Introduction

People rarely go through the day without encountering texts. These texts include the mundane (e.g., receipts, to-do lists, bills) and the specialized (e.g., progress reports, procedures manuals, patient histories). All help form the basis of our social and professional activities by providing us with structured information needed to act in the world. Texts clarify and structure tasks in which they are used, which is to say that they “mediate” (Hutchins, 1997 p. 338) and become part of the environments in which we carry out physical and cognitive activities. Treatment rooms, classrooms, and offices are the names that describe the configurations of technology, texts, and people in those spaces. We learn to participate in these text-rich settings easily enough, as we become more aware of the activities they mediate. Imagine a simple example of buying concert tickets at a ticket counter. Based on the cues that we read in the design of the ticket counter, we know how to complete a transaction (i.e., where to speak, stand, put our money). Also, on the ticket counter are price lists, accepted forms of payment, and concert listings. The information drawn from these texts further structures and clarifies our interaction with the ticket seller.

Texts form part of what Hollan, Hutchins, and Kirsh (2000, p. 181) call a “cognitive architecture,” a configuration of resources and relationships that provide cognitive assistance to those who carry out work in the environment where the architecture is located. A cognitive architecture consists of supports for physical and cognitive work, resources that extend and coordinate the work of individuals. For example, technologies like personal computers and personal digital assistants extend a person’s access to information. Forms help users transform their knowledge and observations into familiar information.

Cognitive architectures of text and technology can be quite broad, mediating the work of an entire organization. The architecture can also be local, mediating the work of an individual at his or her desk. Some cognitive architectures are

stable in that they are built up over time. Others are emergent in that they accommodate activities that require an ad hoc arrangement of resources.

As work environments become more richly laminated with texts and information technologies, what burdens are placed on professionals who must learn to contribute to the discursive activities they mediate? This question forms the basis of the inquiry running throughout the book. It is a line of inquiry that stems from a historical observation that texts have become the heart of broadly social, organized activities. In spite of the broad institutional roles texts play, writing is still considered a highly individualized activity. This perception is further reinforced by writing technologies (e.g., the *personal* computer), but often overlooked in organizational practices such as writing review, where texts "graduate" from individual to organizational status. The point that remains unclear is how the text-mediated structure of an organization emerges in texts and how newcomers learn to recognize and produce it.

Many professionals must become effective communicators in order to participate in text-rich and technology-rich work environments. They must learn to use and produce the texts that mediate organizational activities. As the work of many fields becomes increasingly mediated by information technology, more responsibility falls to professionals in those fields to contribute to the textual architecture that mediates organizational activity. This move toward greater textuality has proven problematic, because it requires that the work of many different professions be partly redefined as communication work, even though professionals in those fields (e.g., engineering) do not see themselves as writers. Some professions are beginning to recognize the importance that text plays in structuring their work, but are slow to provide structured opportunities for professionals to become better writers. The paradoxical relationship between the recognized need for training in writing and the often remarkably poor execution of writing review practices (see Bernhardt, 2003), underscores the need to examine the situation and evaluate our ability to respond. If we step back and examine why many professions have become text-oriented, we can better understand the problems associated with preparing professionals to use and contribute to this textual architecture. When we can see the variety of relationships supported by texts, we will be better able to envision new and better ways to promote enculturation through writing review.

THE NEED FOR TEXTUAL MEDIATION

In 1992, Robert Reich observed a change in the American workforce as it moved away from a model of problem solving to one of problem solving *and* problem creation. In the problem-solving model, the dominant mode of production was manufacturing and craftsmanship. Companies identified consumer needs and met them. Profitability was tied to a company's ability to identify consumer need and to its capacity for satisfying that need. In the latter part of the

20th century, this business model shifted away from satisfying a narrow range of customer needs to addressing a more diverse range of needs. More importantly, the business model shifted away from satisfying *current* customer needs to creating new customer needs.

The shift in labor practices is important as a backdrop for discussing a change in the kind of labor that is valued in this new economy. Instead of privileging craft-based knowledge, the modern economy privileges knowledge related to the articulation and communication of customer needs, as well as that related to the coordination of organizational efforts to meet those needs. The knowledge and ability to fashion and articulate new consumer needs is as valued, if not more so, as knowledge associated with the ability to satisfy those demands. Yet as Reich points out, knowledge is difficult to retain. As people leave companies, they take their knowledge with them, a problem that has led to renewed interest in the power of writing and text to commodify knowledge, to give it a physical, shareable form. For this reason, among others, the 20th century saw the rise of a new kind of professional, one that Reich calls the "symbol analyst," who "[simplifies] reality into abstract images that can be rearranged, juggled, experimented with, communicated to other specialists, and then, eventually, transformed back into reality" (1992, p. 178). In other words, many professionals have become writers.

Modern workplaces are environments that have, over time, become suffused with texts that clarify and structure the work of colleagues within a division, across divisions, and across organizations. One explanation for the prevalence of texts and their increasingly prominent roles is the contribution they make to the practice of systematic management (see Douglas, 1986; Gee, Hull, and Lankshear, 1996; Yates, 1993). Texts allow greater control over, and organization of, resources.

A related benefit of text is that it allows knowledge to be distributed. Using texts, people can work independently and apply information from texts to a variety of work activities. While allowing some degree of freedom, texts also constrain work by creating and reinforcing conventional uses of information, which in turn reinforce particular working relationships among colleagues (see Henderson, 1991; Winsor, 1996, 2001). For example, a text may contain specifications for a product design, including CAD (computer aided design) drawings that are only comprehensible and changeable by people with knowledge of CAD. Texts with CAD create a necessary information-sharing relationship between a group of users and people who can read and change CAD drawings. However, not all work relationships are routine enough to be supported by texts with fixed form. Some relationships emerge as situations warrant, and the texts that mediate those relationships serve an entirely different and somewhat unpredictable purpose.

Not surprisingly, organizations generate voluminous amounts of text for a variety of specialized purposes. In common practice, these texts become

connected to routine work activities and emerge as genres. Genres splinter and become more specialized, acquiring supplemental texts that support ancillary work activities. Together, these genre sets (Yates and Orlikowski, 1994, 2002) mediate more complex, coordination-dependent work activities. One important implication is that writing is a way that professionals participate in an organization's discursive activity.

Organizational work practices are abstractions that describe the work of individuals whose efforts are coordinated, in part, by the texts they all produce and share. It is a fact of many professions that people work with others more often than they work in isolation. They work for complex organizations that carry out tasks impossible for a single person to do alone. For example, monitoring industry compliance with air quality standards is far too complex for a single environmental engineer. Likewise, managing the public relations and the donor relations activities for a large private university is more likely to be the work of a group than a single person. More often than not, these collective work practices are mediated by expansive constellations of texts (see Devitt, 1991).

The coordination required to carry out these complex activities implies cooperation and activity that extends beyond what a single person does at his or her desk. Complex work activities require people to offload cognitive effort to other people, texts, and technologies in the environments where they work. Work that is offloaded to texts, inputted to computer files, and shared with colleagues, is transformed and structured such that it can be used in pursuit of other related activities. Hutchins' (1995) example of the migration of information across representational states shows how observations of landmarks are transformed into bearings, which are recorded as numerals that can be transferred to a nautical chart. Similar transformations happen in other organizations as information passes through different technological interfaces. The texts and technologies of text enable the coordination out of which collective action arises.

Texts help structure work activity in a number of ways. The first is that the design of a text, especially one based on organizational genres, implies a social contract between writers and readers. A text may have formatting that divides information into labeled sections that define both the kind of information required and the relationships between pieces of information (Bazerman, 2000). Blank fields can indicate what kind of information should be collected and how that information should be represented (e.g., the conventions for reporting traffic scene information on accident reports). Texts can contain a wealth of information in structure alone. Their design can turn the complex task(s) that they mediate into simple tasks that people are exceedingly good at (e.g., filling in blanks, following directions, recognizing patterns). Texts with these fixed, designed forms embody the experiences and motivations of those who designed them. By learning to use these texts, one learns the behaviors and social responsibilities that come with participating in a work activity supported by such texts (see Latour, 1995). Still, knowledge of how to use a text is not wholly embedded in the design.

Texts are also embedded in rule-governed social settings, and within these settings, texts are embedded in technological contexts. Readers and writers access their texts through a variety of technological interfaces (e.g., paper, databases, word processors) that portray the texts in various states of completion, approval, comprehensiveness, and authority. Consider the difference between seeing paragraphs of text written in a personal e-mail versus the same paragraphs printed on company letterhead. In the former medium, the paragraphs may appear more tentative and open for discussion. In the latter, the paragraphs may appear more fixed and final. Uses of those texts are shaped as much by their content as by the social and technological contexts in which readers encounter them. Each reader has a responsibility to understand the social contexts in which texts are used and the technological contexts through which texts are accessed. Only with this information can readers decide on the best way to contribute to these activities discursively.

FIXED AND FLUID INFORMATION IN TEXTS

Describing the impact of technology on writing and information, David Levy notes that technology has ensured a certain degree of fixity and fluidity in information (2001, p. 38). While some media theorists suggest that modern information technology is leading to a postmodern condition of unbound, acontextual information (see Bolter, 2001), observations of information use in various settings reminds us that it is always tied to very concrete activities (Brown and Duguid, 2000; Sellen and Harper, 2001) that require fixed information. Yet even routine activities defy expectations. Routine activities are also situated and often require information to be fluid and adaptable (Suchman, 1987).

The desire for fixed and fluid information has resulted in parallel trends of technology development that help reinforce our perceptions of information as fixed or fluid. Throughout the 19th and 20th centuries, people recognized the importance of information and the effect of information (or lack of) on work practice. Driven by a need to manage increasingly complex work activities, companies became early adopters of technologies like copy machines, typewriters, carbon paper, and filing cabinets (see Yates, 1993, pp. 21-64), all of which helped give knowledge a representational form. The resulting fixed nature of information helped mediate work relationships by regularizing them, making them systematic, as notable in the control of assembly-line work (Gee, Hull, and Lankshear, 1996), the management of railroads (Yates, 1993, pp. 101-158), and the practice of providing medical care (Schryer and Spoel, 2005).

The desire for fixed information also coincided with a desire for more fluid information. While a typewriter may have made it possible to record information, set policies and standard procedures, the typewriter also made it possible to

change those texts and redistribute the results more easily. Modern information technologies, like personal digital assistants and cellular phones, also make information fluid and changeable to accommodate situation-specific, ad hoc work practices (see Churchill and Munro, 2001; Gillette, 2001) and to accommodate work practices that rely on continually updated information (see Sellen and Harper, 2001, pp. 78-105).

Another way to summarize the difference between fixed and fluid information is in the kind of coordination they facilitate. Fixed information encourages coordination across an organization by holding individuals to standards set forth in a corpus of texts acting as an organization's collective knowledge (Devitt, 1991). Yet all organizational activity is comprised of much smaller, more local acts of coordination—people working with each other and building coordination through interaction (Medway, 1996). These situated work practices rely on fluid information.

Two observations follow from this discussion. The first is that the technologies we surround ourselves with make information fixed and fluid in ways that accommodate specific interactions between users. Learning to produce texts in an organizational context requires writers to recognize the need for fixed and fluid information. Based on that information, writers must choose representational technologies that afford the production of such information while still allowing them to fulfill personal motivations for writing. The second observation is that many work relationships require information to be fixed and fluid. Because of the nature of the work relationship, only information of a certain type can provide beneficial mediation.

Writing review is a work practice that illustrates the complexity of text use. At once, writing review is an organizationally sanctioned activity in which reviewers assess a text's appropriateness as a fixed information object. At the same time, the writing review is a point of enculturation. The reviewer is a more experienced peer who must work with the writer to develop an appropriate textual contribution. In this sense, the text is a fluid information object, a contribution that is under development.

A cognitive architecture that supports the enculturation of professionals to their text-rich environments will require the presence of tools for representing texts as fixed (to show the relationship to the work of the organization) and fluid (to show a text's development as part of a writer's literate participation). In writing review, the most common tool, paper, does not show texts as fluid information objects, thus cutting off opportunities for effective cooperation between writers and reviewers. The problem is compounded by the fact that reviewers do not see their role as pedagogical. Furthermore, writing reviews tend to occur late in a writing cycle, when writers are more inclined to think that their texts are finished. In practice and in appearance, reviewed texts appear to merit evaluation as fixed information objects, even if the texts reflect writers' difficulty in constructing appropriate literate contributions.

APPROPRIATE TECHNOLOGICAL SUPPORT FOR REVISION AND REVIEW

Initially, learning to write requires guidance from more experienced practitioners who know how texts contribute to the coordination of organizational work practices. One of the more common methods for providing this guidance is writing review, in which supervisors, subject matter experts, and even peers read a text with the dual aim of assessing its "fit" as a fixed information resource (Paradis, Dobrin, and Miller, 1985, p. 293) and assisting writers in developing an awareness of organizational needs that translate into specific writing practices. To support these two goals, the writers and reviewers must treat reviewed texts as fixed manifestations of organizational genres that will successfully or unsuccessfully meet user expectations. A reviewer can best fulfill these supervisory responsibilities when treating the text as an object of fixed information. The review participants must also treat the text as an object that represents a stage in a writing process, where text is under negotiation and incomplete. One aim of writing review is for writers and reviewers to work cooperatively on a text so that the writer learns by acting with a more experienced practitioner. The reviewer can best serve this pedagogical role when treating the reviewed text as a representation of a stage in an ongoing writing process.

There are two problems in thinking about the text as both a fixed and a fluid information object. The first is that supervisory and pedagogical reviewer roles are built around contrasting motives. Where the supervisor's motive might be to take responsibility for a text and to alter it to fit organizational needs, a reviewer providing pedagogical assistance must be willing to work with what the writer is trying to accomplish. Many reviewers will find it difficult to move between these motives because few are trained as professional writers, and fewer are trained to offer any kind of writing instruction (Schriver, 1989).

The second and more serious problem is a lack of an appropriate organizational and technological structure to support review with both aims. One's ability to perform a task is based in part on having the right environment in which to perform it (Hutchins, 1995, p. 169). Given how quickly the work of many professions is being redefined as communication-related, it is not surprising that some organizations lack an appropriate structure to support training in writing. It is clear, however, that the arrangement of resources and conventional practice of writing review can have an influential effect on the kinds or writer/reviewer relationships that can form.

In a writing review, participants will ideally examine the text from the perspectives of organizational need and writer intent. These perspectives must be brought into conversation so that writers can make connections between their writing and the work of the organization at large, between knowing what they want to say and knowing what the organization needs them to say. However, a number of other factors make it difficult for reviewers and writers to engage in an

equitable discussion of a text's fixed and fluid qualities. For one, writers and reviewers often lack enough common ground to coordinate the organizational and practice-oriented perspectives. The writers often lack the reviewers' enculturated experience, making it difficult for them to envision the relevant organizational needs for a text. For the reviewers, writing for the organization is a process that has become so natural that it is generally tacit (Polanyi, 1974; Ryle, 1949). As a result, reviewers spent little time talking about writing practices and more time fiddling with sentence level details and idiosyncrasies of form (van der Geest and van Gemert, 1997, pp. 437-441). This kind of review is further encouraged by common review practices, such as writers waiting to initiate review until they feel their texts are finished, rather than submitting rough drafts that might reveal information about writing process. An argument developed in this book is that this kind of review can arrest a writer's ability to participate in a discourse community organized around textual contributions.

Reviews often occur between participants who do not consider themselves writers, at a point in the writing process when writers consider their texts finished. Reviews occur in settings that are isolated from the complex organizational work activities supported by the text(s) reviewed. Reviews are conducted in technological contexts that contain only static images of a writer's composing practices. Under these conditions, it will be easier to critique texts as fixed information objects, because that is how they appear, and that is how the reviewer/writer relationship is operationally defined as a routine practice.

As a point of contrast, consider that a writing classroom has an altogether different configuration of resources that does support a teacher/student relationship focused on a discussion of writing process. At least part of the time, writers compose in class. Teachers see multiple drafts. Review is a frequent and iterative practice, and there is no dominant set of organizational constraints that drive a student's writing process. The ideal role for reviewers is instructional. In fact, Katz (1998b) has suggested "the supervisor's role as reviewer or editor may be one of the most significant mechanisms for *teaching* [emphasis added] newcomers how to write appropriately in the organization" (p. 170).

While the motivation for providing instructional support may exist, many reviewers lack appropriate support for providing instruction. A lack of access to the writer at the point of composition is one such constraint. With appropriate support, however, reviewers may be better able to offer pedagogical insight on work that newcomers produce. Classroom resources are set up to facilitate cooperative work and to present texts in their fluid, transitional forms. Pieces of a similar cognitive architecture are often conspicuously absent in many organizational settings. One noticeable manifestation of this problem is in the technological support for writers and reviewers.

By changing the arrangement and availability of resources that support review, it is possible to create different opportunities for interaction between

writers and reviewers. Would writing review in organizations be different if the available resources were reconfigured to encourage cooperation, to provide a picture of text in a more fluid form? How would the character of review be different if the means for conducting it more directly accommodated the dual motives of improving texts and improving writing?

This book considers the answers to the above questions by offering an analysis of writers and the different cognitive architectures in which they work toward enculturation. The book addresses the question of how writers become enculturated to their writing-intensive work duties through writing review, a practice that differs between organizations because of the nature of resources available to support it. The book also considers the role that text and the technologies of text play in supporting and encouraging particular writer/reviewer relationships and specific writing review practices. Writing review is a practice in which newcomers learn about the various demands on their texts, and it is also a site at which those demands are played out. By studying how the roles between writers and reviewers are sustained by, and dependent on, the local cognitive architectures of review, we will come away with a model for thinking about the influence of information technology on review and with a model for planning new technologies.

To facilitate this analytic comparison, this book compares the outcomes of two different configurations of technology to support writing review in two different kinds of organizations. The analysis focuses on the importance of an adequate cognitive architecture to support relationships between writers and reviewers that lead to a better articulation of how texts and organizational activity are co-constituted. The book also offers a methodology for conducting research on technological mediation that derives from examinations of local writing review practices.

Specifically, this book is built around a specific set of hypotheses.

- In organizations where there is an appropriate and accommodating cognitive architecture—one that supports cooperative discussion of writing process and organizational demands—there will be less need for mediational changes.
- In organizations where this architecture is not in place, where technologies reinforce the invisibility of writing, changes to the technological configuration of writing review space will help create conditions for enculturation.

Discussion of these issues will allow us to understand what it takes for professionals to learn to participate in the literate activities of complex organizations that are increasingly text-dependent. We will also be able to discuss, more directly, the role of information technology as it pertains to enculturation.

CHAPTER OUTLINE

Together with Technology is a book about the mediation provided by information technology in writing review. It is a book that compares how people in writing professions and those not typically associated with writing learn to become practicing writers. The book also considers what can be learned about the cognitive architectures that support writing review. How do both kinds of organizations restructure writing review practices when the technologies mediating that practice are changed? Where this book differs from other treatments of writing review and enculturation is that it examines the social and mediating role of technology.

By reading this book you will come away with an understanding of:

- How text and other information technologies contribute to the creation and maintenance of local cognitive architectures.
- Why enculturation and enculturation support for professionals who write is necessarily tied to an analysis of the technology.
- How technological mediation helps create opportunities for people to interact with each other and with existing resources to better facilitate enculturation.
- How observations of these writing review practices can inform the development of information technologies to support writing review.

Chapter 1 covers the evolving role of text and textual technologies in modern organizations by tying in studies of genre and systematic management to theories of distributed cognition. The central argument is that texts of all stripes and technological forms directly contribute to organizational coordination and thus play prominent roles in the course of daily work activities.

Chapter 2 explores the practice of writing review in more depth, considering the organizational functions that it serves. The chapter covers the practices by which writing reviews are typically conducted, as well as two goals for writing review that are based on Susan Kleimann's (1993) work. The first goal is to bring the text into coordination with the needs of the organization. The second goal is to assist writers in a revision of their work, both to improve the text and to help writers see how to contribute to the organization via writing. Discussion of these issues draws on numerous studies of writing review that show how the practice itself is a site of enculturation where reviewers scaffold writers' participation in organizational networks of activity. Coordination is shown to be an essential element of enculturation, one that requires professionals to develop an understanding of how to interact with other people, resources, and texts.

Chapter 3 narrows the discussion by looking more directly at the local cognitive architectures of people and material resources that typically support writing review. Drawing on information about enculturation, this chapter covers how

writers and reviewers seek coordination and interactively engage in coordination-building activities. The ability to achieve coordination is constrained and afforded by technology and other available resources. The chapter then moves on to technologies and resources that are typically available during writing review, where it is suggested why some types of coordination needed to carry out the dual motives of writing review are more difficult to achieve. Textual replay is introduced as a technology that offers a new kind of mediation to facilitate coordination that could result in learning.

Chapter 4 sets up the study reported in the book and provides details about the analysis upon which the discussion of the book is based. The method for analyzing changes in writing review practices is derived from work by Spinuzzi (2003). This approach involves breaking down revision and review into the general aims of those practices (e.g., "improve the writer's skills"), the actions that constitute those activities (e.g., "propose revisions," "discuss options"), and the operations by which those actions are carried out (e.g., "questioning," "rephrasing"). The impact of technological mediation will be observed as differences in the increased or decreased presence of particular writing review activities and in the different ways that those activities are operationalized.

This chapter also provides information about the organizational sites of study (city desk at a newspaper, environmental engineering agency, university donor relations office, university media relations office). For each organization, the character, motivation, and support for writing review are topics of discussion.

Chapter 5 summarizes the differences between the writing review sessions that were mediated by text only and those that were mediated by a combination of text and textual replay. The purpose of the chapter is to point to the ways in which writers and reviewers at all of the organizational sites interacted similarly in the text mediated reviews compared to their actions in writing review mediated by text and textual replay. By comparing text mediation to textual replay + text mediation, readers can speculate how consistent differences in review practices could be attributed to features of the texts, textual replays, and to the manner in which both were used during the reviews.

Organizations like the newspaper and the university media relations offices were practice-oriented in that the aim of the reviews was to support the improvement of writing practices. Organizations like the environmental engineering agency and the university donor relations office were artifact-oriented in that the focus of the review sessions was on coordinating the writer's text (the knowledge artifact) with other texts in the organization and with the larger overarching goals of the organization. Chapters 6 and 7 focus more specifically on the writing review practices of the practice-oriented and artifact-oriented organizations, respectively. The purpose of these chapters is to draw a distinction between two types of organizations distinguished by the character of the existing cognitive architecture for supporting writing review.

These chapters also contain a discussion about how the review practices in practice-oriented and artifact-oriented organizations differed and how the review participants appeared to make use of the opportunities for interaction presented by the text and textual replay. In many cases, the textual replay afforded different kinds of interaction that allowed the writers and reviewers to achieve levels of coordination that were not present in the writing reviews mediated by text alone.

Chapter 8 concludes the book by looking at the ways the textual replay was used in the writing reviews across the different organizations. These observations are used as evidence for theorizing the development of a textual replay technology that will support the multiple purposes of writing review more directly. The chapter concludes with a discussion of what worked well and poorly about textual replay and with a way to turn these observations into design suggestions for building a textual replay technology that is better suited to reviews across organizations.

More generally, Chapter 8 is a discussion of how the research reported in this book points to the need for studying local text-mediated practices as the basis for theorizing and developing new information technology for a variety of organizational practices, not just writing review. Scholars of technical and professional communication are ideally suited for this kind of research.