****
****

Document-ID: 746808

Patron:

Note: LL/Hi, Dr. Poole. This is Lisa, Sam's cello teacher.
Have a great day!

NOTICE:

****
****

Pages: 14 Printed: 10-10-05 12:01:26

Sender: Ariel/Windows

CHAPTER CONTENTS

- ICTs and Society 273
  - *The Information Society* 274
  - *Globalization* 274
  - *Access and Equity* 276
  - *Social Networks and Community* 277
  - *Home and School* 279
- ICTs and Organizing 281
  - *Organizational Structure and ICTs* 281
  - *Communication Processes in Organizations* 281
- ICTs and Interaction 283
  - *Technology as Source* 283
  - *Technology as Channel* 284
  - *Social Interaction* 286
- Conclusion 286
- Notes 288
- References 288

12 Bridging the Subdisciplines: An Overview of Communication and Technology Research

LEAH A. LIEVROUW
University of California, Los Angeles

ERIK P. BUCY
Indiana University

T. ANDREW FINN
George Mason University

WOLFGANG FRINDTE
University of Jena

RICHARD A. GERSHON
Western Michigan University

CAROLINE HAYTHORNTHWAITE
University of Illinois, Urbana-Champaign

THOMAS KÖHLER
University of Jena

J MICHAEL METZ
University of Central Florida

S. SHYAM SUNDAR
Pennsylvania State University

Communication and technology (CAT) research is concerned with the development, uses, and consequences of information and communication technologies (ICTs) across all types of social, cultural, and institutional settings. Technology includes the artifacts or devices that enable and extend our abilities to communicate, the communication activities or practices in which we engage when developing and using those devices, and the social arrangements or organizations that form around those practices and devices. Together, these elements also constitute the central phenomenon of interest for CAT research, the mediation of communication processes by ICTs. ICTs are used across many social settings and applications, so CAT research does not fit easily into either the traditional "mass media" or "interpersonal" specializations within the communication discipline. The present essay is organized broadly around the contexts of ICT use and research in society and organizations and by individuals and groups. Three themes resonate throughout this literature: the pervasiveness of electronically mediated communication in contemporary society (ubiquity); the multiplex social formations and phenomena associated with ICTs, rather than effects on particular audiences or demographic groups (the network metaphor); and the changes entailed by the ongoing rearrangement and redefinition of ICTs to suit people's changing needs and circumstances (recombination).

COMMUNICATION and technology (CAT) research is concerned with the development, uses, and consequences of information and communication technologies (ICTs) across all types of social, cultural, and institutional settings. As Langdon Winner (1977) notes, technology is difficult to define; its meaning shifted during the 20th century "from something relatively precise, lim-

Communication Yearbook 24, pp. 271-295

ited and unimportant to something vague, expansive and highly significant" (p. 8). However, a useful definition would include the *artifacts* or devices that enable and extend our abilities to communicate, the communication activities or *practices* in which we engage when developing and using those devices, and the *social arrangements* or organizations that form around those practices and devices. Together, these elements also constitute the central phenomenon of interest for CAT research, the mediation of communication processes by ICTs.

A line of studies dating back to Schramm (1977) has classified media technologies according to their technological attributes, features, or channel characteristics (e.g., Durlak, 1987; Pool, 1983; Steuer, 1995). Early communication technology studies, following this classificatory approach and the tradition of American media effects research, tended toward technological determinism (i.e., emphasizing the effects or "impacts" of ICTs on users, organizations, or society). This tradition is still influential; however, contemporary researchers consider both impacts and the ways in which individuals, groups, and institutions influence and reshape technologies in use.

Today, ICTs are used both for selective interpersonal or group communication and for the production, transmission, and reception of general-interest content. They incorporate computing, telephone, cable, broadcast, print, and satellite technologies, so research in this area is often framed in terms of point-to-point or networked interactions and information flows, in contrast to the more familiar media framework of institutional sources directing broad-based messages to mass audiences through established channels (e.g., publishing or broadcasting) (Rice & Holmes, 1996). ICTs are often said to be used in "demassified" ways (Rogers, 1986). Over the past two decades, the new media/mass media distinction has blurred as ICT systems have undergone increasing technological and institutional convergence (Baldwin, McVoy, & Steinfield, 1996).

ICTs are used in every kind of social setting and application, which makes it difficult to place CAT research easily into either the traditional "mass media" specialization or the "interpersonal" specialization within the communication discipline. CAT researchers often adapt and combine constructs, theories, and methods from diverse specialties within communication or from other disciplines according to the problem or question being investigated. They tend to view CAT research as a bridge between the subdisciplines of mass-media communication and interpersonal communication (Hawkins, Wiemann, & Pingree, 1988; Rogers, 1999).

Although it has lately acquired some trendy connotations in the multimedia, entertainment, and e-commerce industries, the term *new media* has been used by CAT researchers since the late 1970s in social, psychological, economic, political, and cultural studies of ICTs; often, they have applied the term to the field itself (see Rice & Associates, 1984; Rogers, 1986, 1994; for an overview of current thinking about the term new media, see the inaugural issue of the journal *New Media & Society*).[1]

CAT research is an international effort. In Canada, the specialty grew from the Innis-McLuhan tradition at the University of Toronto, Simon Fraser University,

and McGill University. Quebec boasts a large concentration of CAT researchers, encouraged by Canadian government initiatives on computer communications and videotex. Theory-driven researchers such as Armand Mattelart and others connected to the Minitel/Teletel and related projects have led a significant stream of work in France. The engineering-based work of Colin Cherry, the supradisciplinary work of Raymond Williams, and investigations of the service economy laid the groundwork for research in the United Kingdom in the 1980s, especially the Program in Information and Communication Technology of the Economic and Social Research Council. Today, degree programs specializing in communication and technology are found in universities throughout Europe, the United Kingdom, and Asia, as well as in North and South America, and investigators engage in both basic research and applications for business and education.

Although most communication technology studies have taken a social science approach, concentrating on technological, economic, or behavioral issues, in the past decade new media have also become the subject of a vigorous and growing scholarly literature in critical and cultural studies, social theory, and social history. CAT research has a strong grounding in historical scholarship (e.g., Beniger, 1986; Carey, 1989; Fischer, 1992; Marvin, 1988). Technology policy studies in particular have benefited from historical perspectives on key issues such as universal service (Dordick, 1990; Mueller, 1993).

In this chapter our aim is to provide a broad overview of important concepts and an introduction to the essential literatures of the field. Because space is strictly limited, we cannot probe any single issue or researcher's work in great depth, and we may overlook some worthwhile contributions or studies. Nonetheless, we believe that what we present here is reasonably representative of the recent history and current state of research. In general, we cite the most recent, classic, or comprehensive works by particular authors; we encourage readers to seek out their other publications.

This essay is organized broadly around the contexts of ICT use and research in society and organizations and by individuals and groups. Three themes resonate throughout this research: the pervasiveness of electronically mediated communication in contemporary society; the network formations and phenomena associated with ICTs, rather than effects on particular audiences or demographic groups; and the changes entailed by the ongoing rearrangement and redefinition of ICTs to suit people's changing needs and circumstances.

ICTs AND SOCIETY

At the societywide level, communication technology research deals with broad-based social change and movements associated with ICTs as well as with the specific legal, ethical, social, and economic issues that accompany those changes.

The Information Society

Information society research grew out of the influential work of economists and sociologists who detected the movement within developed societies from industrial to postindustrial economies. This was by no means an exclusively American phenomenon; the *johoka shakai* approach in Japan (Ito, 1981) and the recognition of *informatique* by Simon Nora and Alain Minc (1980) in France defined the information society from the outset as an international development.

Fritz Machlup (1962) was among the first economists to recognize and document the increasing numbers of "knowledge workers" in the United States in the postwar period. Daniel Bell (1973) argued that under the influence of new ICTs and the growing dependence on information as an economic good, developed societies were moving to a postindustrial stage characterized by the growth of the service and professional sectors of the economy. Porat and Rubin (1977) refined Machlup's occupational framework and produced the first input-output table of the U.S. *information economy.* Subsequent work in this line focused on defining *information work* and identifying the information workforce (Schement & Lievrouw, 1984), *information industries,* and their relative contribution to national and regional productivity.

In the 1980s an important perspective emerged to challenge the widespread view of a new society driven inevitably by the imperatives of ICT development, the prospect of ever-growing productivity, and swelling ranks of white-collar knowledge workers. This critical view, best illustrated in the work of Herb Schiller, Dallas Smythe, Jennifer Daryl Slack, Colin Cherry, Frank Webster, Kevin Robins, and others, argued that the use of new media technologies tends to reinforce rather than break down existing relations of power and capital. Indeed, the critics said, new ICTs were being implemented in ways that extended the deskilling, alienating patterns of industrial work to industries and workers that had previously seemed immune to assembly-line-style rationalization (e.g., health care, education, and the professions; Slack & Fejes, 1987; Webster, 1995).

The ongoing disagreements between the so-called *discontinuity* and *continuity* viewpoints led Shields and Samarajiva (1993) to conclude that the information society literature could be organized into four major schools: postindustrialists, industrialists, long-wave theorists, and power theorists. Likewise, Webster (1995) has summarized the contributions of social theorists such as Anthony Giddens, Jürgen Habermas, and notably Mark Poster's (1990) *mode of information.* Recently, the information society rubric has taken on a new and more specific form in the European Community as policies of infrastructural expansion and member states' unity or cohesion (see, e.g., European Commission, 1997a).

Globalization

Certainly, Marshall McLuhan had a strong influence on early visions of the information society. In the 1960s he used the term *global village* to describe and

critique the effects he observed of worldwide electronic communications (McLuhan, 1964). Today, the word *globalization* dominates discussions of international trade, information flows and infrastructures, national sovereignty and governance, and popular culture and consumption.

The globalization idea draws on the economics of information (e.g., studies by Kenneth Arrow and Donald Lamberton) and on theories of the nation-state and of new technologies and organizing (see the discussion below). It is also based in the communication and development research tradition that was first associated with the work of Daniel Lerner, moved through the "passing of the dominant paradigm" documented by Everett Rogers, and now recognizes the value of local knowledge and grassroots approaches (see, in this volume, Braman, Shah, & Fair, Chapter 7; Kim, Chapter 6).

Perhaps more than any other technology, communication satellites (and the ancillary technologies of cable networking and multichannel systems) have materially affected perceptions of globalization (see Anderson, 1985; Baldwin et al., 1996; Elasmar, 1995; Gershon & Kanayama, 1995; Marghalani, Palmgreen, & Boyd, 1993; Parsons & Frieden, 1998). Communication satellites have played an integral role in the development process, especially for remote education and access to information about agriculture, industry, health care, and social services. Some of the first communication technology studies in the 1960s and 1970s explored satellite communication and development (Rogers, 1986; see also Hudson, 1997; Mody, 1987).

Globalization is studied empirically in terms of international telecommunications markets, organizations, and treaties, as well as the worldwide extension of the technological networks themselves. Policy researchers have considered the emergence of a global information infrastructure (Drake, 1995) and the implications of international regimes such as the Global Agreement on Tariffs and Trade and the World Intellectual Property Organization for transborder data flows, intellectual property, law enforcement, language, culture, education, and national identity. The International Telecommunications Union has been an important player in the allocation of access to satellite "slots" in geosynchronous orbit, especially claims to slots by countries that lack either technical or financial means to place satellites in orbit themselves.

Observers have also noted the changing perceptions of space and place associated with ICTs (e.g., Curry, 1998; Meyrowitz, 1985). Manuel Castells (1996) describes the "space of flows." International, indeed global, information flows have considerable geopolitical and cultural consequences, raising the question of whether a government or other organization has the right to transmit data or programs to another country without the latter's permission (McBride Commission, 1980; Pelton & Howkins, 1988; Pelton & Snow, 1977; Ploman, 1984; Powell, 1985).

Some question whether the existence of international communication networks necessarily leads to globalization, or claim that the notion itself reflects mainly the perspectives of economic and national elites. Critics have begun to ask whether

moves toward "deglobalization" are under way (see recent special issues of *Foreign Policy* and *New Perspectives Quarterly*). Many observers consider the world today to be a network of economic centers, information hubs, or technopoles that involve nation-states, transnational corporations and other organizations, urban centers, and high-tech regions (see Castells, 1989; Garnsey, 1998; Graham & Marvin, 1996; Saxenian, 1994).

Access and Equity

A major theme of research informing ICT policy and regulation is the equitable distribution of technologies and services. The concern with equity underlies much of the issue-based research that is undertaken in response to policy makers' needs for information on current problems, including the privacy implications of caller ID and similar services (for a fuller discussion of privacy, see Gandy, 1993); reconsiderations of universal service beyond the specific case of POTS (plain old telephone service); concentration of new media ownership and the rise of global oligopolies; the effects of computerization on employment, especially in the telecommunications industry; spectrum allocation and auction; and changes in intellectual property law and speech rights prompted by new technologies, especially related to copyright, fair use, and the public domain (Katsh, 1995; Pool, 1983).

Different approaches to the policy-making process cast access and equity differently. Melody and Mansell (1983) have suggested that *administrative* policy research tends to maintain or reinforce the roles and interests of existing organizations, government and legal authorities, and technologies, whereas *critical* policy research tends to focus on power issues, the political economy of information and technology, and the emancipatory potential of new technologies. Mansell (1993) has also proposed that two competing frameworks guide policy makers' views of how networked ICT systems should develop. The *idealist model* assumes that there are few technical, organizational, or political barriers to the development of open, ubiquitous, and "seamless" networks that cannot be overcome. The *strategic model*, on the other hand, assumes that networks are likely to be fragmented and to diffuse unevenly due to the divergent political, cultural, and monopolistic interests of the players involved.

Uneven access has led to a growing concern about the rise of a *digital divide* between information haves and have-nots based on race, income, family structure, and other demographic characteristics (Cooper & Kimmelman 1999; National Telecommunications and Information Administration, 1998). Such disparities raise a familiar idea in communication research, namely, that the introduction of a new communication medium can create an *information gap* between the best-positioned members of society and the less fortunate.

Although the number of computer users is growing rapidly in the United States and around the world, a majority of the public still does not have Internet access and may not for years to come. Recent surveys suggest that nearly as many people

have discontinued using the Internet as remain current users (Katz & Aspden, 1998). Use of on-line services is particularly low among nonwhites, the poor, and single-parent, female-headed households (National Telecommunications and Information Administration, 1998). Only 60% of American households have cable service, and about 60% of American households do not have Internet access. The number of households with basic telephone service declined after the AT&T divestiture, due to marked increases in local telephone rates associated with the loss of subsidies from long-distance service (Schement, 1995). Overcoming the divide may depend on policy initiatives that promote fair access, such as the Clinton-Gore administration's *e-rate* policy.

Given the Internet's growing importance as a news source (Morris & Ogan, 1996) and the depth of information now available on-line, the potential for the rise of a political and economic "overclass" populated by information elites seems increasingly real. The issue takes on a certain urgency as more governmental functions and educational opportunities become available through the World Wide Web and political campaigns are waged on-line. The digital divide may also exclude a large segment of society from entrepreneurial and career opportunities.

The most affluent people are often assumed to have the most access, opportunity, and competence to communicate. However, different types of inequities may develop as people segregate themselves into ever-smaller communities of interest, using new media to select and interact only with others who are most like themselves (Lievrouw, 1998).

Moreover, even if universal technological access is achieved, substantial social investments in education and training must be made to allow people to benefit from the complex and constantly evolving new media environment (Anderson, Bikson, Law, & Mitchell, 1995). Kling (1999) refers to the mix of professional knowledge, economic resources, and technical skills required for effective use of ICTs as *social access*. Cronin and Davenport (1993) argue that *social intelligence* can affect information seeking and social participation.

Equity is a concern across societies as well as within them. It is often observed that most people in the world have never placed or received a phone call, much less used on-line information services or e-mail. Even in relatively affluent areas such as the European Community, subtle regional differences in the distribution of ICTs have been documented. It is doubtful that systems and services will develop or be distributed in underserved areas as evenly as they have been in affluent societies.

Social Networks and Community

In the past decade, researchers have begun to examine the ways in which certain technologies, especially computer-mediated communication (CMC), support *virtual communities* or societies (Jones, 1998; Kiesler, 1996; Kollock & Smith, 1998; Ludlow, 1996; Rheingold, 1993) and social networks (Wellman et al., 1996).

On-line communicators share language conventions, maintain distinctive social and professional roles, establish boundaries, enact rituals, show commitment to communal goals, follow standards of (n)etiquette, and engage in socioemotional exchanges in both work and leisure settings, much as traditional communities do (Haythornthwaite & Wellman, 1998; Rice & Love, 1987; Walther, 1992). CMC appears to sustain and extend complex interpersonal and community ties. It allows users to increase their range of contacts and form relationships with others who may share their interests but with whom they are unacquainted (Constant, Kiesler, & Sproull, 1996).

Diffusion of innovations theory describes and predicts the ways in which new ideas or practices spread in a community through networks of social relationships (for an overview of the theory and recent studies, see Rogers, 1995). This theory's emphasis on communication and social structure parallels the technological and institutional infrastructures and information flows associated with ICTs. As noted previously, it has been applied widely in studies of economic development, productivity, and technology transfer, as well as in attempts to understand community networks.

Several researchers have extended or elaborated the basic outlines of diffusion of innovations theory. Adopters may *reinvent* innovations, creating new uses for them that were unintended by the originators. *Critical mass theory* (Markus, 1990) suggests that some minimum number of participants must adopt an interactive system, such as telephone or e-mail, before it provides a relative advantage to users. Moreover, because the system provides additional benefit with every additional user, some early users actually contribute more than they benefit from the system as they initiate group use. Where effort and benefit are mismatched, systems may fail to reach critical mass (Grudin, 1989).

Other researchers have taken an explicitly cultural approach to the analysis of social relations and practices among ICT users (Levy, 1997). Reid (1991) argues that the notion of culture is an appropriate concept for the study of users of Internet relay chat (IRC). Curtis's (1996) study of XeroxPARC's LambdaMOO is a seminal work in MUD (multiuser domain) ethnography. Baym (1995) applied ethnographic techniques in her study of Usenet newsgroups; Metz (1995) systematically outlines the cultural attributes of real-time CMC communities as a foundation for examining synchronous and asynchronous CMC from a cultural perspective. One of the most frequently cited cases of the violation of cultural norms and rules in a computer-mediated community is reported by Dibbell (1996), who describes a virtual "rape" and its aftermath. Stone (1995) juxtaposes themes from critical and feminist theory and science fiction with case studies of high-tech firms, research labs, and everyday users of on-line technologies.

Nonetheless, the definition and significance of virtual communities, electronic cultures, and the like remain open questions. In future studies, ethnography may be used to explore further the notion of virtual "community standards" and how they might differ from ordinary (geographic) community standards, the competing value systems and possible culture clashes among Internet user groups or between

Internet users and other social groups, and the process of affiliation and group formation on-line.

Home and School

Although a few pioneering studies were conducted in the 1980s (e.g., Chen & Paisley, 1985; Dutton, Kovaric, & Steinfield, 1985), until recently relatively few empirical data have been available on the adoption and use of new media technologies in the home. Data have been gathered about household CMC in large suburban communities near Toronto (Hampton & Wellman, 1999). The HomeNet study was one of the first longitudinal studies of home Internet use (Kraut, Patterson, & Scherlis, 1998). And a new multiyear project under way at UCLA's Center for Communication Policy will track new media adoption and use in a large-scale longitudinal survey of U.S. households. Taking a different approach, studies of the *domestication* of ICTs—that is, their incorporation into home life and leisure (Silverstone & Hirsch, 1992)—draw on cultural and sociological studies of consumption and popular culture.

ICTs have long been used as instructional media in classrooms, laboratories, consultants' offices, and informal settings. Wilbur Schramm (1977) conducted studies of instructional media in the early days of communication research; the applications of satellite systems and slow-scan television in long-distance schooling and remote medical consultation were studied at Stanford University in the 1970s and 1980s (McAnany, 1983).

Today some believe that ICTs have "become a force for a new form of education" (Harasim, Hiltz, Teles, & Turoff, 1995, p. 271). We encourage interested readers to see the contribution to this volume by Waldeck, Kearney, and Plax (Chapter 4) for a more detailed discussion of instructional media. For our purposes in this essay, one issue in particular merits attention: *distance education.*

Distance learning using the World Wide Web and other new media modalities, especially in higher education, has become an area of intense research interest (Dede, 1996; Mood, 1995). Although critical observers such as David Noble (1998a, 1998b) have noted the economic, privacy, and intellectual property, as well as instructional, implications of the rapid adoption of new media by universities, others note the potential of Web-based technologies for real-time distance instruction, information seeking, and media use as a social process (Lyman, 1996). Some projects are explicitly designed to integrate learning technologies into companies, organizations, and workforces as a means of enhancing their performance; these projects promote the transfer of successful learning technology R&D to the marketplace and focus on the implementation, marketing, and evaluation of learning technologies (European Commission, 1997b; Frindte & Köhler, 1999).

With the growing emphasis in postsecondary education on the cultivation of students' critical thinking skills, researchers have explored uses of the World Wide Web for general education, where close student-teacher interaction is desirable. The integration of *learning companion* systems with sophisticated network-

ing capabilities and user-friendly interfaces into social learning systems is also being explored, and trial systems have been demonstrated and discussed.

Interactive mechanisms for Web-based teaching situations are still relatively undeveloped, but might include forums similar to newsgroups or chat rooms. New Web-based learning software environments that are specifically designed to integrate the didactic and social needs of learning in a single system incorporate specialized content databases, safe personal environments, and multimedia or hypertextual information from the World Wide Web (Frindte, Köhler, Stauche, & Suckfüll, 1998; Hegarty, Phelan, & Kilbridge 1998). They allow teachers to supervise and help students individually and enable the capture of comprehensive evaluation data.

Social accounts of learning and human knowledge have led researchers and teachers to reorganize educational institutions as school-based and work-based *learning communities* (Koschmann, 1996). ICTs, and in particular the World Wide Web, are seen as playing important roles in the creation and operation of learning communities, provided such communities have sufficient access to specialized information about relevant data and analysis tools and personnel trained to handle the demands of the progressively more complex levels of interaction that are involved (O'Neill, Gomez, & Edelson, 1994).

Distance learning studies have provided detailed descriptions of multimedia system features (Hegarty et al., 1998; Lehrer, 1992) and have demonstrated and evaluated techniques for representing comprehensive knowledge in hypermedia structures. Some researchers have considered the World Wide Web as a means for disseminating information, generating and accessing resource materials, and enhancing communication among participants during learning; others have explored techniques and methodologies for integrating computers and telecommunications technology into existing curricula. Some observers believe that use of the Web encourages independent learning, and a number of studies have considered the Web as an information resource and communication channel among younger students in different schools and countries (e.g., Donath, 1994).

Despite these advances, however, system developers and users often seem to assume that multimedia systems will transform the whole process of learning into an open, personalized, interactive experience. They tend to emphasize large-scale distance education projects and the development of technologically mediated communities based on regular and consistent feedback (see, e.g., Barrett, 1992; Issing & Klimsa, 1996; Murray, 1995), rather than the problems of integrating media into local teaching settings. These scenarios have been criticized for underestimating the limitations of new media technologies, including the accessibility of the technology and its fit or suitability for particular pedagogical uses (Hart, 1998; Kawalek, 1996). Some researchers have noted the pedagogical problems associated with use of the Web for teaching elementary and secondary students (e.g., Hegarty et al., 1998; Noack, 1996). The need remains for specific guidelines and techniques for employing ICTs in elementary and secondary teaching and learning.

ICTs AND ORGANIZING

The uses of ICTs in organizational contexts constituted one of the first major research fronts in communication and technology studies. Although technologies and organizational communication are covered more fully elsewhere in this volume, we briefly discuss below two important areas of investigation: ICTs and organizational structure, and ICTs and organizational communication processes.

Organizational Structure and ICTs

New technologies (especially satellites and wireless systems) have had major effects on the organizational structures and processes of the firms that use them (Egan, 1997; Frieden, 1997; Pelton, 1995). The *intelligent network* permits the integration of internal and external organizational information and communication; economies of scale can be realized because the costs of satellite and wireless transmission bear little relationship to the distance involved and/or the number of receivers (Elbert, 1997; Gordon & Morgan, 1993; Richharia, 1999).

Companies that provide satellite communication services have also been affected by international privatization trends and advancing technology. For example, Intelsat, founded in 1964 as a nonprofit international cooperative to deliver global satellite communications services, today finds its core mission being challenged by private satellite carriers and business consortia that offer suboceanic fiber alternatives (Fields, 1994; Gershon, 1990; Wright, 1998).

Over the past few decades, major public and private concerns have undergone an evolutionary process of organizational restructuring and realignment, delegating more decision making and operations to local or peripheral units and forming new types of affiliations and alliances with suppliers, competitors, and clients. Telecommunications and distributed data processing have eliminated many of the time and distance barriers that once separated organizational centers from their affiliate sites and other organizations (Sproull & Kiesler, 1991). Today, widely dispersed organizations operate globally and communicate in real time as so-called *network firms* or *virtual enterprises.* The study of these new organizational forms has been influenced by social network research (see previous section) and self-organizing systems theory (see the reviews by Braman, 1994; Roberts & Grabowski, 1996).

Communication Processes in Organizations

Many of the earliest studies of ICTs in the workplace evaluated their channel capacities or features and compared mediated versus face-to-face communication for particular types of work situations and decision-making tasks (Culnan & Markus, 1987; Daft & Lengel, 1986). These studies concentrated on the use of e-mail and computer conferencing and were frequently designed as laboratory

studies (Rice, 1992). They suggested that computer messaging was similar to telegraphy and probably best for simple, unambiguous, task-related messages.

Investigators found that CMC can give users control over the flow of information. New technologies can reach more people at one time than other channels, provide information simultaneously to remote and local workers, and increase the involvement of both groups (Eveland & Bikson, 1988).

Media richness theory (Daft & Lengel, 1986; Daft, Lengel, & Trevino, 1987; Trevino & Webster, 1992) hypothesizes that certain systems are suitable for certain types of communication, depending on system bandwidth (the capacity to carry interpersonal and nonverbal cues and symbolic content that reduce message uncertainty, equivocality, or ambiguity). It predicts that effective communicators will match the communication channel they select with the degree of richness required for any particular communicative act. Thus simple task-related information exchange can be accomplished with ICTs that are "lean" (low in media richness), whereas bargaining and negotiation require "richer" systems. Rice (1993) refines this approach and proposes the concept of *media appropriateness.*

System- or channel-centered studies were later criticized because they failed to capture the complexity of real communication (Culnan & Markus, 1987; Rudy, 1996). Current analytic frameworks place more emphasis on social processes within groups and organizations, including group and organizational dynamics, norms, and constraints (Fulk & Steinfield, 1990; Lea, 1992; Markus, 1994). Fulk and her colleagues have formulated *social influence theory* to explain how other people and groups within an organization affect an individual's choice of media and the social construction of ICTs (see Fulk, 1993; Fulk, Schmitz, & Steinfield, 1990).

Poole and DeSanctis (1990) have proposed *adaptive structuration* to describe the uses of technologies in organizations (especially group decision support systems). Based on Anthony Giddens's theory of structuration and social studies of technology, adaptive structuration theory outlines the iterative and interdependent relationships among ICTs, people, and organizational structures, and ways that groups create their own local definitions and uses of technologies.

The social studies of technology literature, especially the sociology of computing and, more recently, *social informatics* (Kling, 1999), has been an important influence in studies of ICTs and organizing. Key concepts here include the web of computing (Kling, 1980; Kling & Scacchi, 1982), boundary objects and the social construction of infrastructure (Bowker, Star, Turner, & Gasser, 1997; Star & Ruhleder 1996), and technological trajectories (Hughes, 1989). This *sociotechnical* perspective has been especially influential in studies of collaborative work using new media technologies (Dourish, 1998; Galegher, Kraut, & Egido, 1990; Kraut, 1987; Orlikowski, 1993; Twidale & Nichols, 1999) and of the participatory design of information systems (Clement & Van den Besselaar, 1993).

ICTs AND INTERACTION

The study of communication technologies and interpersonal interaction takes several different directions. Some researchers consider technologies as a *source* of communication or information; this work has its roots in the media effects tradition, uses and gratifications theory, and extensive literatures in computer science and information science on human-computer interaction and interface design. A second group of researchers conceive of technologies as communication *channels* among human communicators; their work draws from the social psychology of telecommunications and computing. A third research perspective moves away from the "source/channel" transmission metaphor of communication and instead looks at ICTs as settings for *social interaction* and the social construction of identity and shared meaning. We review each of these streams of work briefly below.

Technology as Source

A central question for many CAT researchers is whether the technologies themselves generate psychological effects in, and elicit social and behavioral responses from, users. Much of the applied research in this stream is devoted to developing interfaces that conform to people's social and communicative expectations rather than to engineering specifications alone.[2] The emphasis has been on technological or structural features and attributes that may be unique to certain technologies; specific technological features may affect users' reception of different types of content, such as news or advertising (Sundar, Narayan, Obregon, & Uppal, 1998).

The *media equation* thesis suggests that people treat computers, television, and new media as if these technologies were real people and places. Asserting that encounters with communication technologies are "fundamentally social and natural," Reeves and Nass (1996) argue not only that people anthropomorphize communication appliances but also that people's cognitive processing of media content is affected by the formal features and design elements of the interface. Reeves and Nass's research demonstrates that individuals are polite to computers, attribute notions of "self" and "other" as well as personality types to machines, and even apply gender stereotypes to voice-based computers.

The uses and gratifications approach has been applied in CAT studies since the 1980s. Uses and gratifications theory assumes an active audience, that media use is goal oriented, and that media compete with other sources of need satisfaction. Perse and Dunn (1998) found that networked computers satisfied user needs for learning, entertainment, social interaction, escapism, and passing the time, and that they were used out of habit. Ritualistic (as opposed to instrumental) uses, such as passing time and habitual use, indicate that gratifications may not be tied to specific content but rather to the technology or medium itself. Perse and Dunn suggest

that ritualistic uses of computer connectivity might influence personal well-being, possibly leading to addiction.

Studies of information retrieval (IR) systems, such as those that allow users to search distributed databases, library collections, and the World Wide Web (Twidale & Nichols, 1999), also contribute to the understanding of technologies as information sources. IR and information-seeking research tend to focus on the varying abilities and aptitudes of different social or professional groups, such as scientists and historians, to search on-line databases. Borgman (1989), for example, found that the differing technical aptitudes and personality characteristics of engineering, psychology, and English majors had consequences for their uses of information retrieval systems. Lieberman (1992) found that the effectiveness of individuals in retrieving information from a health care information systems depended on important individual-level predictors of learning, such as involvement, motivation, perceived self-efficacy, and sense of personal control.

A key theoretical concept in IR research is *relevance* (Saracevic, 1975), or the degree to which the materials a system retrieves actually match the searcher's request or satisfy his or her query or need. Relevance feedback, for example, is employed in World Wide Web search engines that show percentage figure estimates as indicators of how closely the retrieved items match the user's request. Relevance is a complex phenomenon, however, and some critics have rejected simple matching approaches in favor of *psychological relevance* (Harter, 1992) or other conceptualizations that capture the searcher's sense that the retrieved material is meaningful or appropriate for his or her purposes (Schamber, 1994).

Technology as Channel

Another group of studies has examined systematic changes in interpersonal and small group interactions that may be attributable to media technologies, especially computers, compared to face-to-face communication. Here, investigators have asked whether, and how well, new media channels facilitate interpersonal and small group interaction.

In the 1970s and 1980s, studies of the social psychology of telecommunications and of computing produced several fundamental constructs in this stream, including those of *social presence* (Short, Williams, & Christie, 1976) and *telepresence* (Johansen, Vallee, & Spangler, 1979). Researchers analyzed the use of computer bulletin boards ("bboards"), computer conferencing, the Arpanet, and other computer-based messaging systems by researchers and scientists in academic and military settings to see how well these technologies supported interaction among widely dispersed groups (Hiltz & Turoff, 1993).

Early studies explored the psychological states of individual participants as well as group dynamics in computer-mediated communication (e.g., Rice & Love, 1987, adapted Bales's Interaction Process Analysis). Anonymity, for example, was found to be an attractive feature of CMC for many communicators. New technologies were thought to influence these individual psychological states, and therefore individuals' behavior and group decision-making processes, differently than would face-to-face encounters. More recently, Kraut et al. (1998) found increased use of the Internet to be associated with depression and loneliness.

The absence of *social context cues* in CMC (status and nonverbal, visual cues) was noted in the early 1980s. Researchers argued that because it reduces or removes these cues, CMC compares poorly with the quality of face-to-face communication. The absence of cues may also contribute to *disinhibition*, a reduction in communicators' adherence to social norms and constraints (Kiesler, Siegel, & McGuire, 1984), and encourage a greater degree of aggressive communication such as *flaming* (Sproull & Kiesler, 1991).

Walther's (1992, 1996) *social information processing* theory rejects the idea that CMC is inherently more impersonal than face-to-face communication and assumes that communicators in any setting are motivated to develop social relationships, but that the limitations of text-based technology may slow the development of interpersonal ties. Over time, users will adapt to text as the sole channel for relational communication and develop warm and personal relationships. Walther (1996) argues that research should focus instead on the "critical factors that *interact* with CMC to foster impersonality" (p. 13).

The reduced nonverbal cues and increased disinhibition associated with CMC have also been characterized as a status-equalization function of the technology that empowers individual users. Some observers, however, claim that CMC can actually reinforce power relations (Lea & Spears, 1991). To the extent that interpersonal cues are reduced, the influence of the remaining social cues (status, role, and category membership markers that are explicit in CMC but often only implied in face-to-face contexts) may be magnified rather than diminished (Spears & Lea, 1994). Spears and Lea (1994) developed the SIDE (Social Identity-Deindividuation) model, which hypothesizes that the deindividuating isolation generated by CMC can (depending on whether group identity is important to the person) strengthen or weaken an individual's level of group identification, thereby promoting or undermining conformity to group norms in intergroup contexts.

Rafaeli (1988) was among the first to suggest the centrality of *interactivity* in the study of new media. Since the 1980s, scholars have attempted to define and explain interactivity, either as a quality of mediated dialogue or discourse (Williams, Rice, & Rogers, 1988) or as a function of interface or system features (Durlak, 1987). Whether defined as the degree of relatedness among messages (Rafaeli & Sudweeks, 1997), features that encourage greater user engagement with the system and a sense of telepresence (Reeves & Nass, 1996), or the modifiability of a mediated environment in real time (Steuer, 1995), interactivity has been considered roughly analogous to semantic feedback or reciprocity (see Sims, 1997).

Based on a content analysis of audience e-mail messages to *NBC Nightly News,* Newhagen, Cordes, and Levy (1995) defined *perceived interactivity* as the user's

expectation of receiving a response. Bucy and Newhagen (1999) contend that perceived interactivity can be extended beyond mass media and CMC and applied to the study of other systems.

Social Interaction

From a different perspective, new media technologies are sites for social interaction, allowing users to express and work out personal issues and identities. Schegloff, Mandelbaum, and their colleagues have analyzed interaction in telephone conversations. In *The Second Self* (1984), Sherry Turkle argues that computers (and, by extension, computer-based communication systems) are "projective devices" or "evocative objects"—like Rorschach inkblots—that give inhibited or awkward communicators more control over their self-presentation and allow them to communicate more confidently and effectively than they can in face-to-face communication.

In contrast to claims that prolonged, intensive on-line activity can be harmful, the literature on gender and identity play regards chat rooms, MUDs, role-playing games, and other digitally based worlds as safe havens where individuals can explore different aspects of the self. They can adopt new personas and play in worlds that have no counterpart in "real life" (Sudweeks, McLaughlin, & Rafaeli, 1998). Turkle (1995) asserts that, rather than regarding Internet use as a type of addiction or compulsion, researchers should examine the inherent appeal of multiplicity and the contingent psychological possibilities of exploring a "flexible" self without punitive social repercussions. Although reliance on on-line relationships has been criticized for fostering real-world isolation, there are many prosocial aspects to "life on the screen," such as community building and the ability to work through personal concerns. Similarly, Gergen (1991) has advanced the idea that ICTs may produce the "saturated self," where identity extends across networks of social relationships and roles rather than inhering "in" the individual.

CONCLUSION

After this necessarily brief overview of a growing research front, it may be helpful to ask what has been learned and what themes might unify or organize such a disparate range of work. As we noted at the outset of this chapter, we find that CAT research assumes the *ubiquity* of electronically mediated communication. This sensibility accounts for the prominence of certain research issues in the CAT literature, such as access and equity, "flows" of information and communication content, and cultural influence.

On one hand, this view runs the risk of obscuring the crucial role that face-to-face interaction and nonelectronic media continue to play in everyday social life. On the other hand, many CAT studies also make the implicit assumption that face-to-face interaction is the ideal-typical form of communication, and that media channels should try to simulate face-to-face as closely as possible, despite ample evidence that people understand face-to-face and mediated modes as inseparable aspects of the whole experience of communicating and interacting (Lievrouw & Finn, 1990). CAT research may bridge the interpersonal and media specializations of communication study, but it reveals a persistent habit of bracketing face-to-face interaction as a separate and usually preferable form of engagement. In future studies this implicit assumption should be explicitly questioned and analyzed.

Second, we find that CAT researchers characteristically portray technological and cultural ubiquity by employing a *network* metaphor for communication across levels and contexts of analysis, in contrast to analytic categories such as "audience" and "demographic" that are associated with a "mass" metaphor. To some extent, the network metaphor is derived from the technologies themselves, as Carey (1989) and Hughes (1989) have shown, but it is also rooted firmly in the idea that social, communication, workplace, kinship, and community relations are complex "webs of affiliation" (to use Simmel's phrase) that change over time.

The confluence or mutual shaping of technological and social networks is a view of the reality of communication processes that is different from linear or exchange models of communication. By invoking a network metaphor, CAT researchers suggest that people, organizations, and institutions are not simply either "sources" or "receivers" of content; rather, network roles and positions may entail both aspects of communication simultaneously according to communicators' contexts, meanings, and purposes. This theme is well illustrated in the work of researchers who find that constructs such as family, culture, markets, community, hierarchical corporate organizational forms, and even the nation-state no longer adequately describe or explain contemporary social formations and processes.

Third, one of the most important implications of the network metaphor is that communication practices, technologies, and institutions are constantly changing and rearranging to suit people's needs and circumstances. Networks are mutable phenomena or experiences rather than fixed categories—sets of relations and meanings among, rather than "states" or attributes of, communicators. The metaphor raises the question: What is the nature of change in networked social and technical milieux?

We might also say that mediated communication today is *recombinant*. It is an ongoing process of hybridization arising from communicators' deliberate choices of messages, products, meanings, technologies, and relationships, as well as from a kind of sociotechnical natural selection that shapes languages, genres, contexts, cultures, markets, and communities over time. Existing ("old") and innovative ("new") technologies or their functions are recombined according to the particular communicative needs or applications at hand, the product of a richly interconnected, networked, and adaptive institutional environment.

The metaphor of recombination suggests that ICTs are products of human action and decisions; they are certainly influenced by the existing technological

environment, and may have unforeseen consequences, but they are not determined by an inevitable evolutionary process. Recombination creates an unstable technological landscape and compels CAT researchers to treat artifacts, practices, and social arrangements—the components of technology outlined at the beginning of this chapter—as moving targets. It accounts for both the technological convergence of media systems and the persistent sense of "newness" that characterize this literature—and everyday life in societies and settings where ICTs are prevalent.

These three themes—ubiquity, the network metaphor, and recombination—only begin to suggest possible directions for future research. They are certainly not fully theorized; other concepts may be more useful or enduring. However, we offer them as a challenge for the generation of new questions and as a platform for research and scholarship that continues to bridge the interpersonal and mass-media sides of our disciplinary "house." We hope that this review and brief synthesis have contributed to a better understanding of mediated communication.

NOTES

1. The Communication and Technology Division of the International Communication Association was founded in the early 1980s as the Human Communication Technology Interest Group. The membership changed the name in the early 1990s to accommodate a rapidly growing and broadening range of issues and research problems. For an analysis of the growth of the specialty as reflected in ICA conference submissions, see Rice and Holmes (1996).

2. *Interface* may be defined as the "contact surface" between the user and the technology; the meaning of the term has become more complicated as technologies have grown more sophisticated (Laurel & Mountford, 1990).

REFERENCES

Anderson, J. W. (1985). The economic, legal and scientific implications of direct broadcast satellites. *Communications and the Law, 7*(1), 3-25.

Anderson, R., Bikson, T. K., Law, S. A., & Mitchell, B. M. (1995). *Universal access to e-mail: Feasibility and societal implications.* Santa Monica, CA: RAND Corporation.

Baldwin, T. F., McVoy, D. S., & Steinfield, C. (Eds.). (1996). *Convergence: Integrating media, information and communication.* Thousand Oaks, CA: Sage.

Barrett, E. (1992). *Sociomedia: Multimedia, hypermedia and the social construction of knowledge.* Cambridge: MIT Press.

Baym, N. K. (1995). The emergence of community in computer-mediated communication. In S. G. Jones (Ed.), *Cybersociety: Computer-mediated communication and community* (pp. 138-163). Thousand Oaks, CA: Sage.

Bell, D. (1973). *The coming of post-industrial society: A venture in social forecasting.* New York: Basic Books.

Beniger, J. R. (1986). *The control revolution: Technological and economic origins of the information society.* Cambridge, MA: Harvard University Press.

Borgman, C. L. (1989). All users of information retrieval systems are not created equal: An exploration into individual differences. *Information Processing and Management, 25,* 237-251.

Bowker, G. C., Star, L. S., Turner, W., & Gasser, L. (1997). *Social science, technical systems, and cooperative work.* Mahwah, NJ: Lawrence Erlbaum.

Braman, S. (1994). Entering chaos: Designing the state in the information age. In S. Splichal, A. Calabrese, & C. Sparks (Eds.), *Information society and civil society* (pp. 157-184). West Lafayette, IN: Purdue University Press.

Bucy, E. P., & Newhagen, J. E. (1999). The micro- and macrodrama of politics on television: Effects of media format on candidate evaluations. *Journal of Broadcasting & Electronic Media 43*(2), 193-210.

Carey, J. W. (1989). *Communication as culture: Essays on media and society.* Winchester, MA: Unwin Hyman.

Castells, M. (1989). *The informational city.* Oxford: Blackwell.

Castells, M. (1996). *The rise of the network society.* Oxford: Blackwell.

Chen, M., & Paisley, W. J. (Eds.). (1985). *Children and microcomputers: Research on the newest medium.* Beverly Hills, CA: Sage.

Clement, A., & Van den Besselaar, P. (1993). A retrospective look at PD projects. *Communications of the ACM, 36*(4), 29-37.

Constant, D., Kiesler, S. B., & Sproull, L. S. (1996). The kindness of strangers: The usefulness of electronic weak ties for technical advice. *Organization Science, 7,* 119-135.

Cooper, M., & Kimmelman, G. (1999). *The digital divide confronts the Telecommunications Act of 1996: Economic reality versus public policy.* Washington, DC: Consumer Federation of America/Consumers Union.

Cronin, B., & Davenport, E. (1993). Social intelligence. In M. E. Williams (Ed.), *Annual review of information science and technology* (Vol. 28, pp. 3-44). Medford, NJ: Learned Information.

Culnan, M. J., & Markus, M. L. (1987). Information technologies. In F. M. Jablin, L. L. Putnam, K. H. Roberts, & L. W. Porter (Eds.), *Handbook of organizational communication: An interdisciplinary perspective* (pp. 420-443). Newbury Park, CA: Sage.

Curry, M. R. (1998). *Digital places: Living with geographic information technologies.* New York: Routledge.

Curtis, P. (1996). MUDDING: Social phenomena in text-based virtual realities. In S. B. Kiesler (Ed.), *Cultures of the Internet* (pp. 121-142). Mahwah, NJ: Lawrence Erlbaum.

Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness, and structural determinants. *Management Science, 32,* 554-571.

Daft, R. L., Lengel, R. H., & Trevino, L. K. (1987). Message equivocality, media selection, and manager performance: Implications for information systems. *MIS Quarterly, 11,* 355-366.

Dede, C. J. (1996). The evolution of distance education: Emerging technologies and distributed learning. *American Journal of Distance Education, 10*(2), 4-36.

Dibbell, J. (1996). A rape in cyberspace; or, How an evil clown, a Haitian trickster spirit, two wizards, and a cast of dozens turned a database into a society. In P. Ludlow (Ed.), *High noon on the electronic frontier: conceptual issues in cyberspace* (pp. 375-395). Cambridge: MIT Press.

Donath, R. (1994). Rauf auf die Daten-Autobahn! *Paed Extra, 22,* 10-14.

Dordick, H. S. (1990). The origins of universal service: History as a determinant of telecommunications policy. *Telecommunications Policy, 14,* 223-231.

Dourish, P. (Ed.). (1998). Interaction and collaboration in MUDs [Special issue]. *Computer-Supported Cooperative Work, 7*(1-2).

Drake, W. J. (Ed.). (1995). *The new information infrastructure: Strategies for U.S. policy.* New York: Twentieth Century Fund Press.

Durlak, J. T. (1987). A typology for interactive media. In M. L. McLaughlin (Ed.), *Communication yearbook 10* (pp. 743-756). Newbury Park, CA: Sage.

Dutton, W. H., Kovaric, P., & Steinfield, C. (1985). Computing in the home: A research paradigm. *Computers and the Social Sciences, 1*(1), 5-18.

Egan, B. (1997). The role of wireless communications in the global information infrastructure. *Telecommunications Policy, 21,* 357-386.
Elasmar, M. G. (1995). The direct broadcast satellite industry in the U.S.: Development and economic concerns. *Journal of Broadcasting & Electronic Media, 39,* 200-214.
Elbert, B. R. (1997). *The satellite communication applications handbook.* Norwood, MA: Artech House.
European Commission. (1997a). *Building the European information society for us all: Final policy report of the High Level Expert Group.* Brussels: Author.
European Commission. (1997b). *Telematics for flexible and distance learning.* Brussels: Author.
Eveland, J. D., & Bikson, T. K. (1988). Work group structures and computer support: A field experiment. *ACM Transactions on Office Information Systems, 6,* 354-379.
Fields, A. (1994). Intelsat at a crossroads. *Law and Policy in International Business, 25,* 1335-1355.
Fischer, C. (1992). *America calling: A social history of the telephone to 1940.* Berkeley: University of California Press.
Frieden, R. (1997). Widespread deployment of wireless telephony: Business, legal, regulatory and spectrum challenges. *Telecommunications Policy, 21,* 451-460.
Frindte, W., & Köhler, T. (1999). *Internet communication.* Frankfurt: Peter Lang.
Frindte, W., Köhler, T., Stauche, H., & Suckfüll, M. (1998). *State-of-the-art report: Internet based teaching and learning.* Brussels: European Commission.
Fulk, J. (1993). Social construction of communication technology. *Academy of Management Review, 36,* 921-950.
Fulk, J., Schmitz, J., & Steinfield, C. (1990). A social influence model of technology use. In J. Fulk & C. Steinfield (Eds.), *Organizations and communication technology* (pp. 117-140), Newbury Park, CA: Sage.
Fulk, J., & Steinfield, C. (Eds.). (1990). *Organizations and communication technology.* Newbury Park, CA: Sage.
Galegher, J., Kraut, R. E., & Egido, C. (Eds.). (1990). *Intellectual teamwork: Social and technological foundations of cooperative work.* Hillsdale, NJ: Lawrence Erlbaum.
Gandy, O. (1993). *The panoptic sort: A political economy of personal information.* Boulder, CO: Westview.
Garnsey, E. (1998). The genesis of the high technology milieu: A study in complexity. *International Journal of Urban and Regional Research, 22,* 361-377.
Gergen, K. J. (1991). *The saturated self: Dilemmas of identity in contemporary life.* New York: Basic Books.
Gershon, R. A. (1990). Intelsat: Global cooperation in an era of deregulation. *Telecommunications Policy, 14,* 249-259.
Gershon, R. A., & Kanayama, T. (1995). Direct broadcast satellites in Japan: A case study in government-business partnerships. *Telecommunications Policy, 19,* 217-231.
Gordon, G., & Morgan, W. L. (1993). *Principles of communication satellites.* New York: John Wiley.
Graham, S., & Marvin, S. (1996). *Telecommunications and the city: Electronic spaces, urban places.* London: Routledge.
Grudin, J. (1989). Why groupware applications fail: Problems in design and evaluation. *Office: Technology and People, 4,* 245-264.
Hampton, K. N., & Wellman, B. (1999). Netville online and offline: Observing and surveying a wired suburb. *American Behavioral Scientist 43*(3), 475-492.
Harasim, L., Hiltz, S. R., Teles, L., & Turoff, M. (1995). *Learning networks: A field guide to teaching and learning online.* Cambridge: MIT Press.
Hart, A. (1998). *Teaching the media.* Mahwah, NJ: Lawrence Erlbaum.
Harter, S. (1992). Psychological relevance and information science. *Journal of the American Society for Information Science, 43,* 602-615.
Hawkins, R., Wiemann, J. M., & Pingree, S. (Eds.). (1988). *Advancing communication science: Merging mass and interpersonal processes.* Newbury Park, CA: Sage.

Haythornthwaite, C., & Wellman, B. (1998). Work, friendship and media use for information exchange in a networked organization. *Journal of the American Society for Information Science, 46,* 1101-1114.
Hegarty, M., Phelan, A., & Kilbridge, L. (1998). *Classrooms for distance teaching and learning: A blueprint.* Leuven, Belgium: Leuven University Press.
Hiltz, S. R., & Turoff, M. (1993). *The network nation: Human communication via computer* (Rev. ed.). Cambridge: MIT Press.
Hudson, H. E. (1997). *Global connections: International telecommunications infrastructure and policy.* New York: Van Nostrand Reinhold.
Hughes, T. P. (1989). *American genesis: A century of invention and technological enthusiasm, 1870-1970.* New York: Penguin.
Issing, L. J., & Klimsa, P. (1995). *Information and learning with the help of multimedia.* Weinheim: Psychologie Verlags Union.
Ito, Y. (1981). The "Johoka Shakai" approach to the study of communication in Japan. *Keio Communication Review, 1,* 13-40.
Johansen, R., Vallee, J., & Spangler, K. (1979). *Electronic meetings: Technical alternatives and social choice.* Reading, MA: Addison-Wesley.
Jones, S. G. (Ed.). (1998). *Cybersociety 2.0: Revisiting computer-mediated communication and community.* Thousand Oaks, CA: Sage.
Katsh, M. E. (1995). *Law in a digital world.* New York: Oxford University Press.
Katz, J. E., & Aspden, P. (1998). Internet dropouts in the USA: The invisible group. *Telecommunications Policy, 22,* 327-339.
Kawalek, J. (1996). *Unterricht am Bildschirm.* Frankfurt: Peter Lang.
Kiesler, S. B. (Ed.). (1996). *Cultures of the Internet.* Mahwah, NJ: Lawrence Erlbaum.
Kiesler, S. B., Siegel, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist, 39,* 1123-1134.
Kling, R. (1980). Social analyses of computing: Theoretical orientations in recent empirical research. *Computing Surveys, 12*(1), 61-110.
Kling, R. (1999). What is social informatics and why does it matter? *D-Lib Magazine* [On-line], *5*(1). Available Internet: http://www.dlib.org/dlib/january99/kling/01kling.html
Kling, R., & Scacchi, W. (1982). The web of computing: Computer technology as social organization. *Advances in Computing, 21,* 1-90.
Kollock, P., & Smith, M. (Eds.). (1998). *Communities in cyberspace.* London: Routledge.
Koschmann, T. (1996). *CSCL: Theory and practice of an emerging paradigm.* Mahwah, NJ: Lawrence Erlbaum.
Kraut, R. E. (Ed.). (1987). *Technology and the transformation of white-collar work.* Hillsdale, NJ: Lawrence Erlbaum.
Kraut, R. E., Patterson, M., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being. *American Psychologist, 53,* 1017-1031.
Laurel, B., & Mountford, S. J. (1990). Introduction. In B. Laurel & S. J. Mountford (Eds.), *The art of human-computer interface design* (pp. xi-xvi). Reading, MA: Addison-Wesley.
Lea, M. (Ed.). (1992). *Contexts of computer-mediated communication.* New York: Harvester Wheatsheaf.
Lea, M., & Spears, R. (1991). Computer-mediated communication, de-individuation and group decision making. *International Journal of Man-Machine Studies, 34,* 283-301.
Lehrer, R. (Ed.). (1992). New directions in technology-mediated learning [Special issue]. *Educational Psychologist, 27*(3).
Levy, P. (1997). *Cyberculture.* Paris: Éditions Odile Jacob.
Lieberman, D. (1992). The computer's potential role in health education. *Health Communication, 4,* 211-225.
Lievrouw, L. A. (1998). Our own devices: Heterotopic communication, discourse and culture in the information society. *Information Society, 14,* 83-96.

Lievrouw, L. A., & Finn, T. A. (1990). Identifying the common dimensions of communication: The communication systems model. In B. D. Ruben & L. A. Lievrouw (Eds.), *Mediation, information, and communication: Information and behavior, vol. 3* (pp. 37-65). New Brunswick, NJ: Transaction.

Ludlow, P. (Ed.). (1996). *High noon on the electronic frontier: Conceptual issues in cyberspace.* Cambridge: MIT Press.

Lyman, P. (1996). Is using a computer like driving a car, reading a book, or solving a problem? The computer as machine, text and culture. In M. A. Shields (Ed.), *Work and technology in higher education: The social construction of academic computing* (pp. 19-36). Hillsdale, NJ: Lawrence Erlbaum.

Machlup, F. (1962). *The production and distribution of knowledge in the United States.* Princeton, NJ: Princeton University Press.

Mansell, R. (1993). *The new telecommunications: A political economy of network evolution.* London: Sage.

Marghalani, K., Palmgreen, P., & Boyd, D. A. (1993). The utilization of direct satellite broadcasting in Saudi Arabia. *Journal of Broadcasting & Electronic Media, 42,* 297-314.

Markus, M. L. (1990). Toward a "critical mass" theory of interactive media. In J. Fulk & C. Steinfield (Eds.), *Organizations and communication technology* (pp. 194-218). Newbury Park, CA: Sage.

Markus, M. L. (1994). Electronic mail as the medium of managerial choice. *Organization Science, 5,* 502-527.

Marvin, C. (1988). *When old technologies were new: Thinking about electric communication in the late nineteenth century.* New York: Oxford University Press.

McAnany, E. G. (Ed.). (1983). *Distance education: Evaluating new approaches in education for developing countries.* Oxford: Pergamon.

McBride Commission. (1980). *Many voices, one world* (Report for UNESCO). London: Kogan Page.

McLuhan, M. (1964). *Understanding media: The extensions of man.* New York: Mentor.

Melody, W. H., & Mansell, R. E. (1983). The debate over critical vs. administrative research: Circularity or challenge. *Journal of Communication, 33*(3), 103-116.

Metz, J. (1995). CMC and the question of culture. *New Jersey Journal of Communication, 3*(1), 1-25.

Meyrowitz, J. (1985). *No sense of place.* New York: Oxford University Press.

Mody, B. (1987). Contextual analysis of the adoption of a communications technology: The case of satellites in India. *Telematics & Informatics, 4*(2).

Mood, T. A. (1995). *Distance education: An annotated bibliography.* Englewood, CO: Libraries Unlimited.

Morris, M., & Ogan, C. (1996). The Internet as mass medium. *Journal of Communication, 46*(1), 39-50.

Mueller, M. (1993). Universal service in telephone history: A reconstruction. *Telecommunications Policy, 17,* 352-369.

Murray, J. H. (1995). The pedagogy of cyberfiction: Teaching a course on reading and writing interactive narrative. In E. Barrett & M. Redmond (Eds.), *Contextual media.* Cambridge: MIT Press.

National Telecommunications and Information Administration. (1998, July 28). *Falling through the net II: New data on the digital divide* [On-line]. Available Internet: http://www.ntia.doc.gov/ntiahome/net2/falling.html

Newhagen, J. E., Cordes, J. W., & Levy, M. R. (1995). Nightly@nbc.com: Audience scope and the perception of interactivity in viewer mail on the Internet. *Journal of Communication, 45*(3), 164-175.

Noack, M. (1996). Schule im Internet: Die Datenbahn im Unterricht. *Die Deutsche Schule, 88,* 494-508.

Noble, D. F. (1998a). Digital diploma mills, part 1: The automation of higher education. *October, 86,* 107-117.

Noble, D. F. (1998b). Digital diploma mills, part 2: The coming battle over online instruction. *October, 86,* 118-129.

Nora, S., & Minc, A. (1980). *The computerization of society: A report to the president of France.* Cambridge: MIT Press..

O'Neill, D. K., Gomez, L. M., & Edelson, D. C. (1994). Collaborative hypermedia for the classroom and beyond: A year's experiences with the collaboratory notebook. In J. M. Haake (Ed.), *Proceedings of the CSCW '94 Workshop on collaborative hypermedia systems.* Chapel Hill: University of North Carolina Press.

Orlikowski, W. (1993). Learning from notes: Organizational issues in groupware implementation. *Information Society, 9,* 237-250.

Parsons, P. R., & Frieden, R. M. (1998). *The cable and satellite television industries.* Boston: Allyn & Bacon.

Pelton, J. N. (1995). *Wireless and satellite telecommunications: The technology, the market, and the regulations.* Upper Saddle River, NJ: Prentice Hall.

Pelton, J. N., & Howkins, J. (Eds.). (1988). *Satellites international.* New York: Stockton.

Pelton, J. N., & Snow, M. (Eds.). (1977). *Economic and policy problems in satellite communications.* New York: Praeger.

Perse, E. M., & Dunn, D. G. (1998). The utility of home computers and media use: Implications of multimedia and connectivity. *Journal of Broadcasting & Electronic Media, 42,* 435-456.

Ploman, E. (1984). *Space, earth and communication.* Westport, CT: Quorum.

Pool, I. de S. (1983). *Technologies of freedom.* Cambridge, MA: Harvard University Press.

Poole, M. S., & DeSanctis, G. (1990). Understanding the use of group decision support systems: The theory of adaptive structuration. In J. Fulk & C. Steinfield (Eds.), *Organizations and communication technology* (pp. 173-193). Newbury Park, CA: Sage.

Porat, M. U., & Rubin, M. R. (1977). *The information economy* (OT Special Publication 77-12; 9 vols.). Washington, DC: U.S. Department of Commerce, Office of Telecommunications.

Poster, M. (1990). *The mode of information: Poststructuralism and social context.* Chicago: University of Chicago Press.

Powell, J. T. (1985). *International broadcasting by satellite.* Westport, CT: Quorum.

Rafaeli, S. (1988). Interactivity: From new media to communication. In R. Hawkins, J. M. Wiemann, & S. Pingree (Eds.), *Advancing communication science: Merging mass and interpersonal processes* (pp. 124-181). Newbury Park, CA: Sage.

Rafaeli, S., & Sudweeks, F. (1997). Networked interactivity. *Journal of Computer Mediated Communication* [On-line], *2*(4). Available Internet: http://jcmc.ascusc.org/vol2/issue4/rafaeli. Sudweeks.html

Reeves, B., & Nass, C. (1996). *The media equation: How people treat computers, television, and new media like real people and places.* Stanford, CA: Stanford University, Center for the Study of Language and Information.

Reid, E. M. (1991). Electropolis: Communication and community on Internet relay chat. *Intertek, 3*(3), 7-13.

Rheingold, H. (1993). *The virtual community: Homesteading on the electronic frontier.* Reading, MA: Addison-Wesley.

Rice, R. E. (1992). Contexts of research on organizational computer-mediated communication: a recursive review. In M. Lea (Ed.), *Contexts of computer-mediated communication* (pp. 113-144). New York: Harvester Wheatsheaf.

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., & Associates. (1984). *The new media: Communication, research, and technology.* Beverly Hills, CA: Sage.

Rice, R. E., & Holmes, M. E. (1996, April). *Research themes of the Communication and Technology Division of the International Communication Association, derived from the conceptual structure of conference paper titles.* Unpublished manuscript, Rutgers University and University of Utah.

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

Richharia, M. (1999). *Satellite communication systems.* New York: McGraw-Hill.
Roberts, K. H., & Grabowski, M. (1996). Organization, technology and structuring. In S. R. Clegg, C. Hardy, & W. R. Nord (Eds.), *Handbook of organization studies* (pp. 409-423). Thousand Oaks, CA: Sage.
Rogers, E. M. (1986). *Communication technology: The new media in society.* New York: Free Press.
Rogers, E. M. (1994). *A history of communication study: A biographical approach.* New York: Free Press.
Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.
Rogers, E. M. (1999). Anatomy of the two subdisciplines of communication study. *Human Communication Research, 25,* 618-631.
Rudy, I. (1996). A critical review of research on electronic mail. *British Journal of Information Systems, 4,* 198-213.
Saracevic, T. (1975). Relevance: A review of a framework for thinking on the notion of information science. *Journal of the American Society for Information Science, 26,* 321-343.
Saxenian, A. (1994). *Regional advantage: Culture and competition in Silicon Valley and Route 128.* Cambridge, MA: Harvard University Press.
Schamber, L. (1994). Relevance and information behavior. In M. E. Williams (Ed.), *Annual review of information science and technology* (Vol. 29, pp. 3-48). Medford, NJ: Information Today.
Schement, J. R. (1995). Beyond universal service: Characteristics of Americans without telephones, 1980-1993. *Telecommunications Policy, 19,* 477-485.
Schement, J. R., & Lievrouw, L. A. (1984). A behavioural measure of information work. *Telecommunications Policy, 8,* 321-334.
Schramm, W. (1977). *Big media, little media: Tools and technologies for instruction.* Beverly Hills, CA: Sage.
Shields, P., & Samarajiva, R. (1993). Competing frameworks for research on information-communication technologies and society: Toward a synthesis. In S. A. Deetz (Ed.), *Communication yearbook 16* (pp. 349-380). Newbury Park, CA: Sage.
Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications.* New York: John Wiley.
Silverstone, R., & Hirsch, E. (Eds.). (1992). *Consuming technologies: Media and information in domestic spaces.* London: Routledge.
Sims, R. (1997). Interactivity: A forgotten art? *Computers in Human Behavior, 13,* 157-180.
Slack, J. D., & Fejes, F. (Eds.). (1987). *The ideology of the information age.* Norwood, NJ: Ablex.
Spears, R., & Lea, M. (1994). Panacea or panopticon? The hidden power in computer-mediated communication. *Communication Research, 21,* 427-459.
Sproull, L. S., & Kiesler, S. B. (1991). *Connections: New ways of working in the networked organization.* Cambridge: MIT Press.
Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research, 7*(1), 111-134.
Steuer, J. (1995). Defining virtual reality: Dimensions determining telepresence. In F. Biocca & M. R. Levy (Eds.), *Communication in the age of virtual reality* (pp. 33-56). Mahwah, NJ: Lawrence Erlbaum.
Stone, A. R. (1995). *The war of desire and technology at the close of the mechanical age.* Cambridge: MIT Press.
Sudweeks, F., McLaughlin, M. L., & Rafaeli, S. (Eds.). (1998). *Network and netplay.* Cambridge: MIT Press.
Sundar, S. S., Narayan, S., Obregon, R., & Uppal, C. (1998). Does Web advertising work? Memory for print vs. online media. *Journalism & Mass Communication Quarterly, 75,* 822-835.
Trevino, L. K., & Webster, J. (1992). Flow in computer-mediated communication: Electronic mail and voice mail evaluation and impacts. *Communication Research, 19,* 539-573.
Turkle, S. (1984). *The second self: Computers and the human spirit.* New York: Simon & Schuster.
Turkle, S. (1995). *Life on the screen: Identity in the age of the Internet.* New York: Simon & Schuster.

Twidale, M. B., & Nichols, D. M. (1999). Computer supported cooperative work in the information search and retrieval process. In M. E. Williams (Ed.), *Annual review of information science and technology* (Vol. 33, pp. 259-319). Medford, NJ: Information Today.
Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. *Communication Research, 19,* 52-90.
Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23,* 3-43.
Webster, F. (1995). *Theories of the information society.* London: Routledge.
Wellman, B., Salaff, J., Dimitrova, D., Garton, L., Gulia, M., & Haythornthwaite, C. (1996). Computer networks as social networks: Collaborative work, telework, and virtual community. *Annual Review of Sociology, 22,* 213-238.
Williams, F., Rice, R. E., & Rogers, E. M. (1988). *Research methods and the new media.* New York: Free Press.
Winner, L. (1977). *Autonomous technology: Technics out-of-control as a theme in political thought.* Cambridge: MIT Press.
Wright, D. (1998). The European Commission and the satellite industry combine forces to open markets. *Telecommunications Policy, 22,* 267-272.