	-0.0355	-0.0337	-0.0337	0.2873
116	-0.0414	-0.0414	-0.0398	-0.0398	0.0077	-0.0377	-0.0359	-0.0346	-0.0355	-0.0337	0.1774	0.0202

	25	26	27	28	29	30	31	32	33	34	35	36
108	0.4475	-0.0303	-0.0298	-0.0293	-0.0288	0.5172	-0.0288	-0.0283	0.1645	0.3133	-0.0266	-0.0266
109	-0.0332	0.0276	-0.0298	-0.0293	0.0319	-0.0288	-0.0288	-0.0283	-0.0272	-0.0255	-0.0266	-0.0266
110	-0.0332	-0.0303	-0.0298	-0.0293	0.0319	-0.0288	0.0319	-0.0283	-0.0272	-0.0255	0.0385	-0.0266
111	-0.0332	0.1434	-0.0298	0.3289	-0.0288	-0.0288	0.0925	-0.0283	-0.0272	-0.0255	0.1036	-0.0266
112	-0.0332	-0.0303	-0.0298	-0.0293	-0.0288	0.0319	-0.0288	-0.0283	0.0367	-0.0255	0.0385	-0.0266
113	-0.0332	0.0276	-0.0298	-0.0293	-0.0288	-0.0288	-0.0288	0.0334	-0.0272	-0.0255	0.1687	-0.0266
114	-0.0332	-0.0303	-0.0298	-0.0293	-0.0288	-0.0288	-0.0288	-0.0283	-0.0272	-0.0255	-0.0266	-0.0266
115	0.0202	-0.0303	-0.0298	-0.0293	-0.0288	0.0319	0.0319	0.0334	0.1006	0.0423	-0.0266	-0.0266
116	-0.0332	-0.0303	-0.0298	-0.0293	0.2139	-0.0288	-0.0288	-0.0283	-0.0272	-0.0255	-0.0266	-0.0266

	37	38	39	40	41	42	43	44	45	46	47	48
108	0.1036	-0.0261	0.0423	0.0443	-0.0243	0.1173	-0.0243	-0.0243	0.0465	0.0488	-0.0237	-0.0237
109	-0.0266	0.1067	-0.0255	-0.0249	-0.0243	0.1173	-0.0243	-0.0243	-0.0243	-0.0237	-0.0237	0.0488
110	0.0385	-0.0261	-0.0255	-0.0249	-0.0243	-0.0243	-0.0243	-0.0243	-0.0243	-0.0237	0.0488	-0.0237
111	0.0385	-0.0261	-0.0255	-0.0249	-0.0243	0.0465	-0.0243	-0.0243	-0.0243	-0.0237	0.2662	-0.0237
112	-0.0266	-0.0261	-0.0255	-0.0249	-0.0243	-0.0243	0.0465	0.0465	-0.0243	-0.0237	-0.0237	-0.0237
113	-0.0266	0.0403	-0.0255	-0.0249	-0.0243	0.0465	-0.0243	-0.0243	-0.0243	-0.0237	0.0488	0.0488
114	-0.0266	-0.0261	0.1100	0.0443	0.0465	-0.0243	-0.0243	-0.0243	-0.0243	-0.0237	0.0488	-0.0237
115	-0.0266	-0.0261	-0.0255	-0.0249	0.0465	-0.0243	-0.0243	-0.0243	-0.0243	0.1213	-0.0237	-0.0237
116	-0.0266	-0.0261	0.0423	-0.0249	-0.0243	-0.0243	-0.0243	0.1173	-0.0243	0.1937	-0.0237	0.1937

Variables 108 -116

	49	50	51	52	53	54	55	56	57	58	59	60
108	-0.0237	0.0538	-0.0225	0.0566	0.4488	0.0566	-0.0218	-0.0218	-0.0212	-0.0212	-0.0212	-0.0212
109	-0.0237	0.0538	-0.0225	-0.0218	-0.0218	-0.0218	-0.0218	-0.0218	-0.0212	-0.0212	-0.0212	-0.0212
110	0.0488	-0.0225	-0.0225	-0.0218	-0.0218	-0.0218	-0.0218	-0.0218	-0.0212	-0.0212	-0.0212	0.0596
111	0.0488	-0.0225	-0.0225	-0.0218	-0.0218	-0.0218	-0.0218	-0.0218	-0.0212	0.0596	-0.0212	-0.0212
112	-0.0237	-0.0225	0.0538	-0.0218	0.0566	-0.0218	0.0566	-0.0218	0.0596	-0.0212	-0.0212	0.0596
113	-0.0237	-0.0225	-0.0225	-0.0218	-0.0218	-0.0218	0.0566	-0.0218	0.1404	-0.0212	-0.0212	0.0596
114	0.0488	-0.0225	-0.0225	-0.0218	0.0566	-0.0218	-0.0218	-0.0218	-0.0212	0.0596	-0.0212	0.0596
115	-0.0237	0.2064	0.0538	0.1350	0.0566	0.1350	-0.0218	-0.0218	-0.0212	-0.0212	-0.0212	-0.0212
116	-0.0237	-0.0225	-0.0225	-0.0218	-0.0218	-0.0218	-0.0218	0.0566	-0.0212	-0.0212	-0.0212	-0.0212

	61	62	63	64	65	66	67	68	69	70	71	72
108	-0.0205	-0.0205	-0.0205	0.1462	0.2296	-0.0205	-0.0198	-0.0198	-0.0198	-0.0198	-0.0198	-0.0198
109	-0.0205	-0.0205	-0.0205	-0.0205	-0.0205	-0.0205	-0.0198	-0.0198	0.2389	-0.0198	0.0665	0.0665
110	0.0629	-0.0205	-0.0205	-0.0205	-0.0205	-0.0205	-0.0198	-0.0198	-0.0198	-0.0198	-0.0198	-0.0198
111	-0.0205	-0.0205	-0.0205	-0.0205	-0.0205	-0.0205	-0.0198	-0.0198	-0.0198	-0.0198	0.0665	-0.0198
112	-0.0205	-0.0205	0.0629	-0.0205	-0.0205	-0.0205	-0.0198	0.0665	0.0665	-0.0198	-0.0198	0.0665
113	-0.0205	-0.0205	0.0629	-0.0205	-0.0205	-0.0205	-0.0198	-0.0198	-0.0198	-0.0198	0.0665	0.0665
114	0.0629	-0.0205	0.0629	0.0629	-0.0205	-0.0205	0.0665	0.0665	-0.0198	-0.0198	-0.0198	-0.0198
115	-0.0205	0.0629	-0.0205	-0.0205	-0.0205	-0.0205	0.0665	-0.0198	0.0665	-0.0198	-0.0198	-0.0198
116	-0.0205	0.0629	-0.0205	-0.0205	-0.0205	0.0629	0.0665	-0.0198	-0.0198	-0.0198	-0.0198	-0.0198

	73	74	75	76	77	78	79	80	81	82	83	84
108	-0.0198	-0.0198	-0.0198	-0.0198	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190
109	0.0665	-0.0198	-0.0198	0.0665	-0.0190	-0.0190	0.2491	0.0704	-0.0190	-0.0190	-0.0190	-0.0190
110	0.0665	-0.0198	-0.0198	-0.0198	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	0.0704
111	-0.0198	-0.0198	-0.0198	-0.0198	0.0704	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	0.0704	-0.0190
112	-0.0198	-0.0198	-0.0198	-0.0198	-0.0190	-0.0190	0.0704	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190
113	-0.0198	-0.0198	-0.0198	-0.0198	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	0.0704	0.0704
114	0.0665	-0.0198	-0.0198	-0.0198	0.0704	-0.0190	-0.0190	-0.0190	-0.0190	0.1598	-0.0190	-0.0190
115	-0.0198	0.0665	-0.0198	-0.0198	-0.0190	0.1598	-0.0190	-0.0190	-0.0190	0.0704	-0.0190	-0.0190
116	-0.0198	-0.0198	-0.0198	-0.0198	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190	-0.0190

	85	86	87	88	89	90	91	92	93	94	95	96
108	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0175	-0.0175
109	-0.0183	-0.0183	-0.0183	0.0747	0.0747	0.0747	-0.0183	0.1677	-0.0183	-0.0183	-0.0175	-0.0175
110	0.0747	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	0.1677	0.0747	-0.0183	0.0795	-0.0175
111	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	0.0747	-0.0183	-0.0183	-0.0183	0.0795	-0.0175
112	-0.0183	0.0747	0.0747	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0175	-0.0175
113	0.0747	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	0.0795	-0.0175
114	-0.0183	0.0747	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	0.0747	-0.0183	-0.0183	-0.0175	-0.0175
115	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0175	0.0795
116	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	-0.0183	0.0747	-0.0183	-0.0183	-0.0175	-0.0175

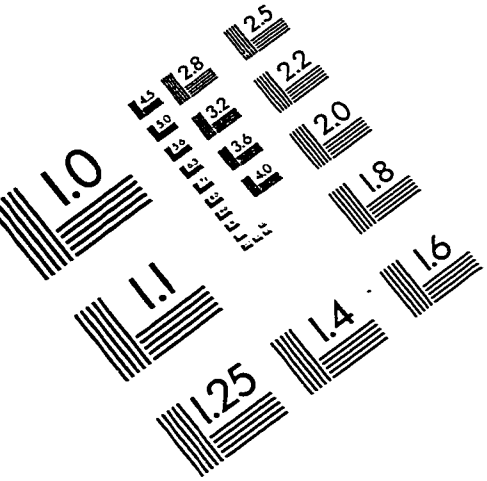
	97	98	99	100	101	102	103	104	105	106	107	108
108	-0.0175	-0.0175	-0.0175	-0.0158	-0.0175	-0.0175	-0.0175	-0.0175	-0.0166	-0.0166	-0.0166	
109	-0.0175	-0.0175	-0.0175	-0.0158	-0.0175	-0.0175	-0.0175	-0.0175	0.0850	-0.0166	-0.0166	-0.0166
110	-0.0175	-0.0175	-0.0175	-0.0158	0.0795	0.0795	-0.0175	0.0795	-0.0166	-0.0166	-0.0166	-0.0166
111	-0.0175	0.0795	-0.0175	-0.0158	0.0795	-0.0175	0.0795	-0.0175	-0.0166	-0.0166	-0.0166	-0.0166
112	-0.0175	-0.0175	0.0795	-0.0158	-0.0175	-0.0175	-0.0175	-0.0175	-0.0166	-0.0166	0.0850	-0.0166
113	-0.0175	0.1766	-0.0175	0.0913	0.0795	-0.0175	0.0795	-0.0175	0.0850	-0.0166	-0.0166	-0.0166
114	-0.0175	-0.0175	-0.0175	-0.0158	-0.0175	-0.0175	0.0795	-0.0175	0.0850	-0.0166	0.0850	-0.0166

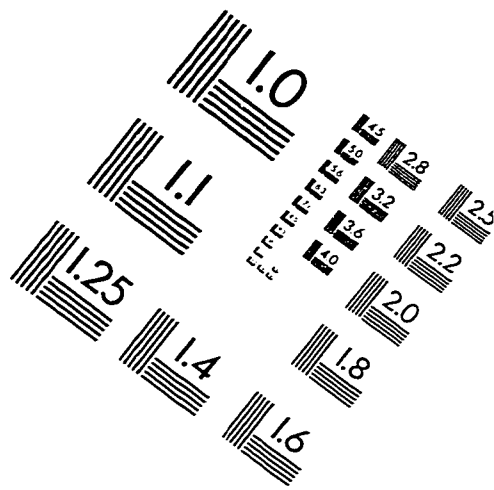
Variables 108 -116

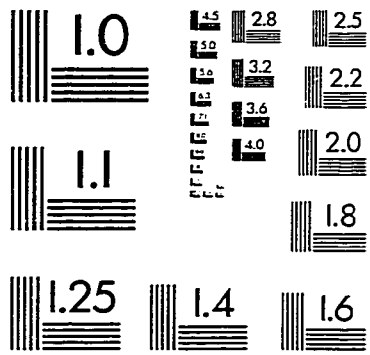
	97	98	99	100	101	102	103	104	105	106	107	108
115	-0.0175	-0.0175	-0.0175	-0.0158	-0.0175	0.0795	-0.0175	-0.0175	-0.0166	-0.0166	-0.0166	0.0850
116	-0.0175	-0.0175	-0.0175	-0.0158	-0.0175	-0.0175	0.0795	-0.0175	-0.0166	-0.0166	-0.0166	-0.0166

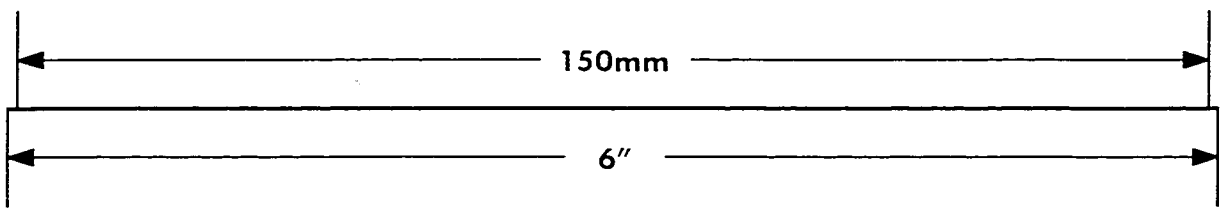
	109	110	111	112	113	114	115
110	-0.0166						
111	-0.0166	-0.0166					
112	0.0850	-0.0166	-0.0166				
113	-0.0166	-0.0166	-0.0166	0.0850			
114	-0.0166	-0.0166	-0.0166	-0.0166	-0.0166		
115	-0.0166	-0.0166	-0.0166	-0.0166	-0.0166	-0.0166	
116	-0.0166	-0.0166	-0.0166	-0.0166	-0.0166	-0.0166	-0.0166

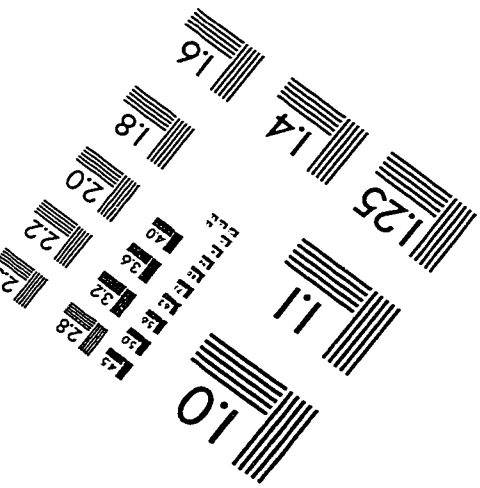
IMAGE EVALUATION
TEST TARGET (QA-3)

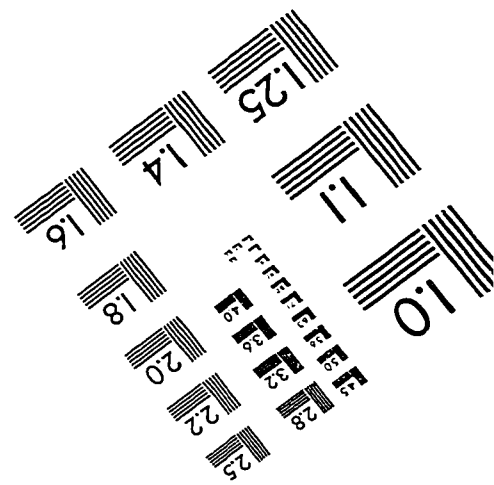












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